AVENTECH RESEARCH INC.

MODEL AIMMS20-ADP

CALIBRATION DATA REPORT

S/N ADP030802

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Table of Functions

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RECORD OF REVISIONS

Date	Issue	Page	Paragraph	Firmware Revision	Comments
24.01.2014	1.00	All	All		Final, Issue 1

1 Contents

PROBE SERIAL NUMBER: ADP030802

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 Nov. 6, 2008:

Coefficient	Value
C_0	1570
C_1	110136

As of Apr. 8, 2010:

Coefficient	Value
C_0	1570
C_1	110136

3.2 Angle-of-Attack

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

As of Nov. 6, 2008:

Coefficient	Value
C_0	-7035
C_1	14020

As of Apr. 8, 2010:

Coefficient	Value
C_0	-7035
C_1	14020

3.3 Angle-of-Sideslip

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

As of Nov. 6, 2008:

Coefficient	Value
C_0	-7029
C_1	14021

As of Apr. 8, 2010:

Coefficient	Value
C_0	-7029
C_1	14021

3.4 Pitot-Static

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

As of Nov. 6, 2008:

Coefficient	Value
C_0	-1277
C_1	14028

As of Apr. 8, 2010:

Coefficient	Value
C_0	-1277
C_1	14028

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 Nov. 6, 2008:

Coefficient	Value – Low Range (-40C to -15C)	Value – High Range (-15C to +50C)
C_0	933.077	171.1058
C_1	-4332.585	-720.1964
C_2	6871.970	1206.1360
C_3	-3757.799	-822.7183

As of Apr. 8, 2010:

Coefficient	Value – Low Range (-40C to -15C)	Value – High Range (-15C to +50C)
C_0	6402.826	161.2060
C_1	-27537.180	-640.6630
C_2	39640.740	1004.3090
C_3	-19159.080	-657.0764

3.6 Relative Humidity Sensor

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

As of Nov. 6, 2008:

Coefficient	Value
C_0	1.1713
C_1	-1.5157

As of Apr. 8, 2010:

Coefficient	Value
C_0	1.1713
C_1	-1.5157

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 Nov. 6, 2008:

Coefficient	Value - x	Value - y	Value – z
C_0	-83.355	-81.035	-81.999
C_1	0.9486	-0.7846	-1.4381
C_2	230.513	218.481	226.418
C_3	5.2759	4.0801	1.6457

As of Apr. 8, 2010:

Coefficient	Value - x	Value - y	Value – z
C_0	-83.355	-81.035	-81.999
C_1	0.9486	-0.7846	-1.4381
C_2	230.513	218.481	226.418
C_3	5.2759	4.0801	1.6457

3.8 Geomagnetic Field Sensors

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

Units: μT

As of Nov. 6, 2008:

Coefficient	Value-x	Value-y	Value-z
C_0	-110.32	101.80	-110.66
C_1	212.28	-206.44	213.43

As of Apr. 8, 2010:

Coefficient	Value-x	Value-y	Value-z
C_0	-110.32	101.80	-110.66
C_1	212.28	-206.44	213.43