Apollo µADC

Micro Air Data System (µADS)

The Aeroprobe µADS is a complete solution for in flight measurement of air data at an unprecedented combination of range, size, and accuracy. The µADS consists of two primary components: a five-port Air Data Probe and Micro Air Data Computer (µADC). These components provide direct measurements of **Angle-of-attack, Angle-of-sideslip, airspeed**, **static and total pressure**, **and barometric altitude**.

The Apollo operates over the widest indicated airspeed range available.

Highlights	
✓	User Configurable Operational Modes
✓	Command Line Interface
✓	Field Upgradeable Firmware
✓	Battery-backed Real Time Clock/Calendar
✓	Start-up Sync Signal
✓	Rugged Aluminum Enclosure
✓	LED Indicator Lights
✓	Data Logging (Standard 8GB)
✓	External GPS Synchronization
✓	PT100 RTD Temperature Input
✓	Mounting Hardware
✓	Probe Heater Control
✓	Optional embedded AHRS

Qualifications

The Apollo Micro Air Data Computer has been tested and certified compliant with the following military and commercial standards.

Table 1. Military and Commercial Standards		
Test Standard	**Method/Procedure/Section**	**Title**
DO-160G	Sections 4.5.1 & 4.5.2, 8 hours @ -55°C (4 hours non-op./4 hours op.)	Storage & Operational Low Temperature
DO-160G	Sections 4.5.3 & 4.5.4 (Proc. I & III), 85°C	Storage & Short-Term Operational High Temperature
DO-160G	Section 4.5.3 (Proc. II), 3 24-hour cycles	Operational High Temperature
Custom	1000 ft @ 25°C to 65000 ft @ -55°C, 3 9-hour cycles	Cyclic Temperature & Altitude
MIL-STD-810H	Method 514.8, Cat. 24, GMI, 1 hour/axis	Vibration
MIL-STD-810H	Method 516.8, Proc. I, 50G, 6 ms, TPS, 3/dir./axis	Shock

System Specifications

Table 2. µADC Interface and SWAP		
Parameter	**Apollo**	**Unit**
ELECTRICAL		
Input Voltage Range	8 to 36	VDC
Power at 12 VDC	1.1	W
Power at 28 VDC	1.5	W
Probe Heater Max Operating Current[1]	3	Amps
Probe Heater Max Operating Voltage[1]	60	VDC
RTD (Class A or B) Range	-200 to 600	°C
COMMUNICATION		
Sampling Data Rate Options[2]	10, 20, 50, 100	Hz
Serial Specification Options	RS232, RS422	-
Serial Data Output Streaming Rate Options[2]	460800, 230400, 115200, 57600, 38400, 19200	bps
Analog to Digital Resolution, bits	16	bits
MECHANICAL		
Size	(66 x 79 x 41) 2.6 x 3.1 x 1.6	mm (inches)
Mounting Flange Footprint	66 x 97 x 1.5 (2.6 x 3.8 x 0.06)	mm (inches)
Weight	200	grams

[1]µADC specification only. Check Air Data Probe Technical drawings for operating voltage and power.
[2]Serial streaming data rate and sample rate are interrelated. Not all combinations are available. Refer to the Aeroprobe Micro Air Data Interface Document (Document No. 91034-14-ICD-02).

Table 3. Sensor Range Options (Properties at Sea Level, 15 °C)			
Range	**Low**	**Mid**	**High**
Maximum Indicated Airspeed	120 knots Mach 0.19	310 knots Mach 0.46	630 knots, Mach 0.95
Recommended Minimum Airspeed[1]	9.0 knots	17 knots	40 knots
Minimum Reported Airspeed[2]	5.0 knots	12 knots	31 knots
Maximum Safe Over-Pressure[3]	270 inH_2O (9.7 psi)	300 inH_2O (10.8 psi)	1400 mbar (20.3 psi)

[1]Indicated airspeed below which expected error in AoA could be greater than 4°. See Figures 1 & 2 for more detail.
[2]The minimum reported airspeed is dictated by the minimum dynamic pressure that can accurately be measured for the given sensor range at zero altitude.
[3]Pressures above the specified maximum safe over-pressure will cause damage to the internal pressure sensors.

Table 4. µADC Specifications		
Parameter	**Apollo**	**Unit**
Angle of Attack Range	±20	deg
Angle of Sideslip Resolution[1]	0.01	deg
Angle of Sideslip Range	±20	deg
Angle of Sideslip Resolution[1]	0.01	deg
Barometric Altitude Range	-500 to 65,000	ft
Barometric Altitude Resolution[1]	3.3	ft
Operating Temperature Range[1,2]	-40 to 85	°C
Storage Temperature Range	-55 to 85	°C

[1]Sea level pressure.
[2]µADC specification only. Check Air Data Probe Technical drawings for operating temperatures.

Table 5. Attitude Heading Reference System (AHRS) Specifications		
Parameter	**Typical**	**Unit**
Roll/Pitch	0.75 (static), 1.0 (dynamic)	deg
Heading	2.0	deg
Output Rate	100	Hz
Gyro Range	±2000	°/s
Gyro Non-linearity	0.1	%FS
Gyro Noise Density	0.01	°/s/√Hz
Gyro G-sensitivity	0.001	°/s/g
Gyro In-run Bias Stability	10	°/hr
Accelerometer Range	±16	g
Accelerometer Non-linearity	0.5	%FS
Accelerometer Noise Density	200	µg/√Hz
Accelerometer Zero g-output	±2	mg
Accelerometer In-run Bias Stability	0.1	mg
Bandwidth	180	Hz
Magnetometer Range	±0.8	Gauss
Magnetometer Non-linearity	0.1	%FS
Magnetometer Noise Density	200	µG/√Hz
Magnetometer Non-linearity	0.2	%FS
Magnetometer Total RMS noise	0.5	mG

Expected Total System Errors - Includes ADP & µADC

Figure 1. Angle Error (2σ)

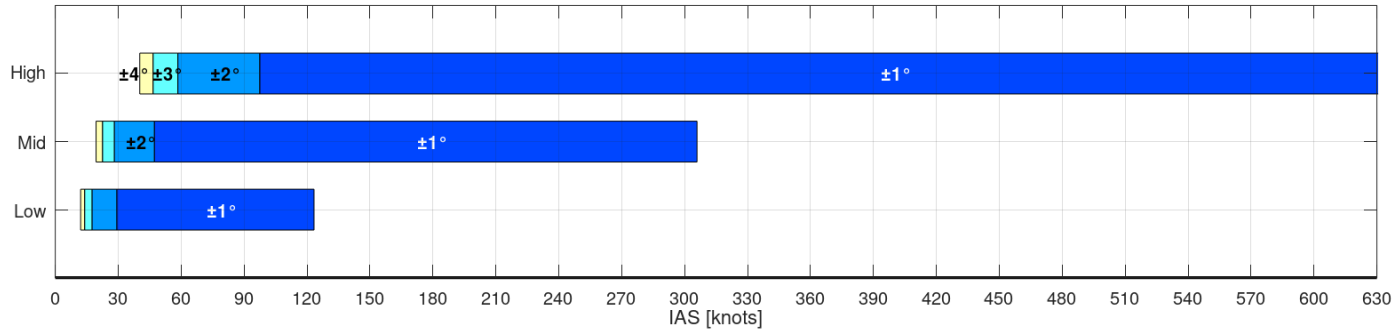


Figure 2. Indicated Airspeed Error (2σ) [knots]

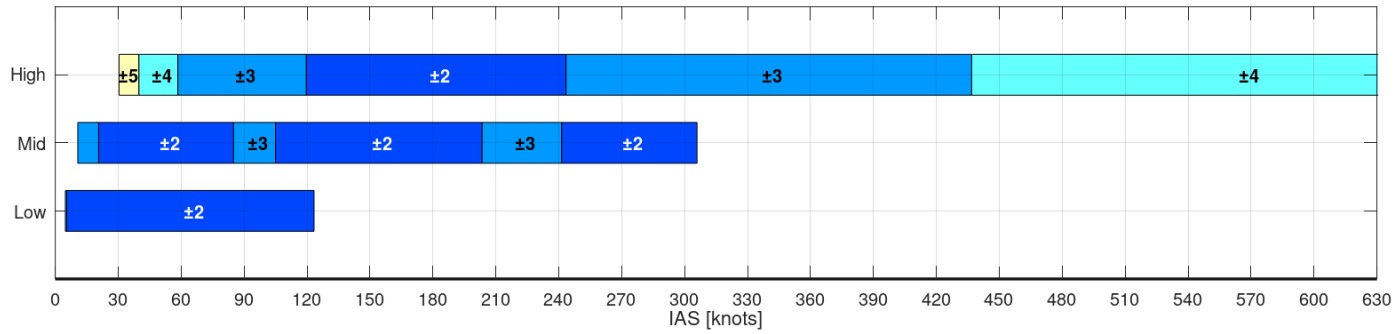
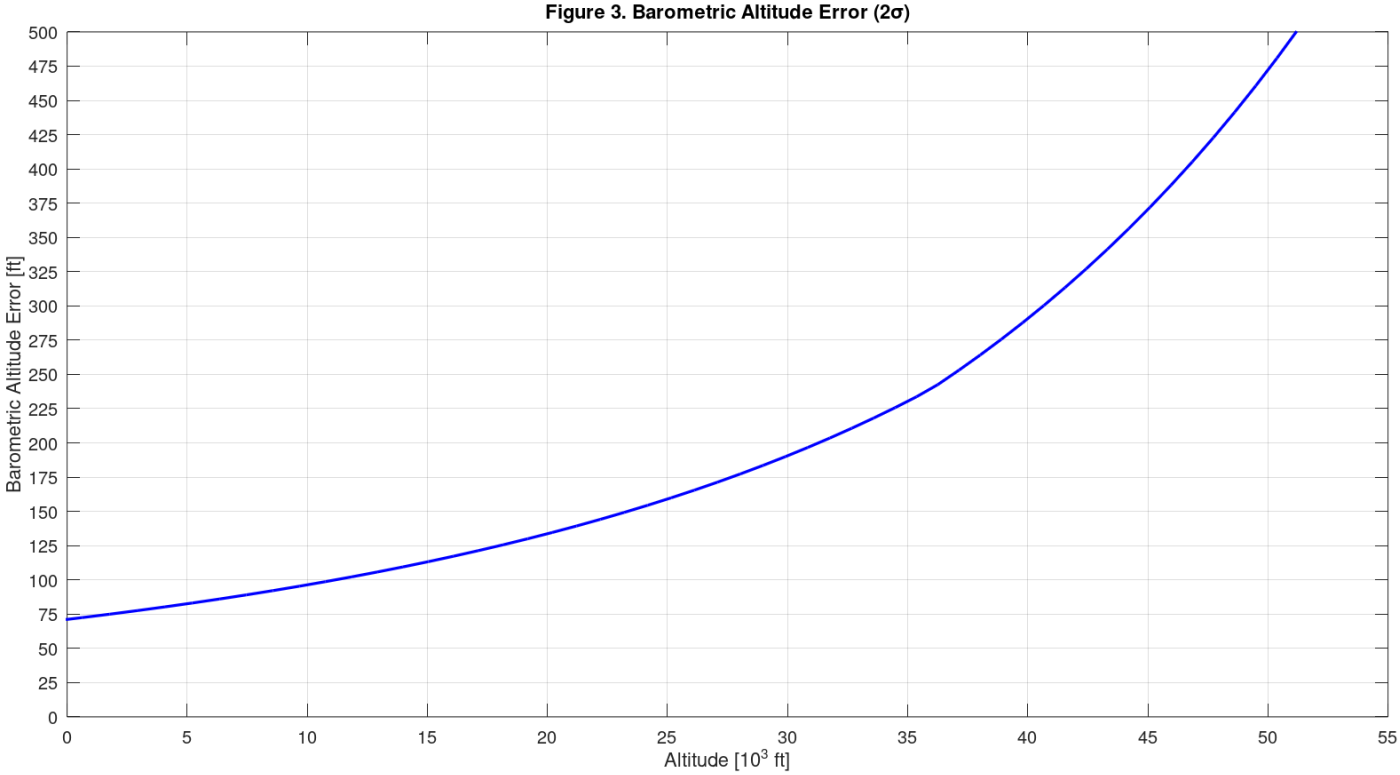


Figure 3. Barometric Altitude Error (2σ)



Mechanical Properties

Apollo