

West Caldwell Calibration Laboratories Inc.

Certificate of Calibration

for

MICROPHONE

Manufactured by: BRUEL & KJAER
Model No: 4144
Serial No: 1138370
Calibration Recall No: 12047

Submitted By:

Customer: STANLEY CHRISTOPHER
Company: WEST CALDWELL CAL.LABS.INC.
Address: 5200 DIXIE ROAD
MISSISSAUGA, ONT. L4W1E4

The subject instrument was calibrated to the indicated specification using standards traceable to the National Institute of Standards and Technology or to accepted values of natural physical constants. This document certifies that the instrument met the following specification upon its return to the submitter.

West Caldwell Calibration Laboratories Procedure No. 4144 BRUE

Upon receipt for Calibration, the instrument was found to be:

Within (X) see attached Report of Calibration.

the tolerance of the indicated specification.

West Caldwell Calibration Laboratories' calibration control system meets the requirements, MIL-STD-45662A, ANSI/NCSL Z540-1, IEC Guide 25, ISO 9002 and ISO 17025.

Note: With this Certificate, Report of Calibration is included.

Approved by:

Calibration Date: 17-Nov-03



Certificate No: 12047 - 6

Felix Christopher
Quality Manager

QA Doc. #1051 Rev. 2.0 10/1/01

Certificate Page 1 of 1

West Caldwell Calibration Laboratories, Inc.
uncompromised calibration
1575 State Route 96, Victor, NY 14564, U.S.A.



ANSI/NCSL Z540-1-1994
MIL-STD-45662A
CALIBRATION TRACEABLE
TO N. I. S. T.



Phone: (585) 586 - 3900 Fax: (585) 586 - 4327

West Caldwell Calibration Laboratories, Inc.
 uncompromised calibration
 1575 State Route 96, Victor NY 14564

ACCREDITATION
 ISO 17025



ANSI/NCSL Z540-1:1994
 MIL-STD-45662A

CALIBRATION TRACEABLE
 TO N I S T.

ISO 9002 REGISTERED
 COMPANY



1533.01

84542

REPORT OF CALIBRATION

for

**Brüel & Kjær Microphone
 Company : WCCL Inc.**

Model No.: 4144

Serial No.: 1138370

I. D. No.: XXXX

Calibration results:

Open Circuit Sensitivity @ 250 Hz and pressure of 99.878 kPa
 200 Volts Polarization voltage (External):
-26.22 dB re.1V/Pascal
48.86 mV/Pascal
0.22 Ko (- dB re 50 mV/Pascal)
 Sensitivity: **Pass**
 Freq. Response **Pass**
 All tests: **Pass**

Before data: After data:
 Before & after data same:
 Ambient Temperature: **21.9 °C**
 Ambient Humidity: **30.0 % RH**
 Ambient Pressure: **99.88 kPa**
 Calibration Date: **17-Nov-2003 9:47 AM**
 Re-calibration Due: **17-Nov-2004**
 Report Number: **12047 -6**
 Control Number: **12047**

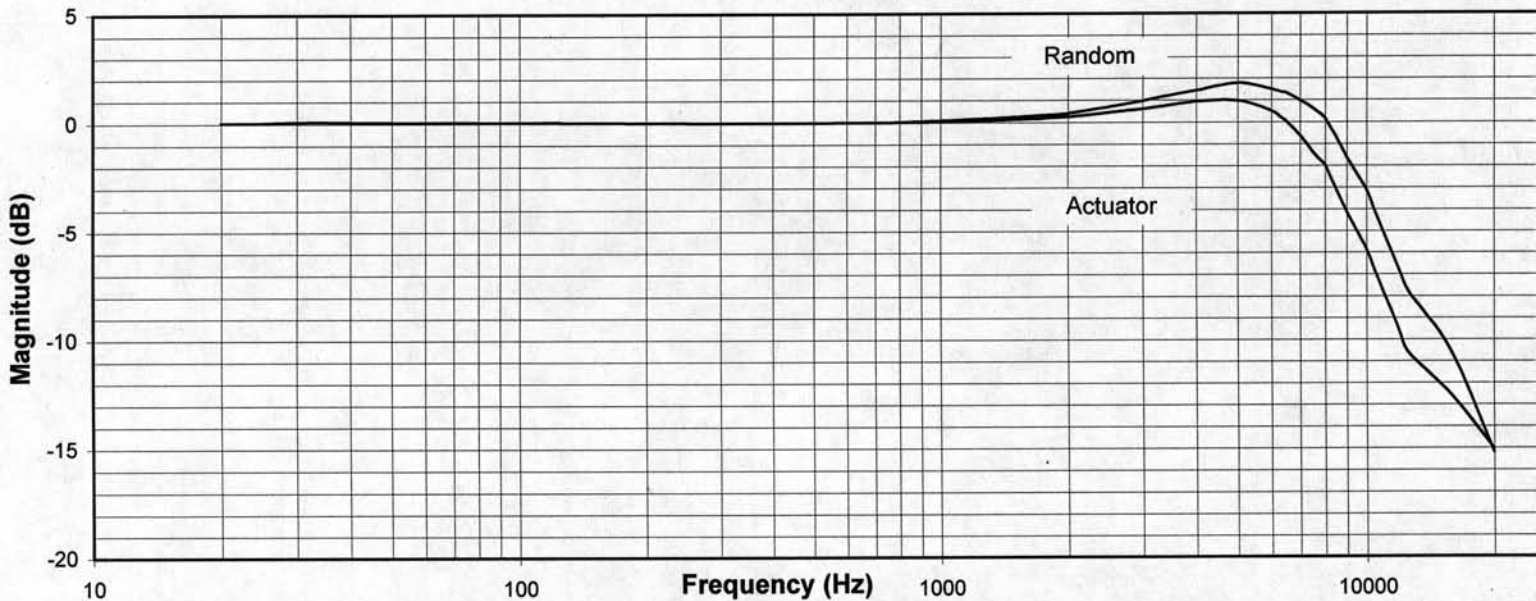
The above listed instrument meets or exceeds the tested manufacturer's specifications.

This Calibration is traceable through NIST test numbers: 822/267453-02

The absolute uncertainty of calibration: 0.18dB at 95% confidence level. Unless otherwise noted, the reported values are both "as found" and "as left" data.


The lower curve is the pressure response recorded with electrostatic actuator.

Frequency Response



The above listed instrument was checked using calibration procedure documented in West Caldwell Calibration Laboratories Inc. procedure : **Rev. 3.0 Nov. 12, 2003 Doc. # 1038 4144B&K**

Calibration was performed by West Caldwell Calibration Laboratories Inc. under Operating Procedures intended to implement the requirements of IEC Guide 25, ANSI/NCSL Z540-1, (MIL-STD-45662A) and ISO 9002, ISO 17025

Measurements performed by: 
Felix Christopher

Calibrated on WCCL system type 9700

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Rev. 3.0 Nov. 12, 2003 Doc. # 1038 4144B&K

West Caldwell Calibration Laboratories Inc.

1575 State Route 96, Victor NY 14564
Tel. (585) 586-3900 FAX (585) 586-4327

Calibration Data Record

for

Brüel & Kjær Microphone

Model No.: 4144

Serial No.: 1138370

I. D. No.: XXXX

Company : WCCL Inc.

Frequency Response (Reference = 0 dB @ 251.19Hz)

Frequency [Hz]	Actuator [dB]	Random (dB)	Frequency [Hz]	Actuator [dB]	Random (dB)
19.95	0.03	0.03	1258.93	0.09	0.19
25.12	0.06	0.06	1500.00	0.14	0.26
31.62	0.09	0.09	1584.89	0.15	0.29
39.81	0.08	0.08	1995.26	0.26	0.41
50.12	0.06	0.06	2000.00	0.26	0.41
63.10	0.06	0.06	2511.89	0.46	0.71
79.43	0.05	0.05	3000.00	0.61	0.97
100.00	0.04	0.04	3162.28	0.68	1.08
125.00	0.06	0.06	3981.07	0.95	1.45
125.89	0.03	0.03	4000.00	0.95	1.45
158.49	0.02	0.02	5011.87	0.98	1.78
199.53	0.01	0.01	6000.00	0.50	1.50
250.00	0.01	0.01	6309.57	0.22	1.37
251.19	0.00	0.00	7943.28	-1.89	0.24
316.23	0.00	0.00	8000.00	-1.99	0.14
398.11	0.00	0.00	10000.00	-5.88	-3.13
500.00	0.00	0.00	12000.00	-9.76	-6.96
501.19	0.00	0.00	12589.25	-10.65	-7.85
630.96	0.00	0.00	15848.93	-12.59	-10.59
750.00	0.01	0.01	19952.62	-15.03	-15.18
794.33	0.02	0.02			
1000.00	0.04	0.09			

4144 S/N 1138370	
Cal. Date: 17-Nov-2003	
Table for audiometric	
Measurements (Ref. = 0dB @ 1kHz)	
Frequency [Hz]	Actuator [dB]
125	0.01
250	-0.04
500	-0.05
750	-0.03
1000	0.00
1500	0.09
2000	0.22
3000	0.57
4000	0.91
6000	0.46
8000	-2.04
12000	-9.81

Instruments used for calibration:	Date of Cal.	Traceability No.	Re-cal. Due Date
Brüel & Kjær 4144 S/N 1410002	6-Jun-2003	822/267453-02	5-Jun-2004
Brüel & Kjær 2636 S/N 1324082	23-Apr-2003	822/268904-03	22-Apr-2004
HP 34401A S/N US360641	18-Sep-2003	4401W092504	17-Sep-2004
Brüel & Kjær 2639 S/N 1748586	11-Jun-2003	822/263868-00	10-Jun-2004
HP 34401A S/N US361024	10-Sep-2003	4401W092504	9-Sep-2004
HP 33120A S/N S3604371	10-Sep-2003	4401W092504	9-Sep-2004

Cal. Date: 17-Nov-2003 9:47 AM

Tested by: Felix Christopher

Calibrated on WCCL system type 9700

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Rev. 3.0 Nov. 12, 2003 Doc. # 1038 4144B&K

West Caldwell Calibration Laboratories Inc.

1575 State Route 96, Victor NY 14564
Tel. (585) 586-3900 FAX (585) 586-4327

Calibration Data Record

for

Audiometric Calibration with the instruments listed**Brüel & Kjær Microphone****Model No: 4144****S/N: 1138370****ANSI S3.6 1996****Company: WCCL Inc.****Microphone corrections.****Calibration in decibels is referenced to 20uN/m²****Decibel levels are given for LIN FLAT response position**

Freq. Hz.	125	250	500	750	1000	1500	2000	3000	4000	6000	8000	12000
Mic. Response Ref. 0dB @ 1kHz	0.0	0.0	0.0	0.0	0.0	0.1	0.2	0.6	0.9	0.5	-2.0	-9.9

Freq. Hz.	125	250	500	750	1000	1500	2000	3000	4000	6000	8000	12000
Mic. Correction Ref. 0dB @ 1kHz	0.0	0.0	0.0	0.0	0.0	-0.1	-0.2	-0.6	-0.9	-0.5	2.0	9.9

ANSI S3.6 1996**Calibration in decibels is referenced to 20uN/m²****Decibel levels are given for LIN FLAT response position****Decibel levels given in the chart are corrected level readings for 70dB HL****If you need to calibrate at 90dB HL, add 20dB to the values given below.**

Freq. Hz.	125	250	500	750	Ref. 1000	1500	2000	3000	4000	6000	8000	12000
TDH-39 dB	115.0	95.5	81.5	78.0	77.0	76.6	79.2	80.6	80.4	86.0	81.0	N/A
TDH-50 dB	117.5	96.7	83.5	78.5	77.5	77.6	81.2	80.1	81.4	84.0	81.0	77.6
TDH-49 & 50 dB	117.5	96.7	83.5	78.5	77.5	77.6	81.2	80.1	81.4	84.0	81.0	
TELEX 1470 dB	115.0	95.0	80.0	76.5	73.0	75.1	74.2	75.6	76.9	78.0	77.0	
TELEX 1470A dB	117.0	97.5	83.0	78.5	76.5	75.1	78.2	78.1	79.9	88.0	85.5	
Audiometer Tol. dB	+ - 3	+ - 3	+ - 3	+ - 3	+ - 3	+ - 3	+ - 3	+ - 3	+ - 3	+ - 5	+ - 5	

Calibration Date: 17-Nov-03**Tested by: Felix Christopher**