

Appendix B
Noise RTC Memorandum

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MEMO

Date: April 15, 2024

To: Juliet Martin
Project Manager I
Circlepoint

From: Michael Thill
Principal Consultant
Illingworth & Rodkin, Inc.

**SUBJECT: 0 Seely Avenue Mixed-Use Project, San Jose, CA –
Responses to Noise Comments**

This memo summarizes Illingworth & Rodkin, Inc.'s (I&R) responses to the noise-related comments made by Adams Broadwell Joesph & Cardozo dated March 11, 2024.

Comment C-3.6

The DEIR Fails to Properly Document Baseline Ambient Noise Measurements

Response C-3.6

The comment questions the accuracy of the ambient noise measurements made by I&R because technical details (e.g., sound level meter settings, microphone height, equipment specifications, calibration records, and the use of field calibrators) were not summarized in the noise and vibration assessment.

A field noise study was conducted following the recommended noise measurement procedures presented in the California Department of Transportation's Technical Noise Supplement (TeNS Manual).¹ Per, the TeNS Manual Abstract, "This manual contains Caltrans noise analysis

¹ Caltrans. 2013. Technical Noise Supplement. September. Sacramento, CA: Environmental Program, Noise, Air Quality, and Hazardous Waste Management Office. Sacramento, CA.

procedures, practices, and other useful technical background information related to the analysis and reporting of highway and construction noise impacts and abatement. ...Except for some Caltrans-specific methods and procedures, most methods and procedures recommended in this document are in conformance with industry standards and practices. This document can be used as a stand-alone guide for highway noise training purposes or as a reference for technical concepts, methodology, and terminology needed to acquire a basic understanding of highway noise and construction noise-related issues.”

Noise measurements were made with Larson Davis Model 820 and LxT1 Integrating Sound Level Meters (SLMs) set at “slow” response. The SLMs were equipped with free field, prepolarized condenser microphones fitted with windscreens. The SLMs were calibrated prior to the noise measurements using a Larson Davis Model CAL200 acoustical calibrator. The response of the system was checked after each measurement session and was always found to be within 0.2 dBA. No calibration adjustments were made to the measured sound levels. The SLMs for the long-term noise measurements were secured to utility poles or trees at heights of 10-12 feet above the ground. The short-term noise measurements were made at a height of five feet above the ground. All instrumentation used during the noise survey met the requirements of the American National Standards Institute SI 4-1983 for Type I use. Calibration records of the equipment used during the noise survey are presented in Appendix A.

Comment C-3.15

The DEIR Fails to Account for Noise Impacts on New Sensitive Receptors as a Result of the Project

Response C-3.15

It is not customary to evaluate temporary construction noise on new sensitive receptors introduced during early phases of the project while the remaining phases of the project are completed. Early phase residents would be fully aware of the potential for annoyance due to temporary construction noise during later phases of the project, but this would not be considered a significant impact under CEQA. The applicable CEQA checklist question related to this comment is, “Would the project result in the generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?” The phrase, “in the vicinity of the project” means the area that is close to or around the project site, and does not mean the area encompassing the project site itself. Therefore, temporary construction noise was not evaluated at new sensitive receptors on the project site, but rather, the evaluation was limited to off-site receptors that were close to or around the project site following the CEQA guidance.

Comment C-3.16

Mitigation Measure NSE-1 Is Insufficient, and The DEIR Underestimates Construction Noise Levels, Further Undermining the Proposed Mitigation Measures

Response C-3.16

The intent of the measure requiring the construction of an eight-foot noise barrier along the northwest boundary of the site adjacent to residences was to reduce noise levels as much as reasonable outdoors where residents would be expected to congregate. The commenter agrees that an eight-foot noise barrier would achieve 5 dBA of noise reduction when the barrier effectively blocks the line of sight between the noise source and the receiver. This condition would occur when the noise source (i.e., heavy construction equipment) and receptor are located at the ground level. In the case of the credible worst-case noise levels predicted as part of the analysis, these noise level estimates assume the operation of the two loudest pieces of heavy construction equipment operating at the ground level. Heavy construction equipment would not operate at the upper floors of the Townhomes, Building A, or Building B. At the upper floors of these buildings, smaller and substantially less noisy tools would be used resulting in lower noise levels than those predicted in the noise and vibration assessment. The eight-foot temporary noise barriers were recommended to reduce noise levels at the ground floor of the adjacent residences, where residents may be expected to congregate outdoors. Other common outdoor activity areas of adjacent residential land uses are located in well shielded courtyards or within well shielded paseos that would only have a limited view of the construction site. While the eight-foot noise barriers would not reduce noise levels at the upper stories of the apartments facing the site, it was assumed that interior noise levels would be controlled by closing the windows.

With respect to the construction noise levels calculated as part of the noise and vibration assessment, both the noise levels from the “two loudest pieces of equipment per phase scenario” and the “all equipment per phase scenario” were calculated. The construction noise levels predicted under each of these scenarios were reviewed and compared, and were found to be within 0 to 1 dBA of each other in all cases but one. In the one case where noise levels varied, (i.e., the site preparation phase during the construction of project infrastructure), the difference in noise levels between the scenario involving the two loudest pieces of equipment per phase and all equipment per phase was up to 6 dBA (i.e., 84 dBA at 50 feet vs. 90 dBA at 50 feet). This unusual difference in predicted noise levels resulted because this phase would utilize up to 13 pieces of construction equipment. However, one cannot assume that all 13 pieces of construction equipment could physically operate at a distance of 50 feet from a receptor in such close proximity to one another. A more likely construction scenario is that the construction equipment during this particular phase is distributed throughout the entire site, thus leaving the noise from the closest construction equipment as the dominant noise source. The “two loudest pieces of equipment scenario” discussed above credibly represents construction noise levels emanating from the site and is a more accurate method for calculating construction noise levels based on observation at numerous construction sites.

(23-056)

Appendix A – Equipment Calibration Certificates

Certificate of Calibration and Conformance

Certificate Number 2020-209001

Instrument Model 820, Serial Number 1211, was calibrated on 14 Feb 2020. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO

Date Calibrated: 14 Feb 2020

Calibration due: 14 Feb 2022

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0445 / 0111	12 Months	4 Dec 2020	2019-208848

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

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 18 %

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.

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.

See "AS RECEIVED" data.
Tested with PRM828-2846

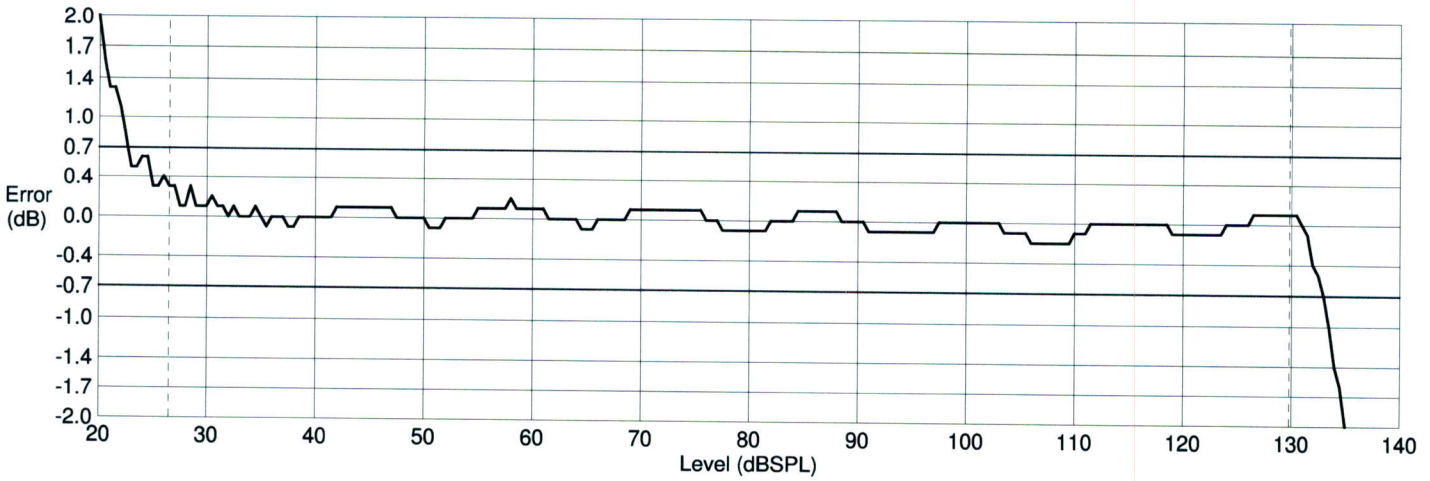
Signed: _____



Technician: Eric Olson

Sound Level Meter Model: 820A Serial Number: A1211 Log Linearity, Differential Linearity and Range Data

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's Log Linearity A-weighted slow response was then electrically tested using a 1kHz sine wave from 18.0 dB SPL to 138.0 dB SPL in 0.5 dB increments.



Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB
18.0	20.9	2.9	38.5	38.5	0.0	59.0	59.1	0.1	79.5	79.4	-0.1	100.0	100.0	0.0	120.5	120.4	-0.1
18.5	20.9	2.4	39.0	39.0	0.0	59.5	59.6	0.1	80.0	79.9	-0.1	100.5	100.5	0.0	121.0	120.9	-0.1
19.0	20.9	1.9	39.5	39.5	0.0	60.0	60.1	0.1	80.5	80.4	-0.1	101.0	101.0	0.0	121.5	121.4	-0.1
19.5	21.4	1.9	40.0	40.0	0.0	60.5	60.6	0.1	81.0	80.9	-0.1	101.5	101.5	0.0	122.0	121.9	-0.1
20.0	21.8	1.8	40.5	40.5	0.0	61.0	61.1	0.1	81.5	81.4	-0.1	102.0	102.0	0.0	122.5	122.4	-0.1
20.5	22.1	1.6	41.0	41.0	0.0	61.5	61.5	0.0	82.0	82.0	0.0	102.5	102.5	0.0	123.0	122.9	-0.1
21.0	22.3	1.3	41.5	41.5	0.0	62.0	62.0	0.0	82.5	82.5	0.0	103.0	103.0	0.0	123.5	123.4	-0.1
21.5	22.8	1.3	42.0	42.1	0.1	62.5	62.5	0.0	83.0	83.0	0.0	103.5	103.4	-0.1	124.0	124.0	0.0
22.0	23.1	1.1	42.5	42.6	0.1	63.0	63.0	0.0	83.5	83.5	0.0	104.0	103.9	-0.1	124.5	124.5	0.0
22.5	23.3	0.8	43.0	43.1	0.1	63.5	63.5	0.0	84.0	84.0	0.0	104.5	104.4	-0.1	125.0	125.0	0.0
23.0	23.5	0.5	43.5	43.6	0.1	64.0	64.0	0.0	84.5	84.6	0.1	105.0	104.9	-0.1	125.5	125.5	0.0
23.5	24.0	0.5	44.0	44.1	0.1	64.5	64.4	-0.1	85.0	85.1	0.1	105.5	105.4	-0.1	126.0	126.0	0.0
24.0	24.6	0.6	44.5	44.6	0.1	65.0	64.9	-0.1	85.5	85.6	0.1	106.0	105.8	-0.2	126.5	126.6	0.1
24.5	25.1	0.6	45.0	45.1	0.1	65.5	65.4	-0.1	86.0	86.1	0.1	106.5	106.3	-0.2	127.0	127.1	0.1
25.0	25.3	0.3	45.5	45.6	0.1	66.0	66.0	0.0	86.5	86.6	0.1	107.0	106.8	-0.2	127.5	127.6	0.1
25.5	25.8	0.3	46.0	46.1	0.1	66.5	66.5	0.0	87.0	87.1	0.1	107.5	107.3	-0.2	128.0	128.1	0.1
26.0	26.4	0.4	46.5	46.6	0.1	67.0	67.0	0.0	87.5	87.6	0.1	108.0	107.8	-0.2	128.5	128.6	0.1
26.5	26.8	0.3	47.0	47.1	0.1	67.5	67.5	0.0	88.0	88.1	0.1	108.5	108.3	-0.2	129.0	129.1	0.1
27.0	27.3	0.3	47.5	47.5	0.0	68.0	68.0	0.0	88.5	88.5	0.0	109.0	108.8	-0.2	129.5	129.6	0.1
27.5	27.6	0.1	48.0	48.0	0.0	68.5	68.5	0.0	89.0	89.0	0.0	109.5	109.3	-0.2	130.0	130.1	0.1
28.0	28.1	0.1	48.5	48.5	0.0	69.0	69.1	0.1	89.5	89.5	0.0	110.0	109.9	-0.1	130.5	130.6	0.1
28.5	28.8	0.3	49.0	49.0	0.0	69.5	69.6	0.1	90.0	90.0	0.0	110.5	110.4	-0.1	131.0	131.0	0.0
29.0	29.1	0.1	49.5	49.5	0.0	70.0	70.1	0.1	90.5	90.5	0.0	111.0	110.9	-0.1	131.5	131.4	-0.1
29.5	29.6	0.1	50.0	50.0	0.0	70.5	70.6	0.1	91.0	90.9	-0.1	111.5	111.5	0.0	132.0	131.6	-0.4
30.0	30.1	0.1	50.5	50.4	-0.1	71.0	71.1	0.1	91.5	91.4	-0.1	112.0	112.0	0.0	132.5	132.0	-0.5
30.5	30.7	0.2	51.0	50.9	-0.1	71.5	71.6	0.1	92.0	91.9	-0.1	112.5	112.5	0.0	133.0	132.3	-0.7
31.0	31.1	0.1	51.5	51.4	-0.1	72.0	72.1	0.1	92.5	92.4	-0.1	113.0	113.0	0.0	133.5	132.5	-1.0
31.5	31.6	0.1	52.0	52.0	0.0	72.5	72.6	0.1	93.0	92.9	-0.1	113.5	113.5	0.0	134.0	132.6	-1.4
32.0	32.0	0.0	52.5	52.5	0.0	73.0	73.1	0.1	93.5	93.4	-0.1	114.0	114.0	0.0	134.5	132.9	-1.6
32.5	32.6	0.1	53.0	53.0	0.0	73.5	73.6	0.1	94.0	93.9	-0.1	114.5	114.5	0.0	135.0	132.9	-2.1
33.0	33.0	0.0	53.5	53.5	0.0	74.0	74.1	0.1	94.5	94.4	-0.1	115.0	115.0	0.0	135.5	132.9	-2.6
33.5	33.5	0.0	54.0	54.0	0.0	74.5	74.6	0.1	95.0	94.9	-0.1	115.5	115.5	0.0	136.0	132.9	-3.1
34.0	34.0	0.0	54.5	54.5	0.0	75.0	75.1	0.1	95.5	95.4	-0.1	116.0	116.0	0.0	136.5	132.8	-3.7
34.5	34.6	0.1	55.0	55.1	0.1	75.5	75.6	0.1	96.0	95.9	-0.1	116.5	116.5	0.0	137.0	132.8	-4.2
35.0	35.0	0.0	55.5	55.6	0.1	76.0	76.0	0.0	96.5	96.4	-0.1	117.0	117.0	0.0	137.5	132.8	-4.7
35.5	35.4	-0.1	56.0	56.1	0.1	76.5	76.5	0.0	97.0	96.9	-0.1	117.5	117.5	0.0	138.0	132.9	-5.1
36.0	36.0	0.0	56.5	56.6	0.1	77.0	77.0	0.0	97.5	97.5	0.0	118.0	118.0	0.0			
36.5	36.5	0.0	57.0	57.1	0.1	77.5	77.4	-0.1	98.0	98.0	0.0	118.5	118.5	0.0			
37.0	37.0	0.0	57.5	57.6	0.1	78.0	77.9	-0.1	98.5	98.5	0.0	119.0	118.9	-0.1			
37.5	37.4	-0.1	58.0	58.2	0.2	78.5	78.4	-0.1	99.0	99.0	0.0	119.5	119.4	-0.1			
38.0	37.9	-0.1	58.5	58.6	0.1	79.0	78.9	-0.1	99.5	99.5	0.0	120.0	119.9	-0.1			

Plotted per typical sensitivity of a 2541 microphone; 44.5 mV/Pa & 17.1 pF.

Overload occurs at 129.9 dB SPL.

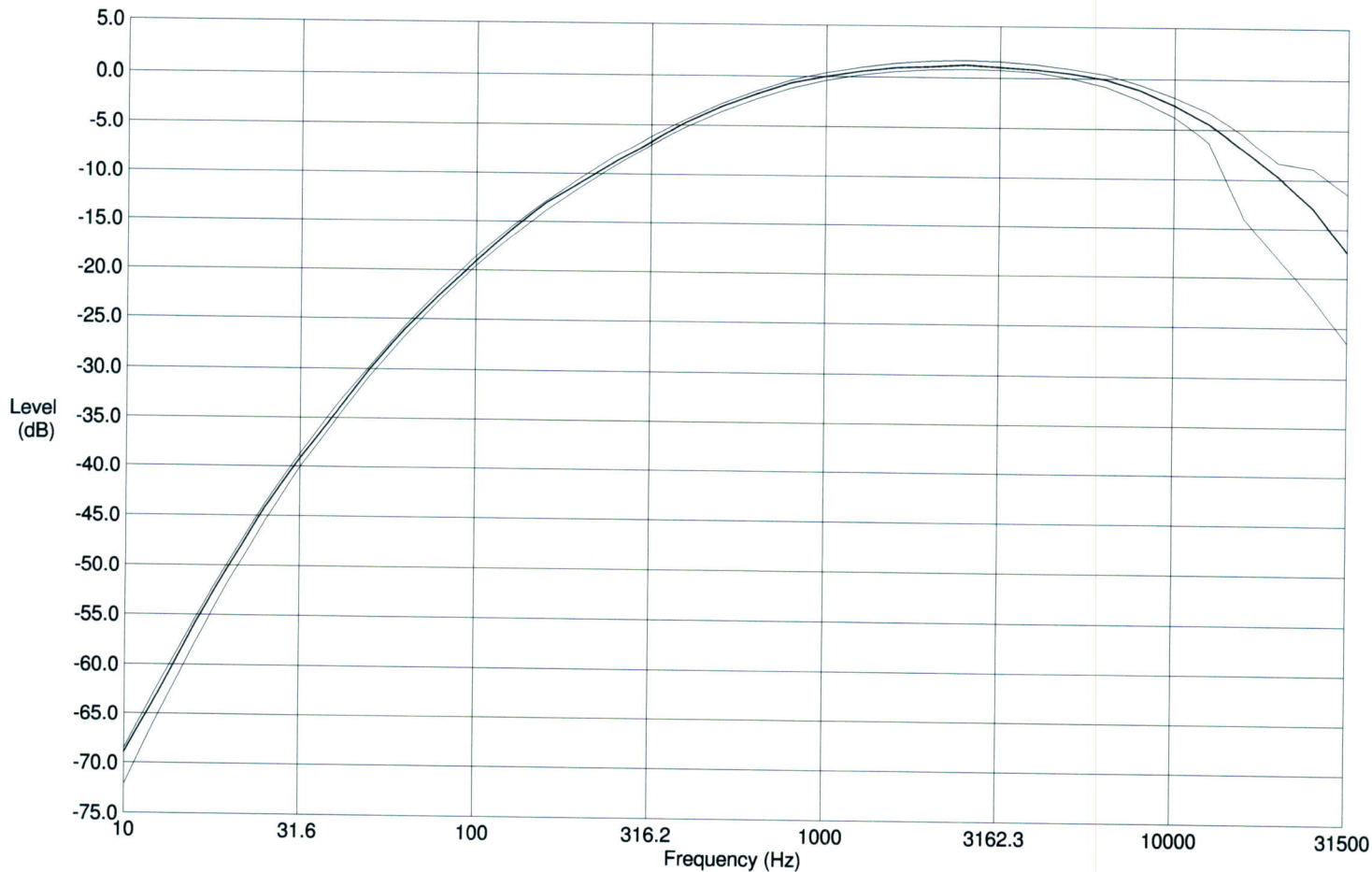
Primary indicator range: 103.3 dB (lower limit: 26.5 dB SPL to upper limit: 129.8 dB SPL).

Dynamic range: 111.5 dB (noise floor: 18.3 dB SPL to upper limit: 129.8 dB SPL).

This instrument is in compliance with IEC 60651 (2001-10) 7.9 and 7.10, ANSI S1.4-1983 3.2 and IEC 60804 (2001-10) 9.2.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

**Sound Level Meter Model: 820A Serial Number: A1211
Certificate of A-Weight Electrical Conformance**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's A-weighted response was then electrically tested using a 2.0 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.

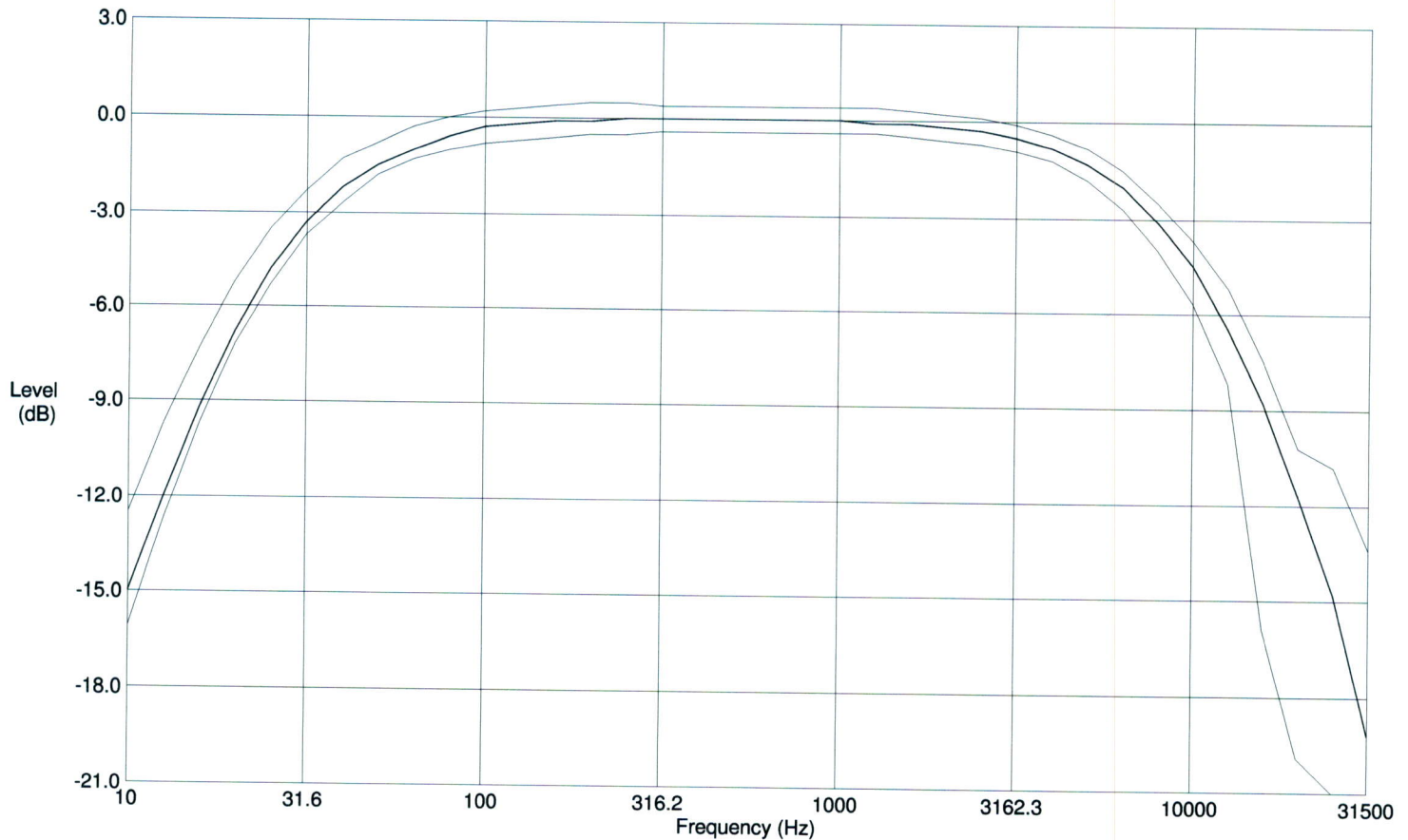


Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-70.4	-69.00	1.40	+1.8, -1.8	630.96	-1.9	-1.80	0.10	+0.4, -0.4
12.59	-63.4	-62.70	0.70	+1.5, -1.5	794.33	-0.8	-0.70	0.10	+0.4, -0.4
15.85	-56.7	-56.00	0.70	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-50.5	-50.00	0.50	+1.0, -1.0	1258.90	0.6	0.60	0.00	+0.4, -0.4
25.12	-44.7	-44.20	0.50	+0.9, -0.9	1584.90	1.0	1.00	0.00	+0.4, -0.4
31.62	-39.4	-39.20	0.20	+0.7, -0.7	1995.30	1.2	1.10	-0.10	+0.4, -0.4
39.81	-34.6	-34.60	0.00	+0.7, -0.7	2511.90	1.3	1.30	0.00	+0.4, -0.4
50.12	-30.2	-30.00	0.20	+0.5, -0.5	3162.30	1.2	1.10	-0.10	+0.4, -0.4
63.10	-26.2	-26.00	0.20	+0.5, -0.5	3981.10	1.0	0.90	-0.10	+0.4, -0.4
79.43	-22.5	-22.50	0.00	+0.5, -0.5	5011.90	0.5	0.50	0.00	+0.5, -0.5
100.00	-19.1	-19.10	0.00	+0.5, -0.5	6309.60	-0.1	-0.10	0.00	+0.5, -0.7
125.89	-16.1	-15.90	0.20	+0.5, -0.5	7943.30	-1.1	-1.10	0.00	+0.5, -1.0
158.49	-13.4	-13.10	0.30	+0.5, -0.5	10000.00	-2.5	-2.60	-0.10	+0.7, -1.3
199.53	-10.9	-10.90	0.00	+0.5, -0.5	12589.00	-4.3	-4.50	-0.20	+1.0, -2.0
251.19	-8.6	-8.70	-0.10	+0.5, -0.5	15849.00	-6.6	-7.00	-0.40	+1.0, -7.4
316.23	-6.6	-6.70	-0.10	+0.4, -0.4	19953.00	-9.3	-9.70	-0.40	+1.0, -8.7
398.11	-4.8	-4.70	0.10	+0.4, -0.4	25119.00	-12.4	-13.00	-0.60	+3.5, -9.6
501.19	-3.2	-3.10	0.10	+0.4, -0.4	31623.00	-15.8	-17.40	-1.60	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

**Sound Level Meter Model: 820A Serial Number: A1211
Certificate of C-Weight Electrical Conformance**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's C-weighted response was then electrically tested using a 2.0 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.



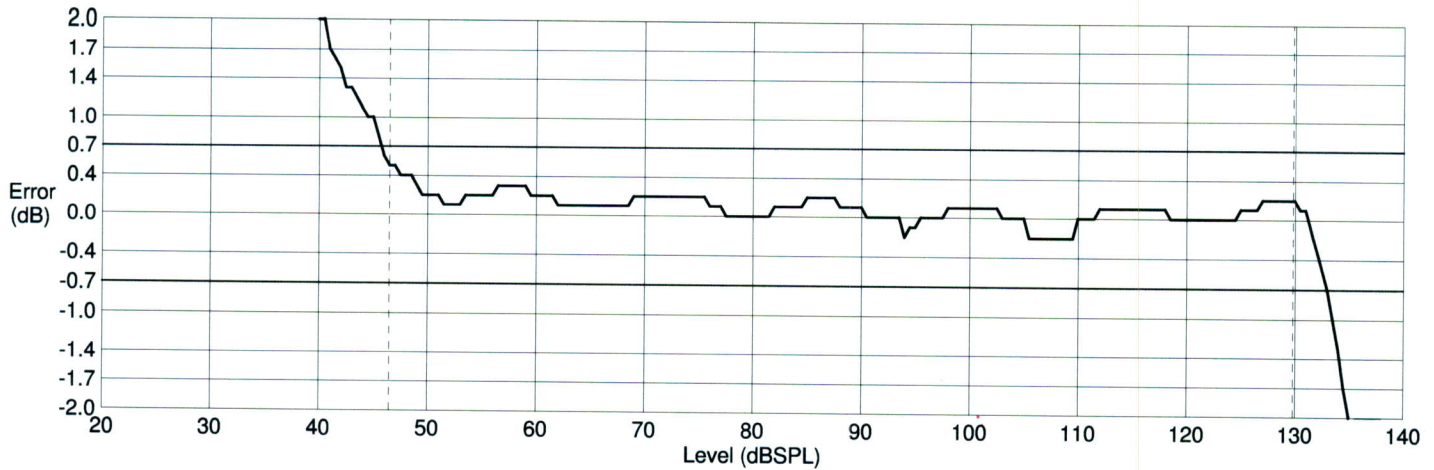
Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-14.3	-15.00	-0.70	+1.8, -1.8	630.96	0.0	0.00	0.00	+0.4, -0.4
12.59	-11.2	-12.00	-0.80	+1.5, -1.5	794.33	0.0	0.00	0.00	+0.4, -0.4
15.85	-8.5	-9.20	-0.70	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-6.2	-6.80	-0.60	+1.0, -1.0	1258.90	0.0	-0.10	-0.10	+0.4, -0.4
25.12	-4.4	-4.80	-0.40	+0.9, -0.9	1584.90	-0.1	-0.10	0.00	+0.4, -0.4
31.62	-3.0	-3.30	-0.30	+0.7, -0.7	1995.30	-0.2	-0.20	0.00	+0.4, -0.4
39.81	-2.0	-2.20	-0.20	+0.7, -0.7	2511.90	-0.3	-0.30	0.00	+0.4, -0.4
50.12	-1.3	-1.50	-0.20	+0.5, -0.5	3162.30	-0.5	-0.50	0.00	+0.4, -0.4
63.10	-0.8	-1.00	-0.20	+0.5, -0.5	3981.10	-0.8	-0.80	0.00	+0.4, -0.4
79.43	-0.5	-0.60	-0.10	+0.5, -0.5	5011.90	-1.3	-1.30	0.00	+0.5, -0.5
100.00	-0.3	-0.30	0.00	+0.5, -0.5	6309.60	-2.0	-2.00	0.00	+0.5, -0.7
125.89	-0.2	-0.20	0.00	+0.5, -0.5	7943.30	-3.0	-3.10	-0.10	+0.5, -1.0
158.49	-0.1	-0.10	0.00	+0.5, -0.5	10000.00	-4.4	-4.50	-0.10	+0.7, -1.3
199.53	0.0	-0.10	-0.10	+0.5, -0.5	12589.00	-6.2	-6.50	-0.30	+1.0, -2.0
251.19	0.0	0.00	0.00	+0.5, -0.5	15849.00	-8.5	-8.80	-0.30	+1.0, -7.4
316.23	0.0	0.00	0.00	+0.4, -0.4	19953.00	-11.2	-11.70	-0.50	+1.0, -8.7
398.11	0.0	0.00	0.00	+0.4, -0.4	25119.00	-14.3	-14.80	-0.50	+3.5, -9.6
501.19	0.0	0.00	0.00	+0.4, -0.4	31623.00	-17.7	-19.20	-1.50	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Technician: Eric Olson Test Date: 14FEB2020

Sound Level Meter Model: 820A Serial Number: A1211
Log Linearity, Differential Linearity and Range Data
****Failed** (PrimIndRange)**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's Log Linearity A-weighted slow response was then electrically tested using a 1kHz sine wave from 18.0 dB SPL to 138.0 dB SPL in 0.5 dB increments.



Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB
18.0	38.7	20.7	38.5	41.1	2.6	59.0	59.3	0.3	79.5	79.5	0.0	100.0	100.1	0.1	120.5	120.5	0.0
18.5	38.6	20.1	39.0	41.5	2.5	59.5	59.7	0.2	80.0	80.0	0.0	100.5	100.6	0.1	121.0	121.0	0.0
19.0	39.4	20.4	39.5	41.7	2.2	60.0	60.2	0.2	80.5	80.5	0.0	101.0	101.1	0.1	121.5	121.5	0.0
19.5	38.6	19.1	40.0	42.1	2.1	60.5	60.7	0.2	81.0	81.0	0.0	101.5	101.6	0.1	122.0	122.0	0.0
20.0	38.6	18.6	40.5	42.5	2.0	61.0	61.2	0.2	81.5	81.5	0.0	102.0	102.1	0.1	122.5	122.5	0.0
20.5	38.6	18.1	41.0	42.7	1.7	61.5	61.7	0.2	82.0	82.0	0.0	102.5	102.6	0.1	123.0	123.0	0.0
21.0	38.5	17.5	41.5	43.1	1.6	62.0	62.1	0.1	82.5	82.5	0.0	103.0	103.0	0.0	123.5	123.5	0.0
21.5	38.5	17.0	42.0	43.5	1.5	62.5	62.6	0.1	83.0	83.0	0.0	103.5	103.5	0.0	124.0	124.0	0.0
22.0	38.5	16.5	42.5	43.8	1.3	63.0	63.1	0.1	83.5	83.6	0.1	104.0	104.0	0.0	124.5	124.5	0.0
22.5	38.5	16.0	43.0	44.2	1.2	63.5	63.6	0.1	84.0	84.1	0.1	104.5	104.5	0.0	125.0	125.0	0.0
23.0	38.5	15.5	43.5	44.7	1.2	64.0	64.1	0.1	84.5	84.6	0.1	105.0	105.0	0.0	125.5	125.6	0.1
23.5	38.5	15.0	44.0	45.1	1.1	64.5	64.6	0.1	85.0	85.2	0.2	105.5	105.3	-0.2	126.0	126.1	0.1
24.0	38.3	14.3	44.5	45.5	1.0	65.0	65.1	0.1	85.5	85.7	0.2	106.0	105.8	-0.2	126.5	126.6	0.1
24.5	38.5	14.0	45.0	46.0	1.0	65.5	65.6	0.1	86.0	86.2	0.2	106.5	106.3	-0.2	127.0	127.0	0.0
25.0	38.5	13.5	45.5	46.3	0.8	66.0	66.1	0.1	86.5	86.7	0.2	107.0	106.8	-0.2	127.5	127.7	0.2
25.5	38.5	13.0	46.0	46.6	0.6	66.5	66.6	0.1	87.0	87.2	0.2	107.5	107.3	-0.2	128.0	128.2	0.2
26.0	38.5	12.5	46.5	47.0	0.5	67.0	67.1	0.1	87.5	87.7	0.2	108.0	107.8	-0.2	128.5	128.7	0.2
26.5	38.3	11.8	47.0	47.5	0.5	67.5	67.6	0.1	88.0	88.1	0.1	108.5	108.3	-0.2	129.0	129.2	0.2
27.0	38.5	11.5	47.5	47.9	0.4	68.0	68.1	0.1	88.5	88.6	0.1	109.0	108.8	-0.2	129.5	129.7	0.2
27.5	38.5	11.0	48.0	48.4	0.4	68.5	68.6	0.1	89.0	89.1	0.1	109.5	109.3	-0.2	130.0	130.2	0.2
28.0	38.5	10.5	48.5	48.9	0.4	69.0	69.2	0.2	89.5	89.6	0.1	110.0	110.0	0.0	130.5	130.6	0.1
28.5	38.6	10.1	49.0	49.3	0.3	69.5	69.7	0.2	90.0	90.1	0.1	110.5	110.5	0.0	131.0	131.1	0.1
29.0	38.6	9.6	49.5	49.7	0.2	70.0	70.2	0.2	90.5	90.5	0.0	111.0	111.0	0.0	131.5	131.4	-0.1
29.5	38.6	9.1	50.0	50.2	0.2	70.5	70.7	0.2	91.0	91.0	0.0	111.5	111.5	0.0	132.0	131.7	-0.3
30.0	38.6	8.6	50.5	50.7	0.2	71.0	71.2	0.2	91.5	91.5	0.0	112.0	112.1	0.1	132.5	132.0	-0.5
30.5	38.8	8.3	51.0	51.2	0.2	71.5	71.7	0.2	92.0	92.0	0.0	112.5	112.6	0.1	133.0	132.3	-0.7
31.0	38.8	7.8	51.5	51.6	0.1	72.0	72.2	0.2	92.5	92.5	0.0	113.0	113.1	0.1	133.5	132.5	-1.0
31.5	38.8	7.3	52.0	52.1	0.1	72.5	72.7	0.2	93.0	93.0	0.0	113.5	113.6	0.1	134.0	132.7	-1.3
32.0	39.0	7.0	52.5	52.6	0.1	73.0	73.2	0.2	93.5	93.5	0.0	114.0	114.1	0.1	134.5	132.8	-1.7
32.5	39.1	6.6	53.0	53.1	0.1	73.5	73.7	0.2	94.0	93.8	-0.2	114.5	114.6	0.1	135.0	133.0	-2.0
33.0	39.1	6.1	53.5	53.7	0.2	74.0	74.2	0.2	94.5	94.4	-0.1	115.0	115.1	0.1	135.5	133.0	-2.5
33.5	39.3	5.8	54.0	54.2	0.2	74.5	74.7	0.2	95.0	94.9	-0.1	115.5	115.6	0.1	136.0	132.8	-3.2
34.0	39.3	5.3	54.5	54.7	0.2	75.0	75.2	0.2	95.5	95.5	0.0	116.0	116.1	0.1	136.5	132.8	-3.7
34.5	39.6	5.1	55.0	55.2	0.2	75.5	75.7	0.2	96.0	96.0	0.0	116.5	116.6	0.1	137.0	132.8	-4.2
35.0	39.6	4.6	55.5	55.7	0.2	76.0	76.1	0.1	96.5	96.5	0.0	117.0	117.1	0.1	137.5	132.8	-4.7
35.5	39.8	4.3	56.0	56.2	0.2	76.5	76.6	0.1	97.0	97.0	0.0	117.5	117.6	0.1	138.0	133.0	-5.0
36.0	40.0	4.0	56.5	56.8	0.3	77.0	77.1	0.1	97.5	97.5	0.0	118.0	118.1	0.1			
36.5	40.2	3.7	57.0	57.3	0.3	77.5	77.5	0.0	98.0	98.1	0.1	118.5	118.5	0.0			
37.0	40.3	3.3	57.5	57.8	0.3	78.0	78.0	0.0	98.5	98.6	0.1	119.0	119.0	0.0			
37.5	40.6	3.1	58.0	58.3	0.3	78.5	78.5	0.0	99.0	99.1	0.1	119.5	119.5	0.0			
38.0	40.8	2.8	58.5	58.8	0.3	79.0	79.0	0.0	99.5	99.6	0.1	120.0	120.0	0.0			

Plotted per typical sensitivity of a 2541 microphone; 44.5 mV/Pa & 17.1 pF.

Overload occurs at 129.9 dB SPL.

Primary indicator range: 83.3 dB (lower limit: 46.5 dB SPL to upper limit: 129.8 dB SPL).

Dynamic range: 110.3 dB (noise floor: 19.5 dB SPL to upper limit: 129.8 dB SPL).

This instrument is NOT in compliance with IEC 60651 (2001-10) 7.9 and 7.10, ANSI S1.4-1983 3.2 and IEC 60804 (2001-10) 9.2.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Certificate of Calibration and Conformance

Certificate Number 2019-208875

Instrument Model 820, Serial Number 1375, was calibrated on 18 Dec 2019. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO

Date Calibrated: 18 Dec 2019

Calibration due: 18 Dec 2021

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	2900 / 2239	0608 / 0110	12 Months	26 Dec 2019	2018-207644

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

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 17 %

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.

The collective uncertainty of the Measurement Standard used does not exceed 25% of the applicable tolerance for each characteristic calibrated unless otherwise noted.

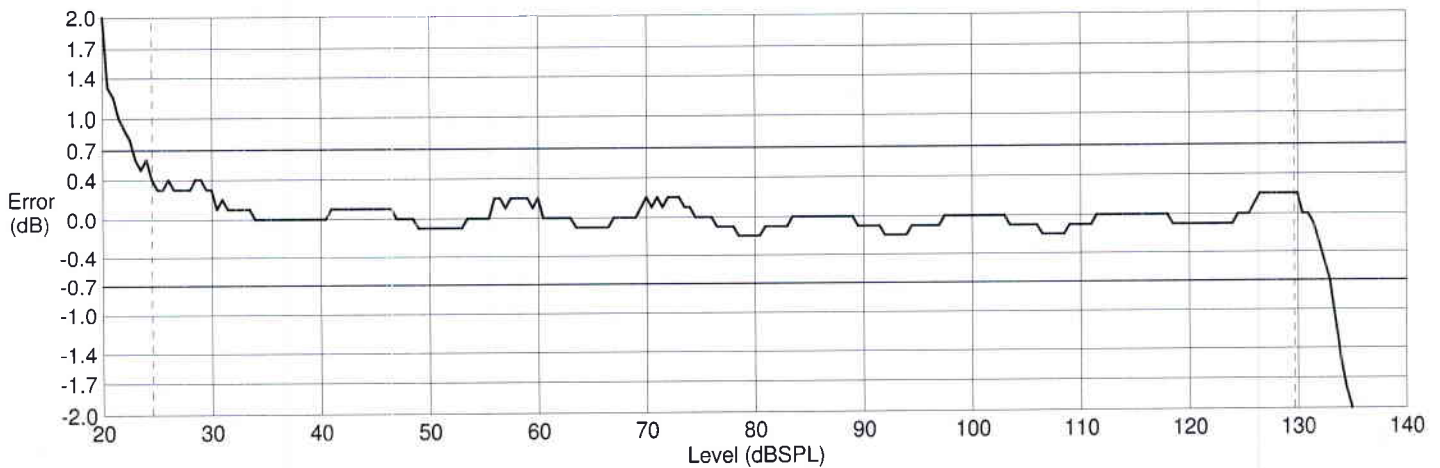
The results documented in this certificate relate only to the item(s) calibrated or tested. A one year calibration is recommended, however calibration interval assignment and adjustment are the responsibility of the end user. This certificate may not be reproduced, except in full, without the written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

"AS RECEIVED" data unavailable due to unit failure.
Tested with PRM828-2095

Signed: 
Technician: Eric Olson

Sound Level Meter Model: 820A Serial Number: A1375 Log Linearity, Differential Linearity and Range Data

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's Log Linearity A-weighted slow response was then electrically tested using a 1kHz sine wave from 18.0 dB SPL to 138.0 dB SPL in 0.5 dB increments.



Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB	Levl dB SPL	Meas dB SPL	Err dB
18.0	20.5	2.5	38.5	38.5	0.0	59.0	59.2	0.2	79.5	79.3	-0.2	100.0	100.0	0.0	120.5	120.4	-0.1
18.5	20.8	2.3	39.0	39.0	0.0	59.5	59.6	0.1	80.0	79.8	-0.2	100.5	100.5	0.0	121.0	120.9	-0.1
19.0	21.0	2.0	39.5	39.5	0.0	60.0	60.2	0.2	80.5	80.3	-0.2	101.0	101.0	0.0	121.5	121.4	-0.1
19.5	21.3	1.8	40.0	40.0	0.0	60.5	60.5	0.0	81.0	80.9	-0.1	101.5	101.5	0.0	122.0	121.9	-0.1
20.0	21.5	1.5	40.5	40.5	0.0	61.0	61.0	0.0	81.5	81.4	-0.1	102.0	102.0	0.0	122.5	122.4	-0.1
20.5	21.8	1.3	41.0	41.1	0.1	61.5	61.5	0.0	82.0	81.9	-0.1	102.5	102.5	0.0	123.0	122.9	-0.1
21.0	22.2	1.2	41.5	41.6	0.1	62.0	62.0	0.0	82.5	82.4	-0.1	103.0	103.0	0.0	123.5	123.4	-0.1
21.5	22.5	1.0	42.0	42.1	0.1	62.5	62.5	0.0	83.0	82.9	-0.1	103.5	103.4	-0.1	124.0	123.9	-0.1
22.0	22.9	0.9	42.5	42.6	0.1	63.0	63.0	0.0	83.5	83.5	0.0	104.0	103.9	-0.1	124.5	124.5	0.0
22.5	23.3	0.8	43.0	43.1	0.1	63.5	63.4	-0.1	84.0	84.0	0.0	104.5	104.4	-0.1	125.0	125.0	0.0
23.0	23.6	0.6	43.5	43.6	0.1	64.0	63.9	-0.1	84.5	84.5	0.0	105.0	104.9	-0.1	125.5	125.5	0.0
23.5	24.0	0.5	44.0	44.1	0.1	64.5	64.4	-0.1	85.0	85.0	0.0	105.5	105.4	-0.1	126.0	126.1	0.1
24.0	24.6	0.6	44.5	44.6	0.1	65.0	64.9	-0.1	85.5	85.5	0.0	106.0	105.9	-0.1	126.5	126.7	0.2
24.5	24.9	0.4	45.0	45.1	0.1	65.5	65.4	-0.1	86.0	86.0	0.0	106.5	106.3	-0.2	127.0	127.2	0.2
25.0	25.3	0.3	45.5	45.6	0.1	66.0	65.9	-0.1	86.5	86.5	0.0	107.0	106.8	-0.2	127.5	127.7	0.2
25.5	25.8	0.3	46.0	46.1	0.1	66.5	66.4	-0.1	87.0	87.0	0.0	107.5	107.3	-0.2	128.0	128.2	0.2
26.0	26.4	0.4	46.5	46.6	0.1	67.0	67.0	0.0	87.5	87.5	0.0	108.0	107.8	-0.2	128.5	128.7	0.2
26.5	26.8	0.3	47.0	47.1	0.1	67.5	67.5	0.0	88.0	88.0	0.0	108.5	108.3	-0.2	129.0	129.2	0.2
27.0	27.3	0.3	47.5	47.5	0.0	68.0	68.0	0.0	88.5	88.5	0.0	109.0	108.9	-0.1	129.5	129.7	0.2
27.5	27.8	0.3	48.0	48.0	0.0	68.5	68.5	0.0	89.0	89.0	0.0	109.5	109.4	-0.1	130.0	130.2	0.2
28.0	28.3	0.3	48.5	48.5	0.0	69.0	69.0	0.0	89.5	89.4	-0.1	110.0	109.9	-0.1	130.5	130.5	0.0
28.5	28.9	0.4	49.0	48.9	-0.1	69.5	69.6	0.1	90.0	89.9	-0.1	110.5	110.4	-0.1	131.0	131.0	0.0
29.0	29.4	0.4	49.5	49.4	-0.1	70.0	70.2	0.2	90.5	90.4	-0.1	111.0	110.9	-0.1	131.5	131.4	-0.1
29.5	29.8	0.3	50.0	49.9	-0.1	70.5	70.6	0.1	91.0	90.9	-0.1	111.5	111.5	0.0	132.0	131.7	-0.3
30.0	30.3	0.3	50.5	50.4	-0.1	71.0	71.2	0.2	91.5	91.4	-0.1	112.0	112.0	0.0	132.5	132.0	-0.5
30.5	30.6	0.1	51.0	50.9	-0.1	71.5	71.6	0.1	92.0	91.8	-0.2	112.5	112.5	0.0	133.0	132.3	-0.7
31.0	31.2	0.2	51.5	51.4	-0.1	72.0	72.2	0.2	92.5	92.3	-0.2	113.0	113.0	0.0	133.5	132.4	-1.1
31.5	31.6	0.1	52.0	51.9	-0.1	72.5	72.7	0.2	93.0	92.8	-0.2	113.5	113.5	0.0	134.0	132.5	-1.5
32.0	32.1	0.1	52.5	52.4	-0.1	73.0	73.2	0.2	93.5	93.3	-0.2	114.0	114.0	0.0	134.5	132.7	-1.8
32.5	32.6	0.1	53.0	52.9	-0.1	73.5	73.6	0.1	94.0	93.8	-0.2	114.5	114.5	0.0	135.0	132.6	-2.4
33.0	33.1	0.1	53.5	53.5	0.0	74.0	74.1	0.1	94.5	94.4	-0.1	115.0	115.0	0.0	135.5	132.5	-3.0
33.5	33.6	0.1	54.0	54.0	0.0	74.5	74.5	0.0	95.0	94.9	-0.1	115.5	115.5	0.0	136.0	132.5	-3.5
34.0	34.0	0.0	54.5	54.5	0.0	75.0	75.0	0.0	95.5	95.4	-0.1	116.0	116.0	0.0	136.5	132.4	-4.1
34.5	34.5	0.0	55.0	55.0	0.0	75.5	75.5	0.0	96.0	95.9	-0.1	116.5	116.5	0.0	137.0	132.4	-4.6
35.0	35.0	0.0	55.5	55.5	0.0	76.0	76.0	0.0	96.5	96.4	-0.1	117.0	117.0	0.0	137.5	132.5	-5.0
35.5	35.5	0.0	56.0	56.2	0.2	76.5	76.4	-0.1	97.0	96.9	-0.1	117.5	117.5	0.0	138.0	132.5	-5.5
36.0	36.0	0.0	56.5	56.7	0.2	77.0	76.9	-0.1	97.5	97.5	0.0	118.0	118.0	0.0			
36.5	36.5	0.0	57.0	57.1	0.1	77.5	77.4	-0.1	98.0	98.0	0.0	118.5	118.4	-0.1			
37.0	37.0	0.0	57.5	57.7	0.2	78.0	77.9	-0.1	98.5	98.5	0.0	119.0	118.9	-0.1			
37.5	37.5	0.0	58.0	58.2	0.2	78.5	78.3	-0.2	99.0	99.0	0.0	119.5	119.4	-0.1			
38.0	38.0	0.0	58.5	58.7	0.2	79.0	78.8	-0.2	99.5	99.5	0.0	120.0	119.9	-0.1			

Plotted per typical sensitivity of a 2541 microphone; 44.5 mV/Pa & 17.1 pF.

Overload occurs at 129.8 dB SPL.

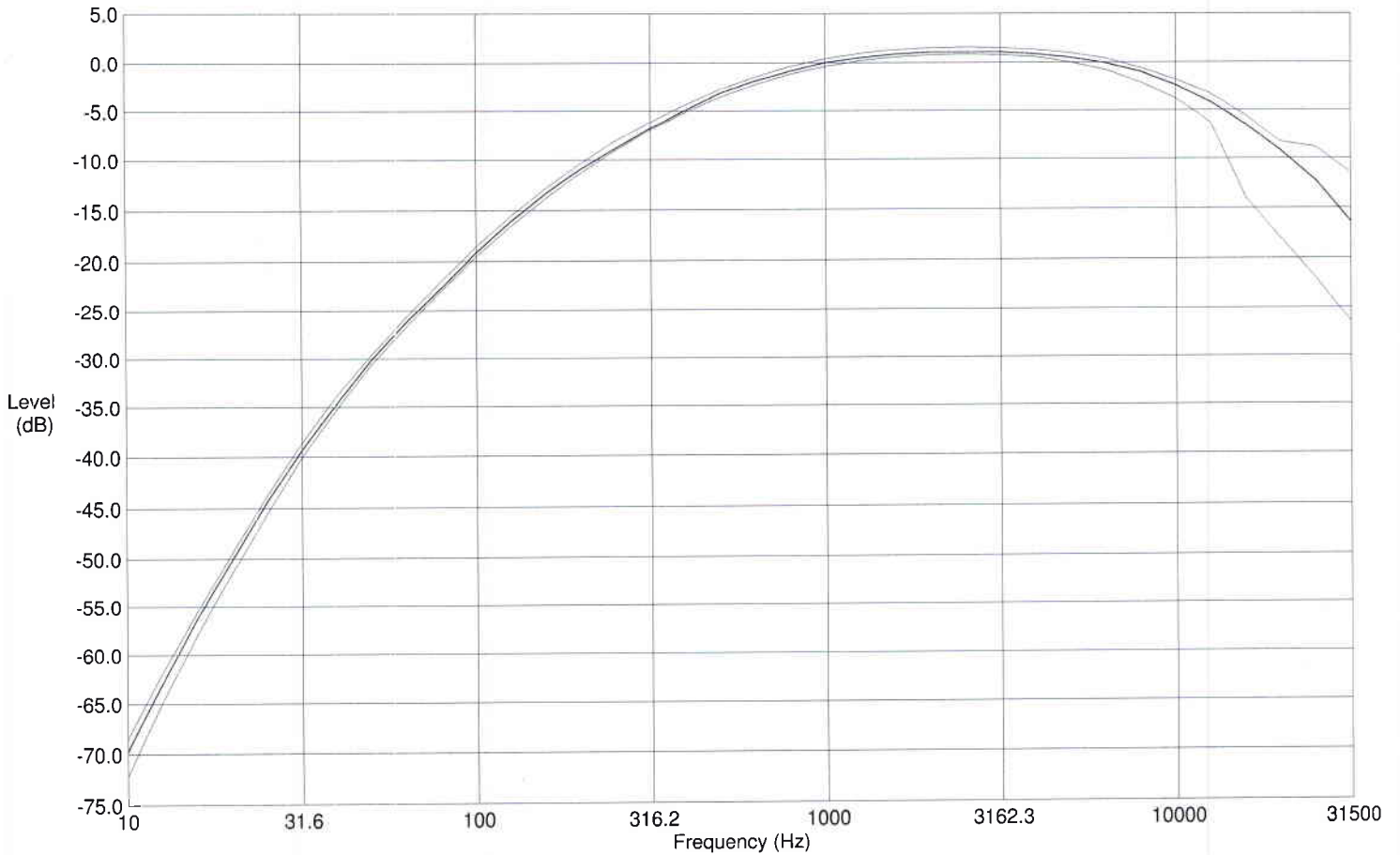
Primary indicator range: 105.2 dB (lower limit: 24.5 dB SPL to upper limit: 129.7 dB SPL).

Dynamic range: 111.8 dB (noise floor: 17.9 dB SPL to upper limit: 129.7 dB SPL).

This instrument is in compliance with IEC 60651 (2001-10) 7.9 and 7.10, ANSI S1.4-1983 3.2 and IEC 60804 (2001-10) 9.2.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

**Sound Level Meter Model: 820A Serial Number: A1375
Certificate of A-Weight Electrical Conformance**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's A-weighted response was then electrically tested using a 1.9 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.

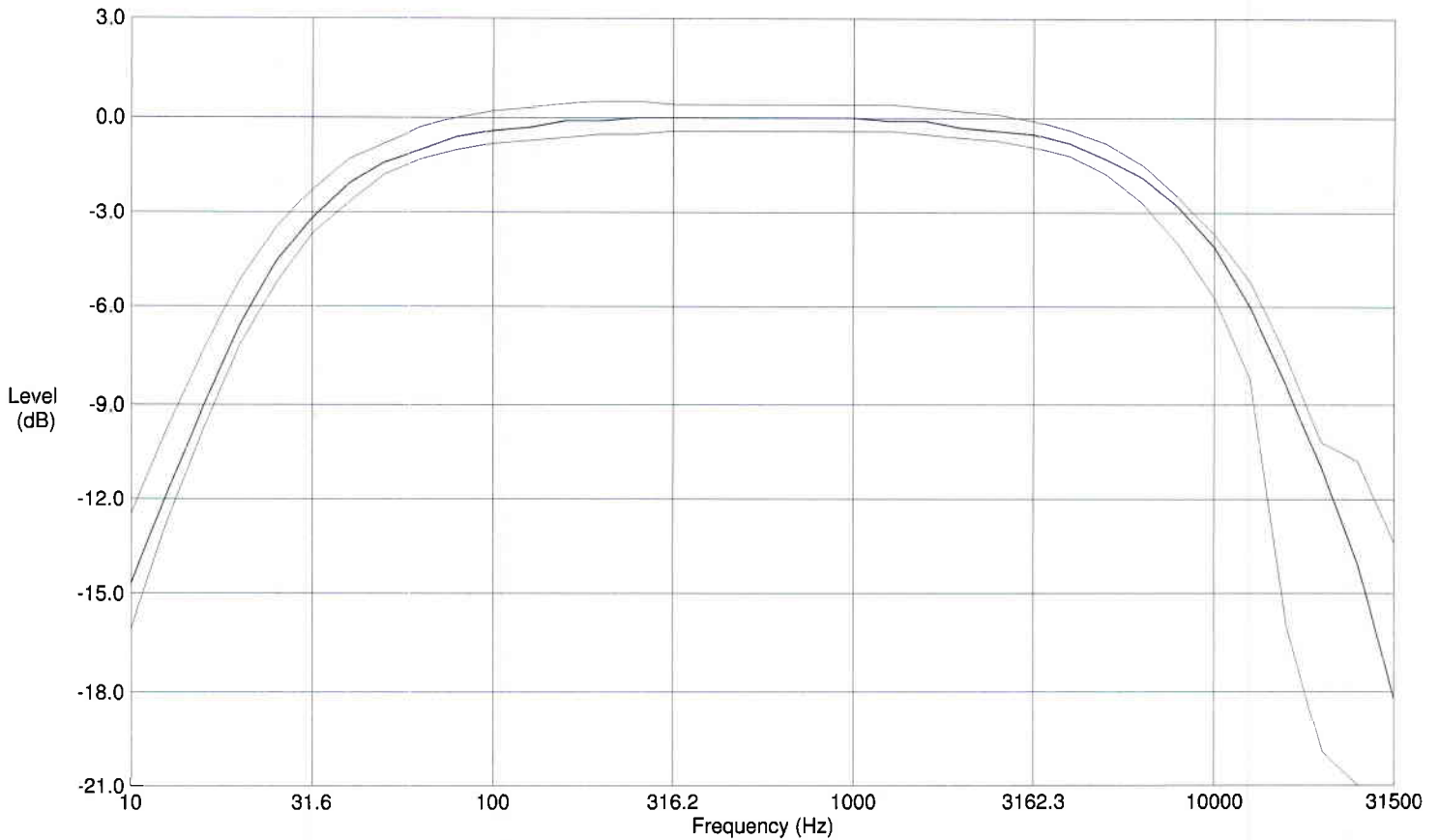


Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-70.4	-69.80	0.60	+1.8, -1.8	630.96	-1.9	-1.90	0.00	+0.4, -0.4
12.59	-63.4	-63.00	0.40	+1.5, -1.5	794.33	-0.8	-0.90	-0.10	+0.4, -0.4
15.85	-56.7	-56.20	0.50	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-50.5	-50.20	0.30	+1.0, -1.0	1258.90	0.6	0.50	-0.10	+0.4, -0.4
25.12	-44.7	-44.40	0.30	+0.9, -0.9	1584.90	1.0	0.90	-0.10	+0.4, -0.4
31.62	-39.4	-39.40	0.00	+0.7, -0.7	1995.30	1.2	1.10	-0.10	+0.4, -0.4
39.81	-34.6	-34.70	-0.10	+0.7, -0.7	2511.90	1.3	1.10	-0.20	+0.4, -0.4
50.12	-30.2	-30.20	0.00	+0.5, -0.5	3162.30	1.2	1.10	-0.10	+0.4, -0.4
63.10	-26.2	-26.20	0.00	+0.5, -0.5	3981.10	1.0	0.90	-0.10	+0.4, -0.4
79.43	-22.5	-22.70	-0.20	+0.5, -0.5	5011.90	0.5	0.50	0.00	+0.5, -0.5
100.00	-19.1	-19.20	-0.10	+0.5, -0.5	6309.60	-0.1	-0.10	0.00	+0.5, -0.7
125.89	-16.1	-16.10	0.00	+0.5, -0.5	7943.30	-1.1	-1.00	0.10	+0.5, -1.0
158.49	-13.4	-13.40	0.00	+0.5, -0.5	10000.00	-2.5	-2.40	0.10	+0.7, -1.3
199.53	-10.9	-11.00	-0.10	+0.5, -0.5	12589.00	-4.3	-4.20	0.10	+1.0, -2.0
251.19	-8.6	-8.90	-0.30	+0.5, -0.5	15849.00	-6.6	-6.50	0.10	+1.0, -7.4
316.23	-6.6	-6.80	-0.20	+0.4, -0.4	19953.00	-9.3	-9.20	0.10	+1.0, -8.7
398.11	-4.8	-5.00	-0.20	+0.4, -0.4	25119.00	-12.4	-12.30	0.10	+3.5, -9.6
501.19	-3.2	-3.20	0.00	+0.4, -0.4	31623.00	-15.8	-16.40	-0.60	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Sound Level Meter Model: 820A Serial Number: A1375
Certificate of C-Weight Electrical Conformance

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's C-weighted response was then electrically tested using a 1.9 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.



Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-14.3	-14.70	-0.40	+1.8, -1.8	630.96	0.0	0.00	0.00	+0.4, -0.4
12.59	-11.2	-11.80	-0.60	+1.5, -1.5	794.33	0.0	0.00	0.00	+0.4, -0.4
15.85	-8.5	-9.00	-0.50	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-6.2	-6.60	-0.40	+1.0, -1.0	1258.90	0.0	-0.10	-0.10	+0.4, -0.4
25.12	-4.4	-4.60	-0.20	+0.9, -0.9	1584.90	-0.1	-0.10	0.00	+0.4, -0.4
31.62	-3.0	-3.20	-0.20	+0.7, -0.7	1995.30	-0.2	-0.30	-0.10	+0.4, -0.4
39.81	-2.0	-2.10	-0.10	+0.7, -0.7	2511.90	-0.3	-0.40	-0.10	+0.4, -0.4
50.12	-1.3	-1.40	-0.10	+0.5, -0.5	3162.30	-0.5	-0.50	0.00	+0.4, -0.4
63.10	-0.8	-1.00	-0.20	+0.5, -0.5	3981.10	-0.8	-0.80	0.00	+0.4, -0.4
79.43	-0.5	-0.60	-0.10	+0.5, -0.5	5011.90	-1.3	-1.30	0.00	+0.5, -0.5
100.00	-0.3	-0.40	-0.10	+0.5, -0.5	6309.60	-2.0	-1.90	0.10	+0.5, -0.7
125.89	-0.2	-0.30	-0.10	+0.5, -0.5	7943.30	-3.0	-2.80	0.20	+0.5, -1.0
158.49	-0.1	-0.10	0.00	+0.5, -0.5	10000.00	-4.4	-4.10	0.30	+0.7, -1.3
199.53	0.0	-0.10	-0.10	+0.5, -0.5	12589.00	-6.2	-6.00	0.20	+1.0, -2.0
251.19	0.0	0.00	0.00	+0.5, -0.5	15849.00	-8.5	-8.40	0.10	+1.0, -7.4
316.23	0.0	0.00	0.00	+0.4, -0.4	19953.00	-11.2	-11.00	0.20	+1.0, -8.7
398.11	0.0	0.00	0.00	+0.4, -0.4	25119.00	-14.3	-14.10	0.20	+3.5, -9.6
501.19	0.0	0.00	0.00	+0.4, -0.4	31623.00	-17.7	-18.20	-0.50	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Technician: Eric Olson Test Date: 18DEC2019

Certificate of Calibration and Conformance

Certificate Number 2020-208999

Instrument Model 820, Serial Number 1939, was calibrated on 13 Feb 2020. The instrument meets factory specifications per Procedure D0001.8160, ANSI S1.4 1983, IEC 651-Type 1 1979, and IEC 804-Type 1 1985.

Instrument found to be in calibration as received: NO

Date Calibrated: 13 Feb 2020

Calibration due: 13 Feb 2022

Calibration Standards Used

MANUFACTURER	MODEL	SERIAL NUMBER	INTERVAL	CAL. DUE	TRACEABILITY NO.
Larson Davis	LDSigGn/2209	0445 / 0111	12 Months	4 Dec 2020	2019-208848

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

Calibration Environmental Conditions

Temperature: 24 ° Centigrade

Relative Humidity: 17 %

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.

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.

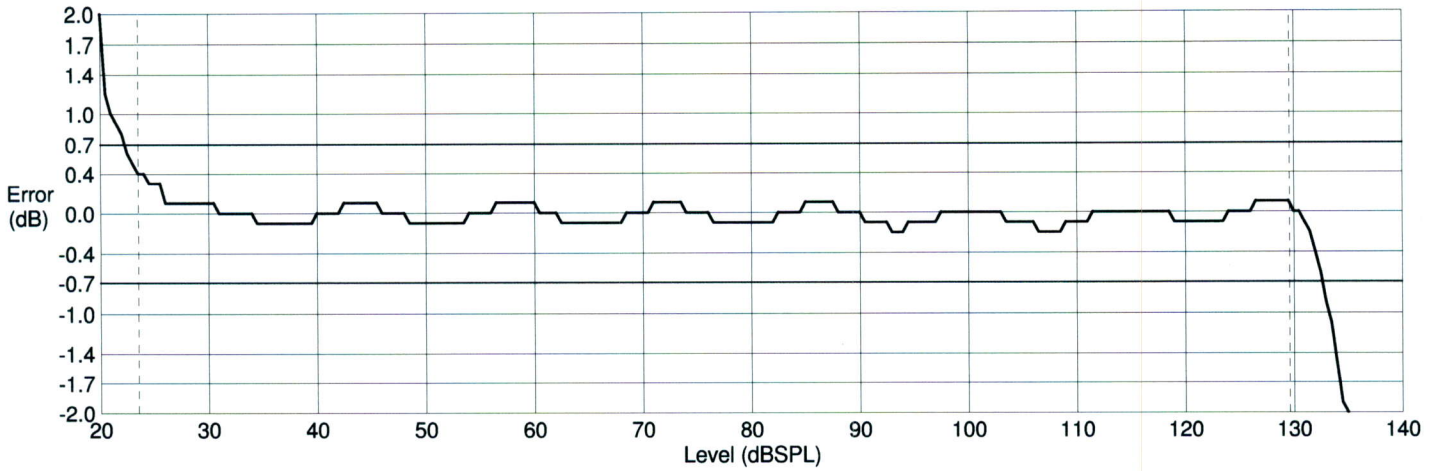
See "AS RECEIVED" data.
Tested with PRM828-3007

Signed: _____


Technician: Eric Olson

Sound Level Meter Model: 820A Serial Number: A1939 Log Linearity, Differential Linearity and Range Data

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dBSPL. The instrument's Log Linearity A-weighted slow response was then electrically tested using a 1kHz sine wave from 18.0 dBSPL to 138.0 dBSPL in 0.5 dB increments.



Levl dBSPL	Meas dBSPL	Err dB	Levl dBSPL	Meas dBSPL	Err dB	Levl dBSPL	Meas dBSPL	Err dB	Levl dBSPL	Meas dBSPL	Err dB	Levl dBSPL	Meas dBSPL	Err dB	Levl dBSPL	Meas dBSPL	Err dB
18.0	20.4	2.4	38.5	38.4	-0.1	59.0	59.1	0.1	79.5	79.4	-0.1	100.0	100.0	0.0	120.5	120.4	-0.1
18.5	20.6	2.1	39.0	38.9	-0.1	59.5	59.6	0.1	80.0	79.9	-0.1	100.5	100.5	0.0	121.0	120.9	-0.1
19.0	20.9	1.9	39.5	39.4	-0.1	60.0	60.1	0.1	80.5	80.4	-0.1	101.0	101.0	0.0	121.5	121.4	-0.1
19.5	21.0	1.5	40.0	40.0	0.0	60.5	60.5	0.0	81.0	80.9	-0.1	101.5	101.5	0.0	122.0	121.9	-0.1
20.0	21.4	1.4	40.5	40.5	0.0	61.0	61.0	0.0	81.5	81.4	-0.1	102.0	102.0	0.0	122.5	122.4	-0.1
20.5	21.7	1.2	41.0	41.0	0.0	61.5	61.5	0.0	82.0	81.9	-0.1	102.5	102.5	0.0	123.0	122.9	-0.1
21.0	22.0	1.0	41.5	41.5	0.0	62.0	62.0	0.0	82.5	82.5	0.0	103.0	103.0	0.0	123.5	123.4	-0.1
21.5	22.4	0.9	42.0	42.0	0.0	62.5	62.4	-0.1	83.0	83.0	0.0	103.5	103.4	-0.1	124.0	124.0	0.0
22.0	22.8	0.8	42.5	42.6	0.1	63.0	62.9	-0.1	83.5	83.5	0.0	104.0	103.9	-0.1	124.5	124.5	0.0
22.5	23.1	0.6	43.0	43.1	0.1	63.5	63.4	-0.1	84.0	84.0	0.0	104.5	104.4	-0.1	125.0	125.0	0.0
23.0	23.5	0.5	43.5	43.6	0.1	64.0	63.9	-0.1	84.5	84.5	0.0	105.0	104.9	-0.1	125.5	125.5	0.0
23.5	23.9	0.4	44.0	44.1	0.1	64.5	64.4	-0.1	85.0	85.1	0.1	105.5	105.4	-0.1	126.0	126.0	0.0
24.0	24.4	0.4	44.5	44.6	0.1	65.0	64.9	-0.1	85.5	85.6	0.1	106.0	105.9	-0.1	126.5	126.6	0.1
24.5	24.8	0.3	45.0	45.1	0.1	65.5	65.4	-0.1	86.0	86.1	0.1	106.5	106.3	-0.2	127.0	127.1	0.1
25.0	25.3	0.3	45.5	45.6	0.1	66.0	65.9	-0.1	86.5	86.6	0.1	107.0	106.8	-0.2	127.5	127.6	0.1
25.5	25.8	0.3	46.0	46.0	0.0	66.5	66.4	-0.1	87.0	87.1	0.1	107.5	107.3	-0.2	128.0	128.1	0.1
26.0	26.1	0.1	46.5	46.5	0.0	67.0	66.9	-0.1	87.5	87.6	0.1	108.0	107.8	-0.2	128.5	128.6	0.1
26.5	26.6	0.1	47.0	47.0	0.0	67.5	67.4	-0.1	88.0	88.0	0.0	108.5	108.3	-0.2	129.0	129.1	0.1
27.0	27.1	0.1	47.5	47.5	0.0	68.0	67.9	-0.1	88.5	88.5	0.0	109.0	108.9	-0.1	129.5	129.6	0.1
27.5	27.6	0.1	48.0	48.0	0.0	68.5	68.5	0.0	89.0	89.0	0.0	109.5	109.4	-0.1	130.0	130.0	0.0
28.0	28.1	0.1	48.5	48.4	-0.1	69.0	69.0	0.0	89.5	89.5	0.0	110.0	109.9	-0.1	130.5	130.5	0.0
28.5	28.6	0.1	49.0	48.9	-0.1	69.5	69.5	0.0	90.0	90.0	0.0	110.5	110.4	-0.1	131.0	130.9	-0.1
29.0	29.1	0.1	49.5	49.4	-0.1	70.0	70.0	0.0	90.5	90.4	-0.1	111.0	110.9	-0.1	131.5	131.3	-0.2
29.5	29.6	0.1	50.0	49.9	-0.1	70.5	70.5	0.0	91.0	90.9	-0.1	111.5	111.5	0.0	132.0	131.6	-0.4
30.0	30.1	0.1	50.5	50.4	-0.1	71.0	71.1	0.1	91.5	91.4	-0.1	112.0	112.0	0.0	132.5	131.9	-0.6
30.5	30.6	0.1	51.0	50.9	-0.1	71.5	71.6	0.1	92.0	91.9	-0.1	112.5	112.5	0.0	133.0	132.1	-0.9
31.0	31.0	0.0	51.5	51.4	-0.1	72.0	72.1	0.1	92.5	92.4	-0.1	113.0	113.0	0.0	133.5	132.4	-1.1
31.5	31.5	0.0	52.0	51.9	-0.1	72.5	72.6	0.1	93.0	92.8	-0.2	113.5	113.5	0.0	134.0	132.5	-1.5
32.0	32.0	0.0	52.5	52.4	-0.1	73.0	73.1	0.1	93.5	93.3	-0.2	114.0	114.0	0.0	134.5	132.6	-1.9
32.5	32.5	0.0	53.0	52.9	-0.1	73.5	73.6	0.1	94.0	93.8	-0.2	114.5	114.5	0.0	135.0	132.6	-2.4
33.0	33.0	0.0	53.5	53.4	-0.1	74.0	74.0	0.0	94.5	94.4	-0.1	115.0	115.0	0.0	135.5	132.5	-3.0
33.5	33.5	0.0	54.0	54.0	0.0	74.5	74.5	0.0	95.0	94.9	-0.1	115.5	115.5	0.0	136.0	132.5	-3.5
34.0	34.0	0.0	54.5	54.5	0.0	75.0	75.0	0.0	95.5	95.4	-0.1	116.0	116.0	0.0	136.5	132.4	-4.1
34.5	34.4	-0.1	55.0	55.0	0.0	75.5	75.5	0.0	96.0	95.9	-0.1	116.5	116.5	0.0	137.0	132.4	-4.6
35.0	34.9	-0.1	55.5	55.5	0.0	76.0	76.0	0.0	96.5	96.4	-0.1	117.0	117.0	0.0	137.5	132.5	-5.0
35.5	35.4	-0.1	56.0	56.0	0.0	76.5	76.4	-0.1	97.0	96.9	-0.1	117.5	117.5	0.0	138.0	132.5	-5.5
36.0	35.9	-0.1	56.5	56.6	0.1	77.0	76.9	-0.1	97.5	97.5	0.0	118.0	118.0	0.0			
36.5	36.4	-0.1	57.0	57.1	0.1	77.5	77.4	-0.1	98.0	98.0	0.0	118.5	118.5	0.0			
37.0	36.9	-0.1	57.5	57.6	0.1	78.0	77.9	-0.1	98.5	98.5	0.0	119.0	118.9	-0.1			
37.5	37.4	-0.1	58.0	58.1	0.1	78.5	78.4	-0.1	99.0	99.0	0.0	119.5	119.4	-0.1			
38.0	37.9	-0.1	58.5	58.6	0.1	79.0	78.9	-0.1	99.5	99.5	0.0	120.0	119.9	-0.1			

Plotted per typical sensitivity of a 2541 microphone; 44.5 mV/Pa & 17.1 pF.

Overload occurs at 129.7 dBSPL.

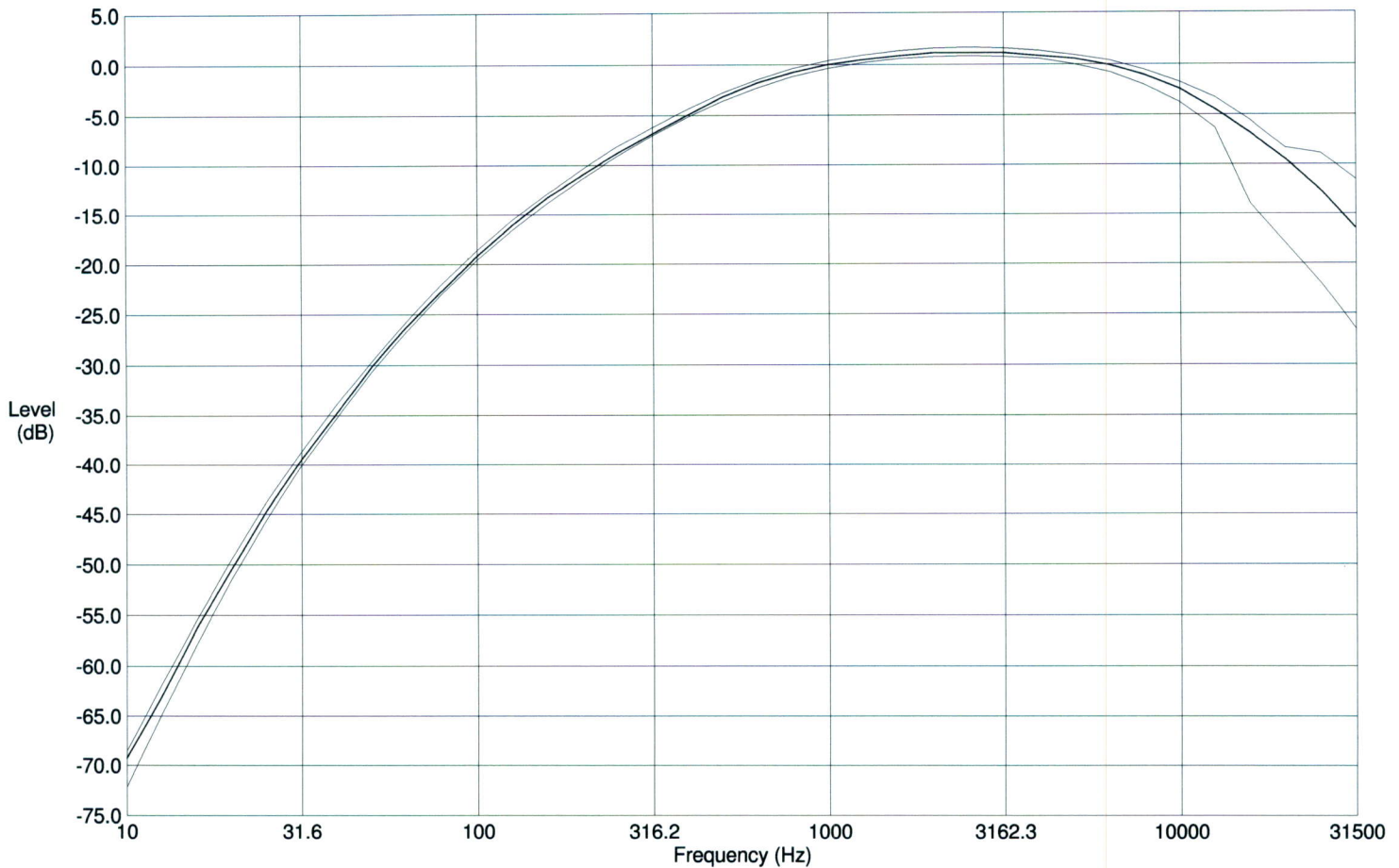
Primary indicator range: 106.1 dB (lower limit: 23.5 dBSPL to upper limit: 129.6 dBSPL).

Dynamic range: 111.9 dB (noise floor: 17.7 dBSPL to upper limit: 129.6 dBSPL).

This instrument is in compliance with IEC 60651 (2001-10) 7.9 and 7.10, ANSI S1.4-1983 3.2 and IEC 60804 (2001-10) 9.2.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

**Sound Level Meter Model: 820A Serial Number: A1939
Certificate of A-Weight Electrical Conformance**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dB SPL. The instrument's A-weighted response was then electrically tested using a 1.9 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.

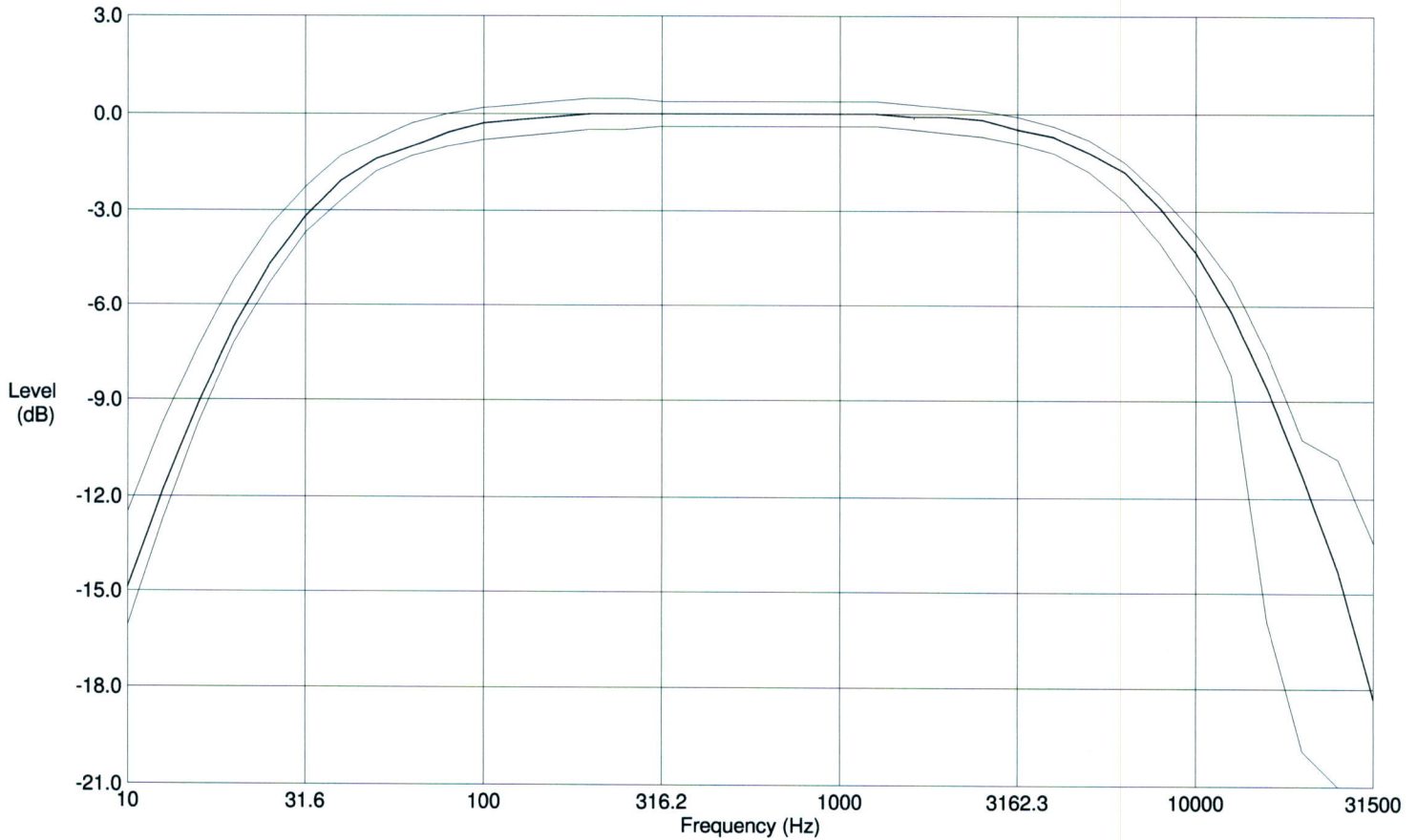


Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-70.4	-69.30	1.10	+1.8, -1.8	630.96	-1.9	-1.80	0.10	+0.4, -0.4
12.59	-63.4	-63.10	0.30	+1.5, -1.5	794.33	-0.8	-0.80	0.00	+0.4, -0.4
15.85	-56.7	-56.30	0.40	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-50.5	-50.50	0.00	+1.0, -1.0	1258.90	0.6	0.50	-0.10	+0.4, -0.4
25.12	-44.7	-44.70	0.00	+0.9, -0.9	1584.90	1.0	0.90	-0.10	+0.4, -0.4
31.62	-39.4	-39.50	-0.10	+0.7, -0.7	1995.30	1.2	1.20	0.00	+0.4, -0.4
39.81	-34.6	-34.80	-0.20	+0.7, -0.7	2511.90	1.3	1.20	-0.10	+0.4, -0.4
50.12	-30.2	-30.20	0.00	+0.5, -0.5	3162.30	1.2	1.20	0.00	+0.4, -0.4
63.10	-26.2	-26.20	0.00	+0.5, -0.5	3981.10	1.0	0.90	-0.10	+0.4, -0.4
79.43	-22.5	-22.70	-0.20	+0.5, -0.5	5011.90	0.5	0.60	0.10	+0.5, -0.5
100.00	-19.1	-19.20	-0.10	+0.5, -0.5	6309.60	-0.1	-0.10	0.00	+0.5, -0.7
125.89	-16.1	-16.10	0.00	+0.5, -0.5	7943.30	-1.1	-1.10	0.00	+0.5, -1.0
158.49	-13.4	-13.30	0.10	+0.5, -0.5	10000.00	-2.5	-2.50	0.00	+0.7, -1.3
199.53	-10.9	-11.00	-0.10	+0.5, -0.5	12589.00	-4.3	-4.50	-0.20	+1.0, -2.0
251.19	-8.6	-8.80	-0.20	+0.5, -0.5	15849.00	-6.6	-6.80	-0.20	+1.0, -7.4
316.23	-6.6	-6.80	-0.20	+0.4, -0.4	19953.00	-9.3	-9.50	-0.20	+1.0, -8.7
398.11	-4.8	-5.00	-0.20	+0.4, -0.4	25119.00	-12.4	-12.60	-0.20	+3.5, -9.6
501.19	-3.2	-3.20	0.00	+0.4, -0.4	31623.00	-15.8	-16.50	-0.70	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Sound Level Meter Model: 820A Serial Number: A1939 Certificate of C-Weight Electrical Conformance

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dBSPL. The instrument's C-weighted response was then electrically tested using a 1.9 Vrms sinewave at exact frequencies as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.



Freq (Hz)	Theor	Measured	Error	Tolerance	Freq (Hz)	Theor	Measured	Error	Tolerance
10.00	-14.3	-14.90	-0.60	+1.8, -1.8	630.96	0.0	0.00	0.00	+0.4, -0.4
12.59	-11.2	-11.80	-0.60	+1.5, -1.5	794.33	0.0	0.00	0.00	+0.4, -0.4
15.85	-8.5	-9.10	-0.60	+1.2, -1.2	1000.00	0.0	0.00	0.00	+0.4, -0.4
19.95	-6.2	-6.70	-0.50	+1.0, -1.0	1258.90	0.0	0.00	0.00	+0.4, -0.4
25.12	-4.4	-4.70	-0.30	+0.9, -0.9	1584.90	-0.1	-0.10	0.00	+0.4, -0.4
31.62	-3.0	-3.20	-0.20	+0.7, -0.7	1995.30	-0.2	-0.10	0.10	+0.4, -0.4
39.81	-2.0	-2.10	-0.10	+0.7, -0.7	2511.90	-0.3	-0.20	0.10	+0.4, -0.4
50.12	-1.3	-1.40	-0.10	+0.5, -0.5	3162.30	-0.5	-0.50	0.00	+0.4, -0.4
63.10	-0.8	-1.00	-0.20	+0.5, -0.5	3981.10	-0.8	-0.70	0.10	+0.4, -0.4
79.43	-0.5	-0.60	-0.10	+0.5, -0.5	5011.90	-1.3	-1.20	0.10	+0.5, -0.5
100.00	-0.3	-0.30	0.00	+0.5, -0.5	6309.60	-2.0	-1.80	0.20	+0.5, -0.7
125.89	-0.2	-0.20	0.00	+0.5, -0.5	7943.30	-3.0	-2.90	0.10	+0.5, -1.0
158.49	-0.1	-0.10	0.00	+0.5, -0.5	10000.00	-4.4	-4.30	0.10	+0.7, -1.3
199.53	0.0	0.00	0.00	+0.5, -0.5	12589.00	-6.2	-6.20	0.00	+1.0, -2.0
251.19	0.0	0.00	0.00	+0.5, -0.5	15849.00	-8.5	-8.60	-0.10	+1.0, -7.4
316.23	0.0	0.00	0.00	+0.4, -0.4	19953.00	-11.2	-11.30	-0.10	+1.0, -8.7
398.11	0.0	0.00	0.00	+0.4, -0.4	25119.00	-14.3	-14.30	0.00	+3.5, -9.6
501.19	0.0	0.00	0.00	+0.4, -0.4	31623.00	-17.7	-18.30	-0.60	+4.3, -10.7

This instrument is in compliance with IEC 60651 (2001-10) 6.1 and 9.2.2, ANSI S1.4-1983 5.1 and 8.2.1, and IEC 60804 (2001-10) 5.1 for Type 1 sound level meters when used with a Larson Davis Type 1 microphone.

Technician: Eric Olson Test Date: 13FEB2020

**Sound Level Meter Model: 820A Serial Number: A1939
Results of Burst Tests**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dBSPL. The instrument's C-weighted response to specific bursts was then electrically tested as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.

*** 2kHz tone burst (rep rate 40Hz) at 2, 12, 22 & 32 dB below upper limit of 129.6 dBSPL ***

Crest Factor	Test Level dBSPL	Cont Ref VRMS	Burst Ampl VRMS	Burst ON Time (ms)	Burst OFF Time (ms)	Ref Level dBSPL	Meas Burst Level	Burst Error	Type 1 Error Tolerance Limits
3	127.6	2.1380	4.5859	5.5	19.5	127.60	OVLD	0.00	+/- 0.5
5	127.6	2.1380	7.6411	2.0	23.0	127.60	OVLD	0.00	+/- 1.0
3	117.6	0.6761	1.4502	5.5	19.5	117.30	117.70	0.40	+/- 0.5
5	117.6	0.6761	2.4163	2.0	23.0	117.30	117.90	0.60	+/- 1.0
3	107.6	0.2138	0.4586	5.5	19.5	107.30	107.70	0.40	+/- 0.5
5	107.6	0.2138	0.7641	2.0	23.0	107.30	107.70	0.40	+/- 1.0
3	97.6	0.0676	0.1450	5.5	19.5	97.50	97.50	0.00	+/- 0.5
5	97.6	0.0676	0.2416	2.0	23.0	97.50	97.70	0.20	+/- 1.0

This instrument is in compliance with IEC 60651 (2001-10) 9.4.2 and ANSI S1.4-1983 8.4.2.

Technician: Eric Olson Test Date: 13FEB2020

Sound Level Meter Model: 820A Serial Number: A1939
Results of Burst Tests
****Failed**: Out of Limits**

This Type 1 Sound Level Meter (including attached PRM828 preamplifier and ADP005 18 pF input adapter) was calibrated with a reference 1kHz sine wave at a level of 114.0 dBSPL. The instrument's C-weighted response to specific bursts was then electrically tested as specified in IEC 60651 (2001-10) and ANSI S1.4-1983.

*** 2kHz tone burst (rep rate 40Hz) at 2, 12, 22 & 32 dB below upper limit of 129.6 dBSPL ***

Crest Factor	Test Level dBSPL	Cont Ref VRMS	Burst Ampl VRMS	Burst ON Time (ms)	Burst OFF Time (ms)	Ref Level dBSPL	Meas Burst Level	Burst Error	Type 1 Error Tolerance Limits
3	127.6	2.1380	4.5859	5.5	19.5	127.60	OVL	0.00	+/- 0.5
5	127.6	2.1380	7.6411	2.0	23.0	127.60	OVL	0.00	+/- 1.0
3	117.6	0.6761	1.4502	5.5	19.5	117.40	118.00	0.60*	+/- 0.5
5	117.6	0.6761	2.4163	2.0	23.0	117.40	118.30	0.90	+/- 1.0
3	107.6	0.2138	0.4586	5.5	19.5	107.40	108.00	0.60*	+/- 0.5
5	107.6	0.2138	0.7641	2.0	23.0	107.40	108.10	0.70	+/- 1.0
3	97.6	0.0676	0.1450	5.5	19.5	97.50	97.80	0.30	+/- 0.5
5	97.6	0.0676	0.2416	2.0	23.0	97.50	98.10	0.60	+/- 1.0

As Received

This instrument is NOT in compliance with IEC 60651 (2001-10) 9.4.2 and ANSI S1.4-1983 8.4.2.

Technician: Eric Olson Test Date: 13FEB2020

Calibration Certificate

Certificate Number 2020013306

Customer:

BRC Engineering
Skypark, #C-4
21870 Eighth Street East
Sonoma, CA 95476, United States

Model Number LxT1
Serial Number 0006320
Test Results **Pass**

Initial Condition As Manufactured

Description SoundTrack LxT Class 1
Class 1 Sound Level Meter
Firmware Revision: 2.404

Procedure Number D0001.8378

Technician Ron Harris

Calibration Date 1 Dec 2020

Calibration Due

Temperature 23.09 °C ± 0.25 °C

Humidity 52.7 %RH ± 2.0 %RH

Static Pressure 86.91 kPa ± 0.13 kPa

Evaluation Method Tested electrically using Larson Davis PRMLxT1L S/N 069991 and a 12.0 pF capacitor to simulate microphone capacitance. Data reported in dB re 20 µPa assuming a microphone sensitivity of 23.6 mV/Pa.

Compliance Standards Compliant to Manufacturer Specifications and the following standards when combined with Calibration Certificate from procedure D0001.8384:

IEC 60651:2001 Type 1

IEC 60804:2000 Type 1

IEC 61252:2002

IEC 61672:2013 Class 1

IEC 61260:2001 Class 1

ANSI S1.4-2014 Class 1

ANSI S1.4 (R2006) Type 1

ANSI S1.25 (R2007)

ANSI S1.43 (R2007) Type 1

ANSI S1.11 (R2009) Class 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 17025:2017. **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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Correction data from Larson Davis LxT Manual for SoundTrack LxT & SoundExpert Lxt, I770.01 Rev O Supporting Firmware Version 4.0.5, 2019-09-10

Calibration Check Frequency: 1000 Hz; Reference Sound Pressure Level: 114 dB re 20 µPa

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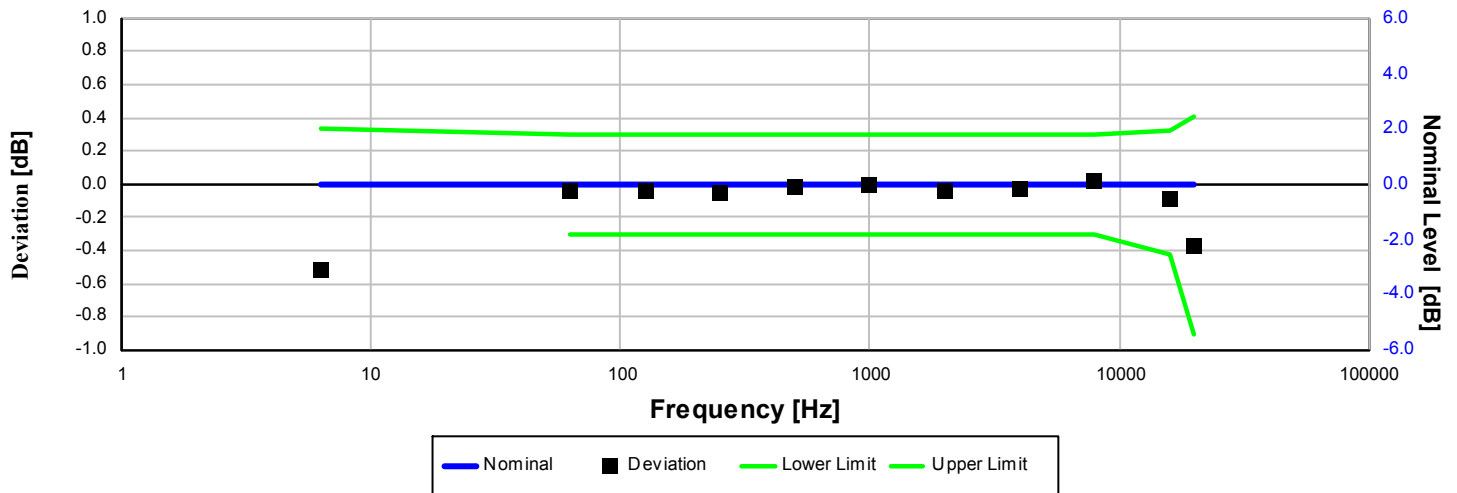
1681 West 820 North
Provo, UT 84601, United States
716-684-0001



Description	Standards Used		
	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	2020-05-12	2021-05-12	006943
SRS DS360 Ultra Low Distortion Generator	2020-01-24	2021-01-24	007710



Z-weight Filter Response



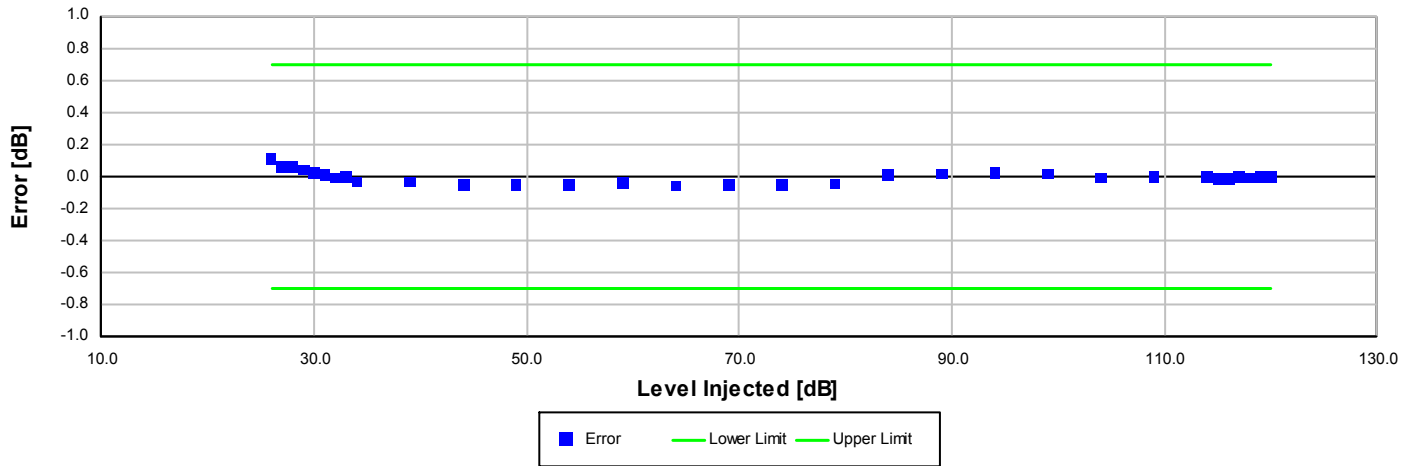
Electrical signal test of frequency weighting performed according to IEC 61672-3:2013 13 and ANSI S1.4-2014 Part 3: 13 for compliance to IEC 61672-1:2013 5.5; IEC 60651:2001 6.1 and 9.2.2; IEC 60804:2000 5; ANSI S1.4:1983 (R2006) 5.1 and 8.2.1; ANSI S1.4-2014 Part 1: 5.5

Frequency [Hz]	Test Result [dB]	Deviation [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
6.31	-0.51	-0.51	-1.11	0.33	0.15	Pass
63.10	-0.04	-0.04	-0.30	0.30	0.15	Pass
125.89	-0.04	-0.04	-0.30	0.30	0.15	Pass
251.19	-0.05	-0.05	-0.30	0.30	0.15	Pass
501.19	-0.02	-0.02	-0.30	0.30	0.15	Pass
1,000.00	0.00	0.00	-0.30	0.30	0.15	Pass
1,995.26	-0.03	-0.03	-0.30	0.30	0.15	Pass
3,981.07	-0.02	-0.02	-0.30	0.30	0.15	Pass
7,943.28	0.03	0.03	-0.30	0.30	0.15	Pass
15,848.93	-0.09	-0.09	-0.42	0.32	0.15	Pass
19,952.62	-0.37	-0.37	-0.91	0.41	0.15	Pass

-- End of measurement results--



A-weighted Broadband Log Linearity: 8,000.00 Hz



Broadband level linearity performed according to IEC 61672-3:2013 16 and ANSI S1.4-2014 Part 3: 16 for compliance to IEC 61672-1:2013 5.6, IEC 60804:2000 6.2, IEC 61252:2002 8, ANSI S1.4 (R2006) 6.9, ANSI S1.4-2014 Part 1: 5.6, ANSI S1.43 (R2007) 6.2

Level [dB]	Error [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
26.00	0.11	-0.70	0.70	0.16	Pass
27.00	0.06	-0.70	0.70	0.16	Pass
28.00	0.06	-0.70	0.70	0.17	Pass
29.00	0.04	-0.70	0.70	0.16	Pass
30.00	0.03	-0.70	0.70	0.35	Pass
31.00	0.01	-0.70	0.70	0.16	Pass
32.00	-0.01	-0.70	0.70	0.16	Pass
33.00	-0.01	-0.70	0.70	0.16	Pass
34.00	-0.03	-0.70	0.70	0.16	Pass
39.00	-0.03	-0.70	0.70	0.16	Pass
44.00	-0.05	-0.70	0.70	0.16	Pass
49.00	-0.05	-0.70	0.70	0.16	Pass
54.00	-0.05	-0.70	0.70	0.16	Pass
59.00	-0.04	-0.70	0.70	0.16	Pass
64.00	-0.06	-0.70	0.70	0.16	Pass
69.00	-0.05	-0.70	0.70	0.16	Pass
74.00	-0.05	-0.70	0.70	0.16	Pass
79.00	-0.04	-0.70	0.70	0.16	Pass
84.00	0.01	-0.70	0.70	0.16	Pass
89.00	0.02	-0.70	0.70	0.16	Pass
94.00	0.02	-0.70	0.70	0.16	Pass
99.00	0.02	-0.70	0.70	0.16	Pass
104.00	-0.01	-0.70	0.70	0.15	Pass
109.00	0.00	-0.70	0.70	0.15	Pass
114.00	0.00	-0.70	0.70	0.15	Pass
115.00	-0.01	-0.70	0.70	0.15	Pass
116.00	-0.01	-0.70	0.70	0.15	Pass
117.00	0.00	-0.70	0.70	0.15	Pass
118.00	-0.01	-0.70	0.70	0.15	Pass
119.00	0.00	-0.70	0.70	0.15	Pass
120.00	0.00	-0.70	0.70	0.15	Pass

-- End of measurement results--



Peak Rise Time

Peak rise time performed according to IEC 60651:2001 9.4.4 and ANSI S1.4:1983 (R2006) 8.4.4

Amplitude [dB]	Duration [μs]		Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
116.15	40	Negative Pulse	117.28	116.06	118.06	0.15	Pass
		Positive Pulse	117.16	116.02	118.02	0.15	Pass
	30	Negative Pulse	116.51	116.06	118.06	0.15	Pass
		Positive Pulse	116.50	116.02	118.02	0.15	Pass

-- End of measurement results--

Positive Pulse Crest Factor

200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVLD	± 0.50	0.15 ‡	Pass
	5	OVLD	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
104.15	3	-0.16	± 0.50	0.15 ‡	Pass
	5	-0.16	± 1.00	0.16 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
94.15	3	-0.13	± 0.50	0.15 ‡	Pass
	5	-0.14	± 1.00	0.15 ‡	Pass
	10	-0.02	± 1.50	0.15 ‡	Pass
84.15	3	-0.14	± 0.50	0.15 ‡	Pass
	5	-0.14	± 1.00	0.15 ‡	Pass
	10	-0.09	± 1.50	0.15 ‡	Pass

-- End of measurement results--

Negative Pulse Crest Factor

200 μs pulse tests at 2.0, 12.0, 22.0, 32.0 dB below Overload Limit

Crest Factor measured according to IEC 60651:2001 9.4.2 and ANSI S1.4:1983 (R2006) 8.4.2

Amplitude [dB]	Crest Factor	Test Result [dB]	Limits [dB]	Expanded Uncertainty [dB]	Result
114.15	3	OVLD	± 0.50	0.15 ‡	Pass
	5	OVLD	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
104.15	3	-0.15	± 0.50	0.15 ‡	Pass
	5	-0.14	± 1.00	0.15 ‡	Pass
	10	OVLD	± 1.50	0.15 ‡	Pass
94.15	3	-0.14	± 0.50	0.15 ‡	Pass
	5	-0.13	± 1.00	0.15 ‡	Pass
	10	0.00	± 1.50	0.15 ‡	Pass
84.15	3	-0.12	± 0.50	0.15 ‡	Pass
	5	-0.15	± 1.00	0.15 ‡	Pass
	10	-0.09	± 1.50	0.15 ‡	Pass

-- End of measurement results--



Gain

Gain measured according to IEC 61672-3:2013 17.3 and 17.4 and ANSI S1.4-2014 Part 3: 17.3 and 17.4

Measurement	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
0 dB Gain	84.01	83.90	84.10	0.15	Pass
0 dB Gain, Linearity	21.15	20.30	21.70	0.16	Pass
OBA Low Range	84.00	83.90	84.10	0.15	Pass
OBA Normal Range	84.00	83.20	84.80	0.15	Pass

-- End of measurement results--

Broadband Noise Floor

Self-generated noise measured according to IEC 61672-3:2013 11.2 and ANSI S1.4-2014 Part 3: 11.2

Measurement	Test Result [dB]	Upper limit [dB]	Result
A-weight Noise Floor	7.28	16.00	Pass
C-weight Noise Floor	11.58	18.00	Pass
Z-weight Noise Floor	19.73	25.00	Pass

-- End of measurement results--

Total Harmonic Distortion

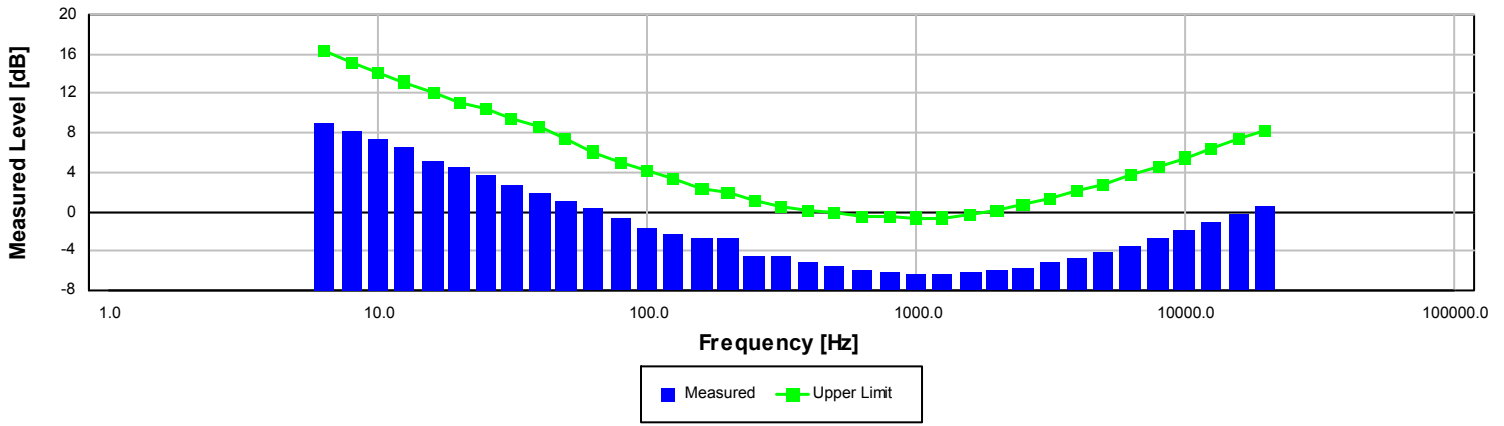
Measured using 1/3-Octave filters

Measurement	Test Result [dB]	Lower Limit [dB]	Upper Limit [dB]	Expanded Uncertainty [dB]	Result
10 Hz Signal	113.15	112.35	113.95	0.15	Pass
THD	-57.05		-50.00	0.00 ‡	Pass
THD+N	-55.45		-50.00	0.00 ‡	Pass

-- End of measurement results--



1/3-Octave Self-Generated Noise



The SLM is set to low range.

Frequency [Hz]	Test Result [dB]	Upper limit [dB]	Result
6.30	8.96	16.30	Pass
8.00	8.29	15.20	Pass
10.00	7.49	14.20	Pass
12.50	6.63	13.20	Pass
16.00	5.23	12.10	Pass
20.00	4.65	11.10	Pass
25.00	3.87	10.40	Pass
31.50	2.76	9.40	Pass
40.00	1.96	8.60	Pass
50.00	1.07	7.40	Pass
63.00	0.39	6.10	Pass
80.00	-0.78	5.00	Pass
100.00	-1.67	4.20	Pass
125.00	-2.34	3.30	Pass
160.00	-2.63	2.40	Pass
200.00	-2.65	1.90	Pass
250.00	-4.46	1.20	Pass
315.00	-4.64	0.60	Pass
400.00	-5.23	0.20	Pass
500.00	-5.52	-0.10	Pass
630.00	-6.01	-0.50	Pass
800.00	-6.15	-0.50	Pass
1,000.00	-6.30	-0.60	Pass
1,250.00	-6.30	-0.60	Pass
1,600.00	-6.24	-0.20	Pass
2,000.00	-5.94	0.20	Pass
2,500.00	-5.68	0.70	Pass
3,150.00	-5.19	1.40	Pass
4,000.00	-4.68	2.10	Pass
5,000.00	-4.10	2.80	Pass
6,300.00	-3.45	3.70	Pass
8,000.00	-2.74	4.60	Pass
10,000.00	-1.96	5.50	Pass
12,500.00	-1.14	6.40	Pass
16,000.00	-0.32	7.40	Pass
20,000.00	0.53	8.30	Pass

-- End of measurement results--



-- End of Report--

Signatory: Ron Harris

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



Calibration Certificate

Certificate Number 2021011648

Customer:

Illingworth & Rodkin Inc
429 E Cotati Avenue
Cotati, CA 94931, United States

Model Number	CAL200	Procedure Number	D0001.8386
Serial Number	3012	Technician	Scott Montgomery
Test Results	Pass	Calibration Date	17 Sep 2021
Initial Condition	Adjusted	Calibration Due	17 Sep 2023
Description	Larson Davis CAL200 Acoustic Calibrator	Temperature	23 °C ± 0.3 °C
		Humidity	31 %RH ± 3 %RH
		Static Pressure	101.3 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
Larson Davis Model 2900 Real Time Analyzer	04/01/2021	04/01/2022	001051
Agilent 34401A DMM	03/02/2021	03/02/2022	002588
Microphone Calibration System	02/24/2021	02/24/2022	005446
1/2" Preamplifier	08/26/2021	08/26/2022	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/09/2021	08/09/2022	006507
1/2 inch Microphone - RI - 200V	09/24/2020	09/24/2021	006511
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Pressure Transducer	06/28/2021	06/28/2022	007310

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



Initial Assessment

Certificate Number 2021011647

Customer:

Illingworth & Rodkin Inc
429 E Cotati Avenue
Cotati, CA 94931, United States

Model Number	CAL200	Procedure Number	D0001.8386
Serial Number	3012	Technician	Scott Montgomery
Test Results	Pass	Calibration Date	17 Sep 2021
Initial Condition	As Received	Calibration Due	17 Sep 2023
Description	Larson Davis CAL200 Acoustic Calibrator	Temperature	23 °C ± 0.3 °C
		Humidity	31 %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
Larson Davis Model 2900 Real Time Analyzer	04/01/2021	04/01/2022	001051
Agilent 34401A DMM	03/02/2021	03/02/2022	002588
Microphone Calibration System	02/24/2021	02/24/2022	005446
1/2" Pre-amplifier	08/26/2021	08/26/2022	006506
Larson Davis 1/2" Pre-amplifier 7-pin LEMO	08/09/2021	08/09/2022	006507
1/2 inch Microphone - RI - 200V	09/24/2020	09/24/2021	006511
Hart Scientific 2626-H Temperature Probe	02/04/2021	08/04/2022	006767
Pressure Transducer	06/28/2021	06/28/2022	007310

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.0	114.00	113.80	114.20	0.14	Pass
94	101.3	94.00	93.80	94.20	0.15	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
114	101.0	1,000.15	990.00	1,010.00	0.20	Pass
94	101.3	1,000.18	990.00	1,010.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.0	0.28	0.00	2.00	0.25 ‡	Pass
94	101.3	0.35	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	108.1	-0.04	-0.30	0.30	0.04 ‡	Pass
101.3	101.4	0.00	-0.30	0.30	0.04 ‡	Pass
92.0	92.1	0.03	-0.30	0.30	0.04 ‡	Pass
83.0	83.0	0.03	-0.30	0.30	0.04 ‡	Pass
74.0	73.8	-0.03	-0.30	0.30	0.04 ‡	Pass
65.0	65.0	-0.17	-0.30	0.30	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	108.1	0.00	-10.00	10.00	0.20 ‡	Pass
101.3	101.4	0.00	-10.00	10.00	0.20 ‡	Pass
92.0	92.1	0.00	-10.00	10.00	0.20 ‡	Pass
83.0	83.0	0.00	-10.00	10.00	0.20 ‡	Pass
74.0	73.8	0.00	-10.00	10.00	0.20 ‡	Pass
65.0	65.0	0.00	-10.00	10.00	0.20 ‡	Pass

-- End of measurement results--

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.4	114.10	113.80	114.20	0.14	Pass
94	101.2	94.09	93.80	94.20	0.14	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
114	101.4	1,000.14	990.00	1,010.00	0.20	Pass
94	101.2	1,000.16	990.00	1,010.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.4	0.28	0.00	2.00	0.25 ‡	Pass
94	101.2	0.34	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	108.1	-0.04	-0.30	0.30	0.04 ‡	Pass
101.3	101.4	0.00	-0.30	0.30	0.04 ‡	Pass
92.0	92.1	0.03	-0.30	0.30	0.04 ‡	Pass
83.0	83.0	0.03	-0.30	0.30	0.04 ‡	Pass
74.0	73.8	-0.03	-0.30	0.30	0.04 ‡	Pass
65.0	65.0	-0.17	-0.30	0.30	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	108.1	0.00	-10.00	10.00	0.20 ‡	Pass
101.3	101.4	0.00	-10.00	10.00	0.20 ‡	Pass
92.0	92.1	0.00	-10.00	10.00	0.20 ‡	Pass
83.0	83.0	0.00	-10.00	10.00	0.20 ‡	Pass
74.0	73.8	0.00	-10.00	10.00	0.20 ‡	Pass
65.0	65.0	0.00	-10.00	10.00	0.20 ‡	Pass

-- End of measurement results--



Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	108.1	0.29	0.00	2.00	0.25 ‡	Pass
101.3	101.4	0.28	0.00	2.00	0.25 ‡	Pass
92.0	92.1	0.27	0.00	2.00	0.25 ‡	Pass
83.0	83.0	0.26	0.00	2.00	0.25 ‡	Pass
74.0	73.8	0.25	0.00	2.00	0.25 ‡	Pass
65.0	65.0	0.26	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: Scott Montgomery

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 Provo, UT 84601, United States
 716-684-0001



Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 23 °C, 31 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	108.1	0.29	0.00	2.00	0.25 ‡	Pass
101.3	101.4	0.28	0.00	2.00	0.25 ‡	Pass
92.0	92.1	0.27	0.00	2.00	0.25 ‡	Pass
83.0	83.0	0.26	0.00	2.00	0.25 ‡	Pass
74.0	73.8	0.25	0.00	2.00	0.25 ‡	Pass
65.0	65.0	0.26	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: Scott Montgomery

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