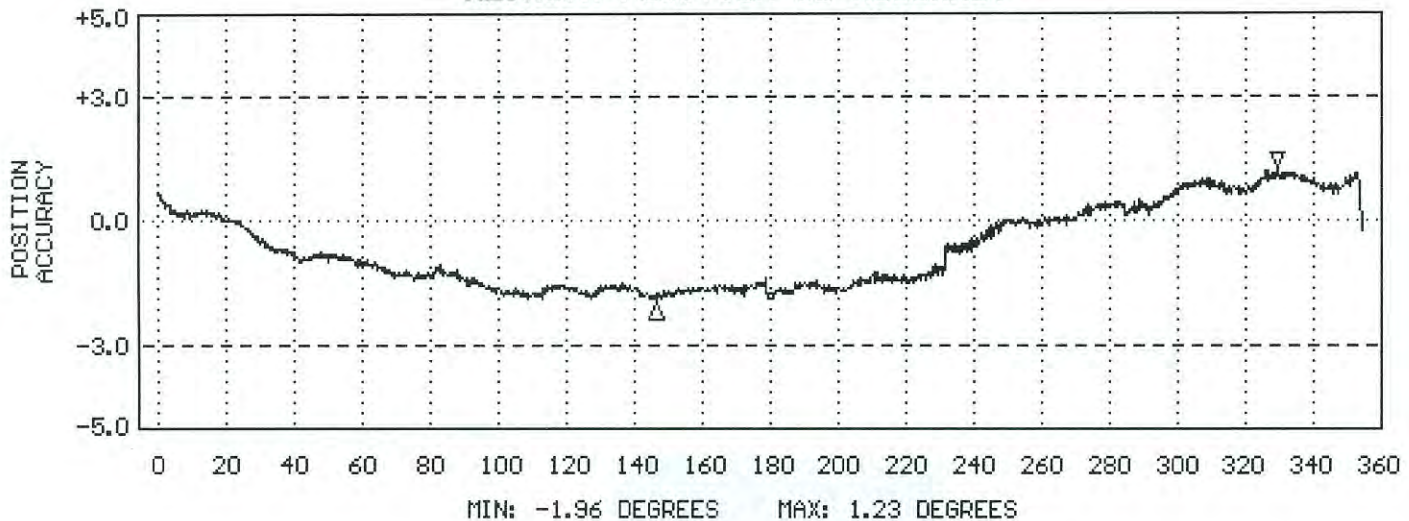


R. M. YOUNG COMPANY WIND SENSOR CALIBRATION CERTIFICATE

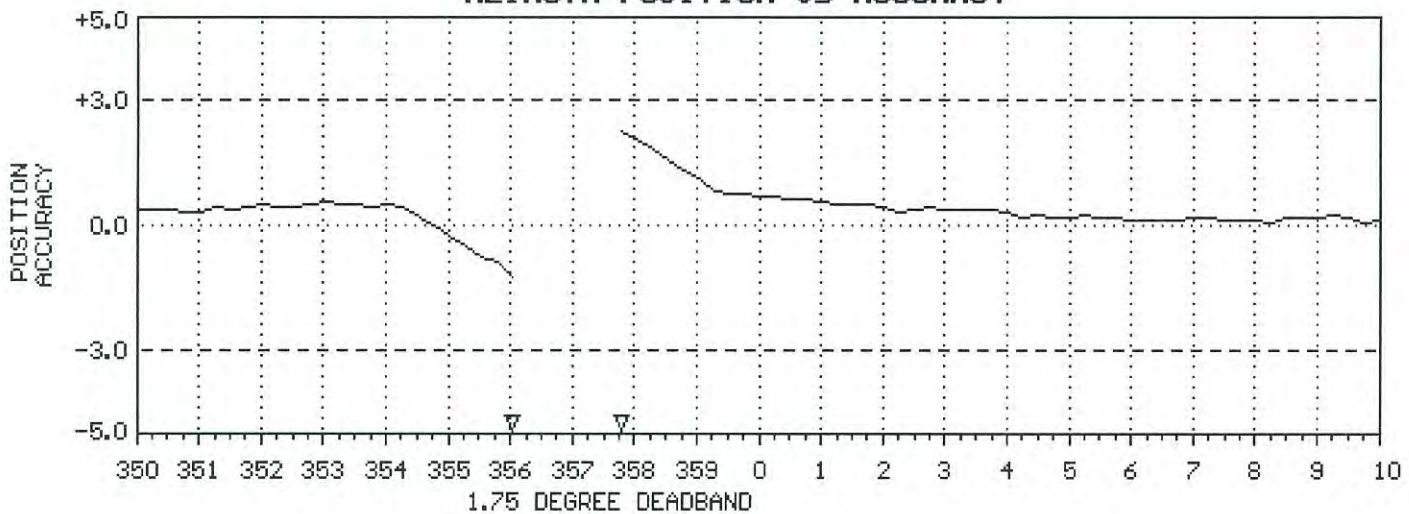
SENSOR: 05106 WIND MONITOR-MA
SENSOR SERIAL NUMBER: WM43393
BEARINGS: SEALED/WATERPROOF GREASE
DATE: JAN 29 2013

WIND SPEED THRESHOLD TEST: PASS
LOW WIND SPEED AMPLITUDE/FREQUENCY TEST: PASS
HIGH WIND SPEED AMPLITUDE/FREQUENCY TEST: PASS
VANE TORQUE TEST: PASS
SPECIAL NOTES:
SPECIAL NOTES:

AZIMUTH POSITION vs ACCURACY



AZIMUTH POSITION vs ACCURACY



NOTE: Azimuth Position vs Accuracy graphs are accurate to within 0.5 degrees. The accuracy shown in the potentiometer deadband region between 355 and 0 degrees is the result of no resistance change while position changes. The gap represents the actual deadband (open circuit).



R.M. Young Company
 2801 Aero Park Drive
 Traverse City, Michigan 49686 USA



CALIBRATION REPORT
Wind Speed

Customer: *University of Hawaii*

Test Number: 3128-02W Customer PO: Z10020870
 Test Date: 28 January 2013 Sales Order: 3142

<u>Test Sensor:</u>	
Anemometer: 05106 Wind Monitor	Propeller: 08234
Serial Number: WM43393	Serial Number: 51153

Report of calibration comparison with National Institute of Standards and Technology calibrated anemometer in the R.M. Young Company 50 x 75 cm rectangular test section open return wind tunnel. The following data describe the relationship between test section wind speed, as determined by the NIST calibrated standard anemometer, and test anemometer rpm, as determined by its output. Indicated wind speed is calculated using anemometer's published formula.

Wind Speed According to Standard Anemometer		Wind Speed According to Test Anemometer			
Model:	05103 / 08234	Anem:	05106	Prop:	08234
Serial #:	00005	Serial #:	WM43393	Serial #:	51153
Nominal Speed m/s	Actual Speed m/s (1)	100 Second Pulse Count	Output Frequency	Propeller RPM (2)	Indicated Speed m/s (3)
30	30.0	30874	308.7	6175	30.3
25	25.0	25717	257.2	5143	25.2
20	20.0	20508	205.1	4102	20.1
16	16.0	16349	163.5	3270	16.0
14	14.0	14290	142.9	2858	14.0
12	12.0	12225	122.3	2445	12.0
10	10.0	10166	101.7	2033	10.0
8	8.0	8088	80.9	1618	7.9
6	6.0	6044	60.4	1209	5.9
5	5.0	5008	50.1	1002	4.9
4	4.0	3992	39.9	798	3.9
3	3.0	2978	29.8	596	2.9
2	2.1	1921	19.2	384	1.9
1	1.1	866	8.7	173	0.8

National Institute of Standards and Technology Reference

Calibrated Standard Anemometer (4)
 Test #: TN251034
 Date: 9 Nov 1992
 Model: 08234 Serial #: 00005

Environmental Conditions

Barometric Pressure (hPa): 986
 Temperature (C): 23.0
 Relative Humidity (%): 48.0

- (1) Actual wind speed determined by relationship between tunnel fan rpm and NIST calibrated standard propeller rpm.
- (2) Wind Monitor output is three (3) pulses per revolution: $Rpm = Hz / 3 \times 60 \text{ sec.}$
- (3) Published calibration: $Wind \text{ speed (m/s)} = 0.00490 \times \text{propeller rpm.}$
- (4) NIST Calibration accuracy is within 1%.

Tested By 



R.M. Young Company
 2801 Aero Park Drive
 Traverse City, Michigan 49686 USA

CALIBRATION REPORT
Wind Speed (page 2)

Test Number: 3128-02W

Linear Regression

A linear regression is performed on the calibration data to determine the best fit straight line representing the relationship between propeller rpm and actual wind speed as determined by the NIST calibrated standard anemometer.

Slope: 0.00482 meters per second per RPM
 Intercept: 0.19 meters per second
 Pitch: 28.94 centimeters per revolution
 Correlation Coefficient: 0.99999

Wind Speed =	Slope	x RPM +	Intercept	Slope	x Hz +	Intercept
m/s	= 0.00482	x RPM +	0.19	0.09646	x Hz +	0.19
mph	= 0.01079	x RPM +	0.42	0.21578	x Hz +	0.42
knots	= 0.00937	x RPM +	0.36	0.18738	x Hz +	0.36
km/hr	= 0.01736	x RPM +	0.67	0.34726	x Hz +	0.67

Threshold Measurements

	New Instrument	As Found	As Left
Start:		0.4 m/s	0.5 m/s
	n/a		
Stop:		0.2 m/s	0.4 m/s

