AVENTECH RESEARCH INC.

MODEL AIMMS20-ADP

CALIBRATION DATA REPORT

S/N ADP121103

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Table of Functions

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RECORD OF REVISIONS

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PROBE SERIAL NUMBER: ADP121103

2 OVERVIEW

The air-data probe (ADP) data system is comprised of eight sensor subsystems listed below:

1. Barometric pressure
2. Angle-of-attack differential pressure
3. Sideslip differential pressure
4. Pitot-static differential pressure
5. Temperature sensor (thermistor)
6. Relative humidity sensor
7. Acceleration sensors (x 3 channels)
8. Geomagnetic field sensors (x 3 channels)

The ADP digital signal processor (DSP) reads the digitized signals from the analog-to-digital converter (ADC) and applies various calibration equations to derive fully compensated and calibrated sensor data. The parameters associated with these calibration equations are detailed in Section 3 for each sensor subsystem.

Calibration parameters are stored in non-volatile DFLASH memory on-board the DSP and can be reprogrammed through an RS232 serial interface.

Pressure sensors are temperature compensated using a special ASIC device, one dedicated to each sensor. Analog signals from the pressure sensors are compensated before they are input to the ADC. Therefore, temperature compensation is not performed by the DSP for these sensors and temperature compensation parameters are not included in the data set stored by the internal DFLASH unit.

3 SENSOR CALIBRATION DATA SET

Sensor calibration functions are expressed in terms of a normalized channel voltage, i.e. voltage expressed as a fraction of full scale. Thus, with a 4.096V reference, the voltage for each channel is expressed as

$$\tilde{V} = \frac{V}{4.096}$$

3.1 Barometric Sensor

Calibration Function: $P = C_0 + C_1\tilde{V}$
Units: Pa

As of Oct. 31, 2011:

Coefficient	Value
C_0	5666.41
C_1	110014.80

As of May. 7, 2013:

Coefficient	Value
C_0	5757.75
C_1	110011.40

3.2 Angle-of-Attack

Calibration Function: $P = C_0 + C_1\tilde{V}$
Units: Pa

As of Oct. 31, 2011:

Coefficient	Value
C_0	-6998.43
C_1	14018.84

As of May. 7, 2013:

Coefficient	Value
C_0	-7002.35
C_1	14019.07

3.3 Angle-of-Sideslip

Calibration Function: $P = C_0 + C_1\tilde{V}$
Units: Pa

As of Oct. 31, 2011:

Coefficient	Value
C_0	-7005.71
C_1	14018.76

As of May. 7, 2013:

Coefficient	Value
C_0	-7008.48
C_1	14015.85

3.4 Pitot-Static

Calibration Function: $P = C_0 + C_1\tilde{V}$
Units: Pa

As of Oct. 31, 2011:

Coefficient	Value
C_0	-1281.20
C_1	14007.77

As of May. 7, 2013:

Coefficient	Value
C_0	-1289.62
C_1	14020.81

3.5 Temperature Sensor

Calibration Function: $T = C_0 + C_1\tilde{V} + C_2\tilde{V}^2 + C_3\tilde{V}^3$
Units: C

As of Oct. 31, 2011:

Coefficient	Value – Low Range (-40C to -15C)	Value – High Range (-15C to +50C)
C_0	6341.965	159.9910
C_1	-27423.72	-629.8731
C_2	39696.26	981.5250
C_3	-19291.20	-641.7212

As of May. 7, 2013:

Coefficient	Value – Low Range (-40C to -15C)	Value – High Range (-15C to +50C)
C_0	69341.665	159.691
C_1	-27423.72	-629.8731
C_2	39696.26	981.5250
C_3	-19291.2	-641.7212

3.6 Relative Humidity Sensor

Calibration Function: $RH = C_0 + C_1\tilde{V}$
Units: fractional value, 0 - 1

As of Oct. 31, 2011:

Coefficient	Value
C_0	1.0959
C_1	-1.404873

As of May. 7, 2013:

Coefficient	Value
C_0	1.0959
C_1	-1.4049

3.7 Acceleration Sensors

Calibration Function: $A_{x,y,z} = (C_0 + C_1\tilde{V}_t) + (C_2 + C_3\tilde{V}_t)\tilde{V}_{x,y,z}$

Units: m/s/s, $\tilde{V}_t$ = sensor-temperature signal

As of Oct. 31, 2011:

Coefficient	Value - x	Value - y	Value – z
C_0	-95.820620	-88.307940	-77.269970
C_1	-0.532949	-3.508326	1.651912
C_2	217.7026	222.7078	228.7866
C_3	-0.998233	1.749547	8.139198

As of May. 7, 2013:

Coefficient	Value - x	Value - y	Value – z
C_0	-86.0209	-84.5728	-91.1055
C_1	-6.8434	-8.8828	-12.3439
C_2	214.9938	218.1814	214.9037
C_3	4.6590	3.2845	6.2206

3.8 Geomagnetic Field Sensors

Calibration Function: $M_{x,y,z} = C_0 + C_1\tilde{V}_{x,y,z}$

Units: μT

As of Oct. 31, 2011:

Coefficient	Value-x	Value-y	Value-z
C_0	-110.00	109.23	-111.34
C_1	220.00	-201.71	213.18

As of May. 7, 2013:

Coefficient	Value-x	Value-y	Value-z
C_0	-110.00	109.23	-111.34
C_1	220.00	-201.71	213.18