



**Delehanty Hall**  
**3rd Floor**  
**University Of Vermont**  
**Burlington, Vermont**  
**Precision Balancing # 2047**  
**October, 2008**

# PRECISION BALANCING LLC

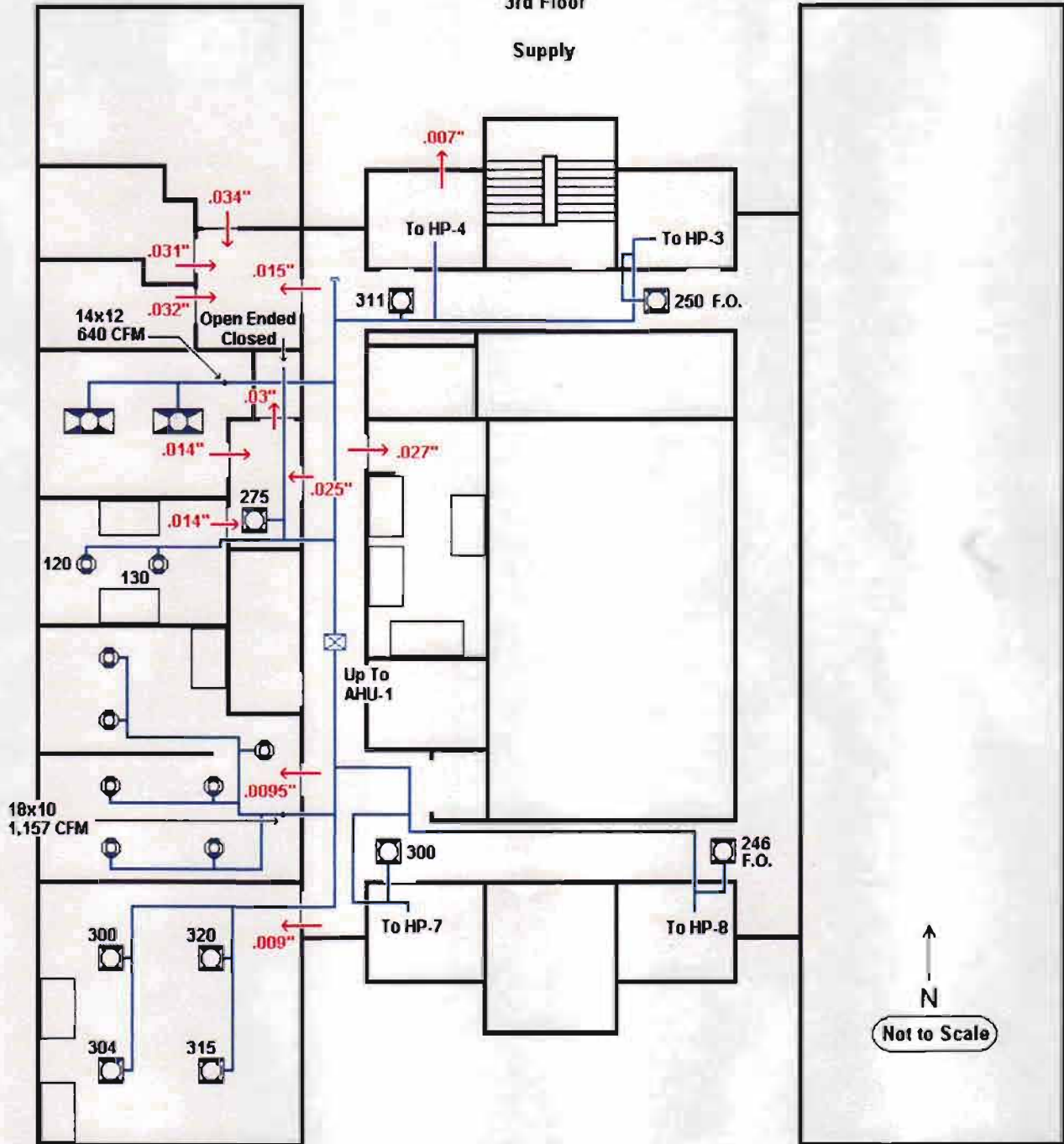
SAVE ENERGY • BE COMFORTABLE • GET BALANCED!

Delehanty Hall  
University Of Vermont  
UVM (Mike Stevens)  
Precision Balancing # 2047

October 17, 2008

3rd Floor

Supply



# PRECISION BALANCING LLC

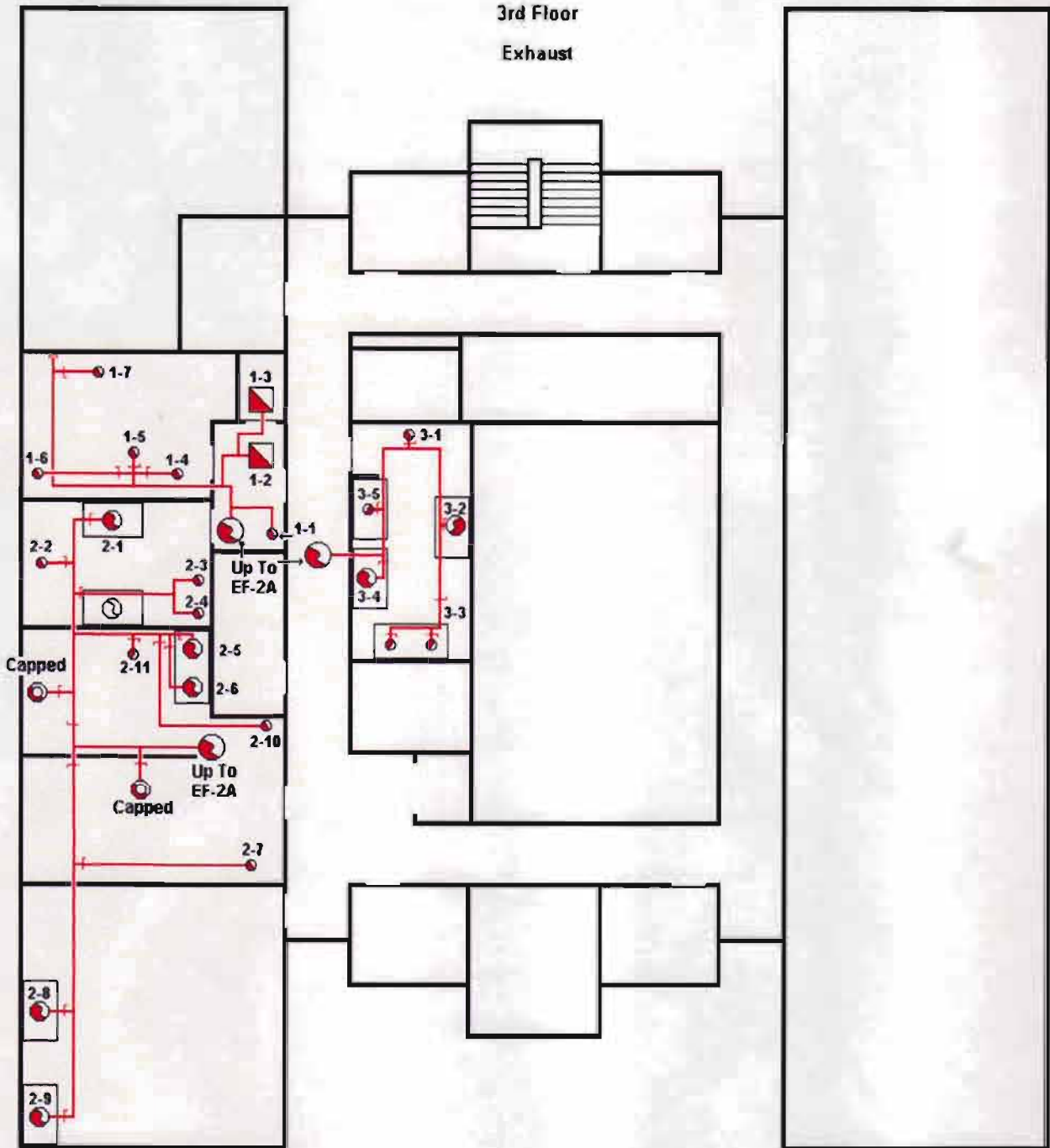
SAVE ENERGY • BE COMFORTABLE • GET BALANCED!

Delehanty Hall  
University Of Vermont  
UVM (Mike Stevens)  
Precision Balancing # 2047

October 8, 2008

3rd Floor

Exhaust



# PRECISION BALANCING LLC

**SAVE ENERGY • BE COMFORTABLE • GET BALANCED!**

Precision Balancing No. 2047		Contractor No. UVM ( Mike Stevens)	
Contract No.	Job Name: Delahanty Hall 3rd Floor	Technician: PM & DC	
Project: 2047e2ap	Location: Burlington, Vermont	Date: 9-26-08	

## Air Apparatus Test Report

**System/Unit:** Exhaust Fan EF-2A (Pre-Reading)

### UNIT DATA

Make	MK Plastics	Class/Discharge	/
Model No.	DHK 3000	Tag No.	EF-2A
Serial No.	MK Job # 13621-1	Location	Penthouse

### MOTOR DATA

Make	WEG	Model / Part No.	02518EP3E284T	RPM	1760
Frame	284T	Volts / Phase /Hz	208-230-460 / 3 / 60	S.F.	N/A
H.P.	25	Full Load Amps	59.3 - 29.6	Flac	59.2
Measured Volts	208.4 208.5 208.0	Measured Amps	34 34 34.2	BHP	14.4

### DRIVE DATA

Fan Data			Motor Data		
Sheave Size / Make	4B80 SK		Sheave Size / Make	4MVP50B64 x 1 7/8"	
Bushing / Bore Size	SK		Bushing / Bore Size	1 7/8"	
No. Belts / Make / Size	(4) Carlisle / B65		Sheave C to C	21.5"	
Fan Design RPM	1,503	Fan Actual RPM	1,246	Motor Actual RPM	1,781

### AIR DATA

	Design	Actual		Design	Actual
Total CFM	14,000 (Rated)	N/A	Total S.P.	6.0"	5.85"
O.A. CFM	Exhaust Fan	/	Disch. S. P.		Atmospheric
Ret. Air CFM	Exhaust Fan	/	Suc. S. P.		5.85" Neg
Pre-Heat S.P. Drop	/	Cooling Coil S.P. Drop	/	Re-Heat S.P. Drop	/
Pre-Filter S.P. Drop	/	Hi Eff. Filter S.P. Drop	/		
Vortex Damp. Pos.	/	O.A. Damper Pos.	/	Ret. Air Damp Pos.	/

### NOTES

# PRECISION BALANCING LLC

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Precision Balancing No. 2047		Contractor No. UVM ( Mike Stevens)	
Contract No.	Job Name: Delahanty Hall 3rd Floor	Technician: PM & DC	
Project: 2047e2af	Location: Burlington, Vermont	Date: 10-8-08	

## Air Apparatus Test Report

**System/Unit: Exhaust Fan EF-2A (Final Reading)**

### UNIT DATA

Make	MK Plastics	Class/Discharge	/
Model No.	DHK 3000	Tag No.	EF-2A
Serial No.	MK Job # 13621-1	Location	Penthouse

### MOTOR DATA

Make	WEG	Model / Part No.	02518EP3E284T	RPM	1760
Frame	284T	Volts / Phase / Hz	208-230-460 / 3 / 60	S.F.	N/A
H.P.	25	Full Load Amps	59.3 - 29.6	Flac	58.5
Measured Volts	210.7 211.7 210.1	Measured Amps	23.6 24.5 25.3	BHP	10.3

### DRIVE DATA

Fan Data			Motor Data		
Sheave Size / Make	4B80 SK		Sheave Size / Make	4B46 SD Martin	
Bushing / Bore Size	SK		Bushing / Bore Size	SD 1 7/8"	
No. Belts / Make / Size	(4) Carlisle / B60		Sheave C to C	20.75"	
Fan Design RPM	1,503	Fan Actual RPM	1,055	Motor Actual RPM	1,788

### AIR DATA

	Design	Actual		Design	Actual
Total CFM	14,000 (Rated)	7,057	Total S.P.	6.0"	4.0"
O.A. CFM	Exhaust Fan	/	Disch. S. P.	/	Atmospheric
Ret. Air CFM	Exhaust Fan	/	Suc. S. P.	/	4.0" neg.
Pre-Heat S.P. Drop	/	Cooling Coil S.P. Drop	/	Re-Heat S.P. Drop	/
Pre-Filter S.P. Drop	/	Hi Eff. Filter S.P. Drop	/		
Vortex Damp. Pos.	/	O.A. Damper Pos.	/	Ret. Air Damp Pos.	/

### NOTES

# PRECISION BALANCING LLC

**SAVE ENERGY • BE COMFORTABLE • GET BALANCED!**

Precision Balancing No. 2047		Contractor No. UVM (Mike Stevens)	
Contract No.	Job Name: Delehanty Hall	Technician: DC & PM	
Project: 2047exa	Location: UVM Burlington, Vermont	Date: 10-8-08	

## Diffuser, Register, & Grille Test Report

System/Unit: EF-2A

Area Served	Outlet Number	Type	Size	"K" Factor	Design		Pre CFM	Final		%Diff CFM	Statics
					FPM	CFM		FPM	CFM		
	1-1	PVC	2"	.022	2955	65		2996	66	1.5%	2.52"
	1-2	CE	10"	1	450	450		458	458	1.8%	
	1-3	CE	8"	1	300	300		302	302	0.7%	
	1-4	Galv.	4"	.087	575	50		535	47	-6.0%	2.8"
	1-5	Galv.	8"	.349	472	165		475	166	0.6%	3.2"
	1-6	Flex	3"	.049	2041	100		1915	94	-6.0%	.69"
	1-7	PVC	2"	.022	3409	75		3298	72	-4.0%	2.3"
FH-11	2-1	Hood	70.25x8	3.90	100	390		110	429	10.0%	
	2-2	Galv.	3"	.049	1531	75		1500	74	-1.3%	2.3"
	2-3	PVC	2"	.022	2273	50		2301	51	2.0%	.42"
	2-4	SS	4"	.087	2874	250		2837	247	-1.2%	.62"
FH-9	2-5, 6	Hood	84x19	11.08	100	1108		109	1208	9.0%	
	2-7	PVC	3"	.049	347	17		343	17	0.0%	2.7"
FH-8	2-8	Hood	62.5x17	7.38	100	738		107	790	7.0%	
FH-7	2-9	Hood	62.5x17	7.38	100	738		108	797	8.0%	
	2-10	PVC	3"	.049	408	20		400	20	0.0%	2.7"
	2-11	PVC	3"	.049	408	20		393	19	-5.0%	2.6"
<b>Total from Previous Page(s)</b>								<b>Previous Total</b>			
<b>Total</b>							<b>4611</b>	<b>Total</b>		<b>4857</b>	

**NOTES**

1.) Refer to drawing for exhaust locations.

2.) Flowhood used where 'K' factor equals (1) one.



# AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

Customer ID: 011144 S/N: M96891  
 Customer: PRECISION BALANCING LLC City: ESSEX JUNCTION State: VT  
 As-Received Model #: ADM-870 Converted to Model #: \_\_\_\_\_ Order #: R081389  
 PO #: \_\_\_\_\_ Customer Eqpt ID#: \_\_\_\_\_ Calibration Due Date: \_\_\_\_\_

This instrument has been calibrated using Calibration Standards which are traceable to NIST (National Institute of Standards and Technology). Quality Assurance Program and calibration procedures meet the requirements for ANSI/NCSS Z540-1-1994; MIL-STD 45662A and manufacturer's specifications. Calibration accuracy is certified when meters are used with properly functioning accessories only. All Uncertainties are expressed in expanded terms (twice the calculated uncertainty). This report shall not be reproduced, except in full, without the written approval of Shortridge Instruments, Inc. Results relate only to the item calibrated. For limitations on use, see Shortridge Instruments, Inc. Instruction Manual for the use of AirData Multimeters. Procedure used: Procedure for Differential Pressure, Absolute Pressure and Temperature Recalibration of AirData Multimeters SIP-CP02 Revision: 26 Dated: 03/31/06

Calibration Technician(s): A. Goulet, J. Thompson Calibration Date: 05-05-2008  
 Calibration Approved by: L. Normand Title: QA Mgr Date: 05-07-2008

AS-Received By <u>ag</u>	Final Test By <u>JW</u>	Test By _____
Date <u>04/25/08</u> Rh <u>28</u> %	Date <u>05/05/08</u> Rh <u>73</u> %	Date _____ Rh <u>PIA</u> %
Ambient Temperature <u>75</u> °F	Ambient Temperature <u>76</u> °F	Ambient Temperature _____ °F
Barometric Pressure <u>28.54</u> in Hg	Barometric Pressure <u>28.22</u> in Hg	Barometric Pressure _____ in Hg
Within spec <u>(YES)</u> NO NA	Within spec <u>(YES)</u> NO	Within spec YES NO

### ABSOLUTE PRESSURE TEST (in Hg)

TEST METER TOLERANCE = ± 2.0 % ± .1 in Hg AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A

Pressure Standard: Heise #02-R	S/N: 41741/42451	Calibration Date: 03/11/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #04-R	S/N: 41743/42453	Calibration Date: 10/07/07	Calibration Due Date: 10/2008	<u>(As-Rcvd)</u>	Test 2	Test 3
Pressure Standard: Heise #06-R	S/N: 41742/42452	Calibration Date: 02/19/08	Calibration Due Date: 02/2009	As-Rcvd	<u>(Test 2)</u>	Test 3
Pressure Standard: Heise #08-R	S/N: 42186/43328	Calibration Date: 03/05/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #10-R	S/N: 42203/43352	Calibration Date: 01/14/08	Calibration Due Date: 01/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #12-R	S/N: 43166/44731	Calibration Date: 03/26/07	Calibration Due Date: 03/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #14-R	S/N: 43412/45043	Calibration Date: 06/08/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3
Heise Model PPM-2 Mfgd by Dresser Industries Rated Accuracy: 0.05% fs (0.0305 in Hg) Range: 0-61 in Hg Resolution: 0.01 Uncertainty: < 0.0358						

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
14.0	14.18	14.2	.14	13.51	13.5	-.07			
28.4	28.54	28.6	.21	28.22	28.2	-.07			
40.0	40.60	40.6	0	40.48	40.4	-.20			

### DIFFERENTIAL PRESSURE TEST (in wc)

TEST METER TOLERANCE = ± 2.0 % ± 0.001 in wc AS-RECEIVED TEST WITHIN SPEC (YES) NO N/A

Pressure Standard: Heise #01-L	S/N: 41739/42449	Calibration Date: 03/15/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #01-R	S/N: 41739/42446	Calibration Date: 03/15/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #02-L	S/N: 41741/42454	Calibration Date: 03/15/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #03-L	S/N: 41738/42448	Calibration Date: 10/10/07	Calibration Due Date: 10/2008	<u>(As-Rcvd)</u>	Test 2	Test 3
Pressure Standard: Heise #03-R	S/N: 41738/42445	Calibration Date: 10/10/07	Calibration Due Date: 10/2008	<u>(As-Rcvd)</u>	Test 2	Test 3
Pressure Standard: Heise #04-L	S/N: 41743/42456	Calibration Date: 10/09/07	Calibration Due Date: 10/2008	<u>(As-Rcvd)</u>	Test 2	Test 3
Pressure Standard: Heise #05-L	S/N: 41740/42450	Calibration Date: 02/22/08	Calibration Due Date: 02/2009	As-Rcvd	<u>(Test 2)</u>	Test 3
Pressure Standard: Heise #05-R	S/N: 41740/42447	Calibration Date: 02/22/08	Calibration Due Date: 02/2009	As-Rcvd	<u>(Test 2)</u>	Test 3
Pressure Standard: Heise #06-L	S/N: 41742/42455	Calibration Date: 02/22/08	Calibration Due Date: 02/2009	As-Rcvd	<u>(Test 2)</u>	Test 3
Pressure Standard: Heise #07-L	S/N: 42185/42186	Calibration Date: 11/26/07	Calibration Due Date: 11/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #07-R	S/N: 42185/43326	Calibration Date: 11/21/07	Calibration Due Date: 11/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #08-L	S/N: 42186/43329	Calibration Date: 03/10/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #09-L	S/N: 42202/43351	Calibration Date: 01/29/08	Calibration Due Date: 01/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #09-R	S/N: 42202/43350	Calibration Date: 01/29/08	Calibration Due Date: 01/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #10-L	S/N: 42203/43353	Calibration Date: 01/30/08	Calibration Due Date: 01/2009	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #11-L	S/N: 43165/44551	Calibration Date: 03/27/07	Calibration Due Date: 03/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #11-R	S/N: 43165/44730	Calibration Date: 03/27/07	Calibration Due Date: 03/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #12-L	S/N: 43166/44732	Calibration Date: 03/27/07	Calibration Due Date: 03/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #13-L	S/N: 43415/45041	Calibration Date: 06/12/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #13-R	S/N: 43415/45039	Calibration Date: 06/11/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3
Pressure Standard: Heise #14-L	S/N: 43412/45045	Calibration Date: 06/12/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3

Differential Pressure Standards: Heise Model PPM1 Manufactured by Dresser Industries

#01-L, 03-L, 05-L, 07-L, 09-L, 11-L, 13-L	Rated Accuracy: > 0.07% fs (0.000175 in wc)	Range: 0.0-0.25 in wc	Res.: 0.00001	Uncertainty: < 0.00035
#01-R, 03-R, 05-R, 07-R, 09-R, 11-R, 13-R	Rated Accuracy: > 0.06% fs (0.003 in wc)	Range: 0.0-5.0 in wc	Res.: 0.0001	Uncertainty: < 0.00348
#02-L, 04-L, 06-L, 08-L, 10-L, 12-L, 14-L	Rated Accuracy: > 0.06% fs (0.03 in wc)	Range: 0.0-50.0 in wc	Res.: 0.001	Uncertainty: < 0.0346

Approx Set Pt	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff	Standard	Test Meter	% Diff
.0500	.0510	.0511	.20	.0512	.0512	0			
.1250	.1279	.1281	.16	.1257	.1255	-.16			
.2250	.2253	.2257	.18	.2250	.2245	-.22			
.2700	.2735	.2748	.48	.2724	.2735	.40			
2.000	2.009	2.019	.50	2.049	2.055	.29			
3.600	3.626	3.642	.44	3.610	3.613	.08			
4.400	4.403	4.433	.68	4.438	4.445	.16			
27.00	27.04	27.07	.11	27.41	27.50	.33			
50.00	50.18	50.22	.08	50.42	50.51	-.18			
Overrange	NA	✓	NA	NA	✓	NA	NA	NA	NA

Shortridge Instruments, Inc.  
 7855 East Redfield Road Scottsdale, Arizona 85260  
 (480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com



# AIRDATA MULTIMETER CERTIFICATE OF RECALIBRATION

S/N: m96891  
Order #: R081389

LOW VELOCITY CONFIRMATION (FPM)  
TEST METER TOLERANCE =  $\pm 3.0\% \pm 7$  FPM AS-RECEIVED TEST WITHIN SPEC **(YES)** NO N/A

Vel Equiv Trans Std: AirData Multimeter	S/N: M96452	Calibration Date: 06/15/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3
Vel Equiv Trans Std: AirData Multimeter	S/N: M99420	Calibration Date: 06/15/07	Calibration Due Date: 06/2008	As-Rcvd	<b>(Test 2)</b>	Test 3
Vel Equiv Trans Std: AirData Multimeter	S/N: M02903	Calibration Date: 06/15/07	Calibration Due Date: 06/2008	As-Rcvd	Test 2	Test 3
Vel Equiv Trans Std: AirData Multimeter	S/N: M02009	Calibration Date: 12/04/07	Calibration Due Date: 12/2008	<b>(As-Rcvd)</b>	Test 2	Test 3
Vel Equiv Trans Std: AirData Multimeter	S/N: M96099	Calibration Date: 03/27/08	Calibration Due Date: 03/2009	As-Rcvd	Test 2	Test 3

Rated Accuracy: Velocity  $\pm 1.5\% \pm 3.5$  fpm      Manufactured by Shortridge Instruments, Inc.      Range: 100-5000 fpm      Resolution: 0.1  
Uncertainty: <5.00 fpm at 100 fpm; <7.50 fpm at 500 fpm

Approx Set Point	Standard	Test Meter	Diff	Standard	Test Meter	Diff	Standard	Test Meter	Diff
100	105.9	107	1.1	128.8	129	.2	<b>N/A</b>		
500	520.8	522	1.2	517.5	517	-.5			

ADM-880C, ADM-870/870C and ADM-860/860C AirData Multimeters are read in AirFoil Mode. ADM-850 Multimeters are read in Pitot Tube Mode.

TEMPERATURE TEST - AIRDATA MULTIMETER (° F)  
TEST METER TOLERANCE =  $\pm 0.2$ ° F AS-RECEIVED TEST WITHIN SPEC **(YES)** NO N/A

RTD Simulator: S/N 249	Calibration Date: 01/24/08	Calibration Due Date: 01/2012	As-Rcvd <b>(Test 2)</b>	Test 3	Set Point: <b>(35.6° F)</b>	95° F	154.4° F
RTD Simulator: S/N 250	Calibration Date: 01/24/08	Calibration Due Date: 01/2012	As-Rcvd <b>(Test 2)</b>	Test 3	Set Point: 35.6° F	<b>(95° F)</b>	154.4° F
RTD Simulator: S/N 253	Calibration Date: 01/24/08	Calibration Due Date: 01/2012	As-Rcvd <b>(Test 2)</b>	Test 3	Set Point: 35.6° F	95° F	<b>(154.4° F)</b>
RTD Simulator: S/N 254	Calibration Date: 03/07/08	Calibration Due Date: 03/2012	As-Rcvd	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 256	Calibration Date: 03/07/08	Calibration Due Date: 03/2012	As-Rcvd	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 257	Calibration Date: 03/07/08	Calibration Due Date: 03/2012	As-Rcvd	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 292	Calibration Date: 12/03/07	Calibration Due Date: 12/2011	<b>(As-Rcvd)</b>	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 293	Calibration Date: 12/03/07	Calibration Due Date: 12/2011	<b>(As-Rcvd)</b>	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F
RTD Simulator: S/N 294	Calibration Date: 12/03/07	Calibration Due Date: 12/2011	<b>(As-Rcvd)</b>	Test 2 Test 3	Set Point: 35.6° F	95° F	154.4° F

RTD Simulators Model RTD-1000/500      Manufactured by General Resistance      Rated Accuracy: 0.025% of setting      Range: 100  $\Omega$  to 11111.10  $\Omega$   
Resolution: 0.01  $\Omega$       Uncertainty: < 32 ppm

RTD Simulator Temperature Equivalent Set Point	Test Meter	Difference	Test Meter	Difference	Test Meter	Difference
35.60	35.6	0	35.7	.1	<b>N/A</b>	
95.00	95.1	.1	95.0	0		
154.40	154.4	0	154.4	0		

TEMPERATURE TEST OF CUSTOMER'S TEMPROBE (° F)  
TEMPROBE TOLERANCE FOR ADT442, ADT443, ADT444, ADT445, ADT446 =  $\pm 0.3$ ° F  
AS-RECEIVED TEST WITHIN SPEC **(YES)** NO N/A (TempProbes are ADT442 unless otherwise stated)

Thermometer #1 S/N 8A089/Thermistor	S/N A410660	Calibration Date: 02/21/08	Cal Due Date: 02/2010	Set Point 35° F	95° F	155° F
Thermometer #2 S/N 8B104/Thermistor	S/N 871507	Calibration Date: 10/19/06	Cal Due Date: 10/2008	Set Point 35° F	95° F	<b>(155° F)</b>
Thermometer #3 S/N 92142/Thermistor	S/N A560303	Calibration Date: 05/11/07	Cal Due Date: 05/2009	Set Point 35° F	<b>(95° F)</b>	155° F
Thermometer #4 S/N 92143/Thermistor	S/N A310867	Calibration Date: 08/29/06	Cal Due Date: 08/2008	Set Point <b>(35° F)</b>	95° F	155° F

Rated Accuracy(combined): 0.023° F/0.018° F      Mfgd by Hart Scientific      Range: 32° F-176° F      Resolution: 0.001° F      Combined Uncertainty: < 0.025° F

Temperature Standard AirData Multimeter S/N M00136	Calibration Date: 02/07/08	Cal Due Date: 02/2009	Set Point <b>(35° F)</b>	95° F	155° F
Temperature Standard AirData Multimeter S/N M96100	Calibration Date: 03/07/08	Cal Due Date: 03/2009	Set Point 35° F	95° F	155° F

Rated Accuracy: 0.03° F      Manufactured by Shortridge Instruments, Inc.      Range: 33° F-158° F      Resolution: 0.01° F      Uncertainty: < 0.023° F  
Total combined Uncertainty for TempProbe testing: < 0.039° F

Approx Set Point	Standard	TempProbe	Diff	TempProbe	Diff	TempProbe	Diff	TempProbe	Diff	TempProbe	Diff	TempProbe	Diff
35.0	35.0	35.0	0										
95.0	95.0	95.0	0										
155.0	155.0	154.9	-.1										

NOTES: \_\_\_\_\_

**Shortridge Instruments, Inc.**  
7855 East Redfield Road Scottsdale, Arizona 85260  
(480) 991-6744 • Fax (480) 443-1267 • www.shortridge.com

**FLUKE**® Everett Service Center1420 75th St. SW  
Everett, Washington 98203  
USA**Calibration Certificate**

ISO 9001

NQA ISO 9000: 2000 Certified

<b>Description:</b>	MULTIMETER	<b>Certificate Number:</b>	885906-66480245:1199875789
<b>Manufacturer:</b>	FLUKE	<b>Date of Calibration:</b>	09 January 2008
<b>Model:</b>	21 II	<b>Date of Certificate:</b>	09 January 2008
<b>Serial Number:</b>	66480245	<b>Date Due:</b>	09 January 2009
<b>Customer Name:</b>	PRECISION BALANCING LLC	<b>Procedure Name:</b>	FLUKE 21-2: (1 YEAR) CAL VER/ALT 5520A
<b>City, State:</b>	ESSEX JUNCTION, VT	<b>Procedure Revision:</b>	1.0
<b>Customer Item ID:</b>	66480245	<b>Temperature:</b>	23.00 °Celsius
<b>PO Number:</b>	MITCHELL CCS	<b>Relative Humidity:</b>	40 %
<b>RMA Number:</b>	3872716	<b>Data Type:</b>	FOUND-LEFT
		<b>Test Result:</b>	PASS

In the attached measurement results, deviation may be expressed with units, *Measured Value (MV) - Nominal Value (NV)* or as a proportion of the nominal value ( $(MV-NV)/NV$ ), expressed without units with a scalar multiplier such as % (0.01), or as a ratio of the units (mW/W, mA/A, mV/V, etc.) Descriptions such as mW/W, mV/V, and others, where used to annotate results or measurement uncertainties, are the preferred replacements for what was historically labeled as "ppm" or parts-per-million and describe the results in that column, unless otherwise noted by units symbols.

The Data type that could be found in this certificate must be interpreted as:

- As Found - Calibration data collected before the unit is adjusted and/or repaired.
- As Left - Calibration data collected after the unit is adjusted and/or repaired.
- As Found/ As Left - Calibration data collected without any adjustment and/or repair performed.

Unless otherwise stated the TUR (Test Uncertainty Ratio) of this calibration is 4:1 or greater.

This Calibration conforms to ANSI/NCSL Z540.1-1994(R2002)

Results are reviewed to establish where any measurement results exceeded the manufacturer's specifications.

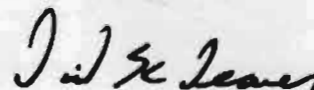
Measured values greater than the Manufacturer's specification are indicated by "I".

This certificate applies only to the item identified and shall not be reproduced other than in full, without the specific written approval by Fluke Corporation. The user is obliged to have the object recalibrated at appropriate intervals. Calibration certificates without signature are not valid.

**Comments:**


Long Le

Metrology Technician



David Deaver

Technical Manager

## Calibration Results

Function/Range	Nominal Value	Measured Value	TUR	Manufacturer's Specifications	
				Lower Limit	Upper Limit
10.00 MOhm	10.000	10.02		9.79	10.21
<b>DIODE TEST</b>					
BEEPER AUDIBLE		PASS			
BEEPER OFF		PASS			
<b>DC VOLTAGE TEST</b>					
<b>320mV Range</b>					
300.0 mV	300.00	299.9		298.7	301.3
<b>DC VOLTAGE TEST</b>					
<b>3.2V Range</b>					
2.700 V	2.7000	2.700		2.688	2.712
<b>32V Range</b>					
27.00 V	27.000	27.00		26.88	27.12
<b>320V Range</b>					
270.0 V	270.00	270.0		268.8	271.2
<b>1000V Range</b>					
1000 V	1000.0	1000		995	1005
<b>AC VOLTAGE TEST</b>					
<b>3.2V Range</b>					
2.700 V @ 100 Hz	2.7000	2.704		2.644	2.756
2.700 V @ 500 Hz	2.7000	2.693		2.644	2.756
<b>750V Range</b>					
750 V @ 100 Hz	750.0	751		733	767
750 V @ 1000 Hz	750.0	755		733	767
<b>DC mA TEST</b>					
<b>32mA Range</b>					
27.00 mA	27.000	26.89		26.57	27.43
<b>320mA Range</b>					
200.0 mA	200.00	199.8		196.8	203.2
<b>DC AMPS TEST</b>					
<b>10A Range</b>					
2.00 A	2.000	1.98		1.95	2.05

End of Report

# — NIST —

## Calibration Certificate

Certificate No: S22082  
Manufacturer: Nidec-Shimpo America Corp.  
Model: DT-315EB  
Description: Digital Stroboscope  
Serial No: 22707004  
Range: 54.0 to 33,000 FPM  
Tolerance:  $\pm 0.01\%$  of reading

Date Calibrated: 06/17/2008  
Next Date Due: 06/17/2009  
Calibrated by: S.BLYAKHMAN  
*S. Blyakhman*  
Conditions  
Degrees Fahrenheit: 71.3°F  
Relative Humidity: 44%

This certificate attests that this instrument has been calibrated under the standard conditions with standards traceable to the National Institute of Standards and Technology (NIST). Evidence of traceability is included and also maintained on file at our laboratory. An acceptable accuracy ratio between the standard and the item calibrated has been maintained.

Accuracy of standard used for certification is equal to or greater than the accuracy of the certified instrument. Calibration is in conformance with manufacture's specification.

Standard Used: Shimpo Non-contact Tachometer  
Model: DT-209X  
Serial No: E058A0007  
Accuracy: Certificate No. 342861

Check Point (STD)	+ Limit (FPM)	- Limit (FPM)	Unit Reads (FPM)
1,000.0	1,000.1	999.9	1,000.0
5,000	5,000.5	4,999.5	5,000
10,000	10,001	9,999	10,000
15,000	15,002	14,998	15,000
20,000	20,002	19,998	20,000
25,000	25,003	24,997	25,000
33,000	33,003	32,997	33,000

SHIMPO INSTRUMENTS  
1701 Glenlake Avenue Itasca, IL 60143