HASP Payload Specification and Integration Plan

Payload Title: O_3 Sensor Technology Development and Atmospheric Experimentation

Payload Class: [✓ Small] Large (circle one)

Payload ID: 7

Institution: University of North Dakota

Contact Name: Nate Ambler - or - Dr. Ronald Fevig

Contact Phone: +1 (352) 284.3087 -or- +1 (520) 820-3440

Contact E-mail: nambler@ufl.edu -or- rfevig@aero.und.edu

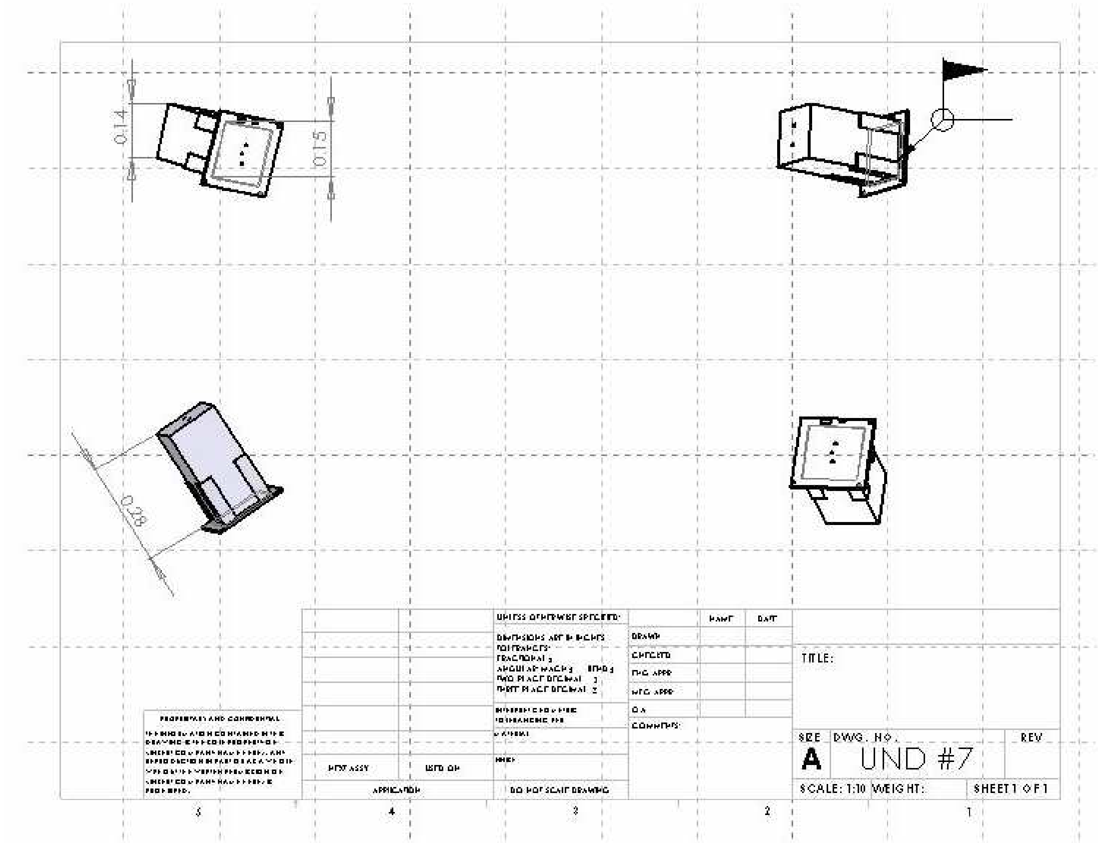
Submit Date: 30-May-2008

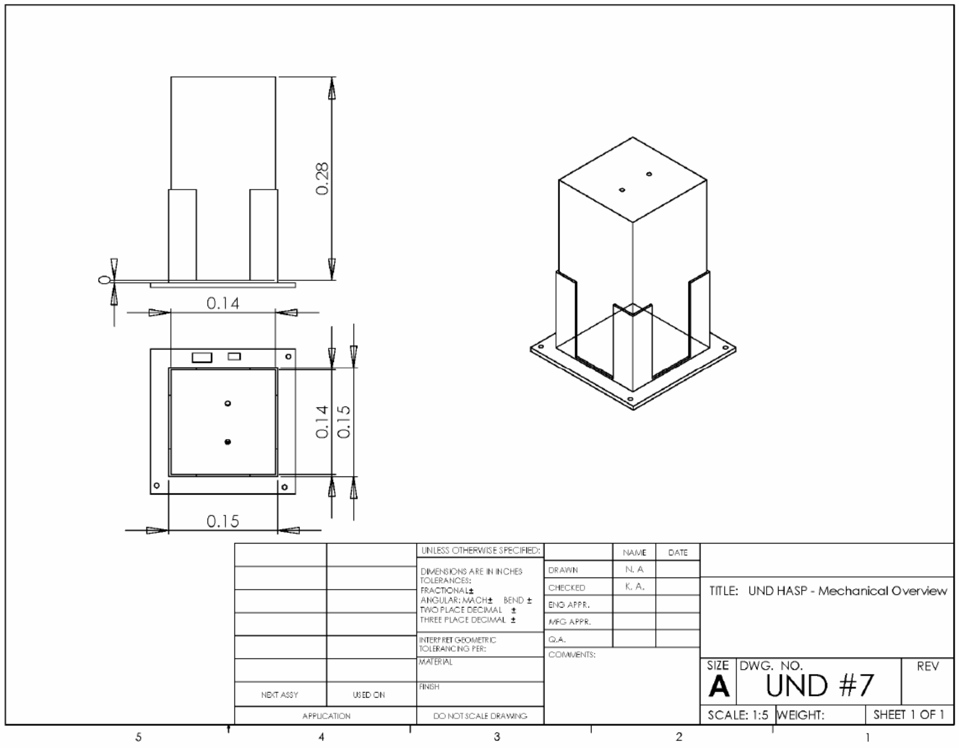
I. Mechanical Specifications:

A. Measured weight of the payload (not including payload plate)

~2.8 kg

B. Provide a mechanical drawing detailing the major components of your payload and specifically how your payload is attached to the payload mounting plate **(in meters)**





C. If you are flying anything that is potentially hazardous to HASP or the ground crew before or after launch, please supply all documentation provided with the hazardous components (i.e. pressurized containers, radioactive material, projectiles, rockets…)

N/A

D. Other relevant mechanical information

Plate attaches to the payload through three holes. A center hole secures the payload using a ¼" carriage screw/bolt through the mounting plate, and into the AL6061 base plate for the payload. The two offset center holes are attached using ¼" threaded rod and lock bolts to the mounting plate, and at the top of the payload at the top of the insulation providing compressive stress to the payload. The footprint of the payload is limited to less than 30 cm in height (~28cm), and is ~15cm x 15cm.

The corner braces are welded to the plate to form a aluminum support and mounting structure for the extruded polystyrene foam insulation ¼" thickness. The insulation is snug fit and chemically adhered at the edges, and is in compressive stress from the insulation foam on top by the two washers and bolts that run through the structure and also supports the internal electronics and sensor mountings.

II. Power Specifications:

A. Measured current draw at 30 VDC

~0.47 A

B. If HASP is providing power to your payload, provide a power system wiring diagram starting from pins on the student payload interface plate EDAC 516 connector through your power conversion to the voltages required by your subsystems.

Wiring diagram provided, “UND Power Diagram.pdf”.

C. Other relevant power information

III. Downlink Telemetry Specifications:

A. Serial data downlink format: Stream [✓ **Packetized**]

B. Approximate serial downlink rate (in bits per second)

Packets will be sent at 1200 baud.

C. Specify your serial data record including record length and information contained in each record byte.

Filtered ozone sensor data and periodic environmental data will be sent in packets along with data integrity checksums; ~50 byte (400 bit) packets finalized upon preliminary software completion.

D. Number of analog channels being used:

0

E. If analog channels are being used, what are they being used for?

N/A

F. Number of discrete lines being used:

0

G. If discrete lines are being used what are they being used for?

N/A

H. Are there any on-board transmitters? If so, list the frequencies being used and the transmitted power.

None.

I. Other relevant downlink telemetry information.

IV. Uplink Commanding Specifications:

A. Command uplink capability required: [✓ **Yes**] No

B. If so, will commands be uplinked in regular intervals: Yes [✓ **No**]

C. How many commands do you expect to uplink during the flight (can be an absolute number or a rate, i.e. *n commands per hour*)

1-2 commands per hour.

D. Provide a table of all of the commands that you will be uplinking to your payload.

1. Heater off. 2. Heater on. 3. System suspend/sleep mode 4. Fan Speed Up. 5. Fan speed down. 6. Fan off. 7. Fan on. 8. System restart.; Will be finalized upon preliminary software completion.

E. Are there any on-board receivers? If so, list the frequencies being used.

None.

F. Other relevant uplink commanding information.

V. Integration and Logistics

A. Date and Time of your arrival for integration:

Group arrives on Sunday August 3rd to Palestine, TX

Will be available at anytime on Monday August 4th

B. Approximate amount of time required for integration:

~1 hr

C. Name of the integration team leader:

Nate Ambler

D. Email address of the integration team leader:

nambler@ufl.edu –or- nathaniel.ambler@und.nodak.edu

E. List **ALL** integration participants (first and last names) who will be present for integration with their email addresses:

Jonathan Musselwhite, Kyle Anderson, James Jemtrud, Nathaniel Ambler, Ronald Fevig

rfevig@aero.und.edu; nathaniel.ambler@und.nodak.edu; james.jemtrud@und.edu; kyle.anderson4@und.edu; jonathan.musselwhite@und.nodak.edu

F. Define a successful integration of your payload:

Payload successfully mounts to platform, and successfully performs a sensor/communication check. This success is further defined by the evaluation of the data stream for integrity, and systems health checks to ensure proper data/headers formatting. After an initial test sequences a steady 1 Hz led flashing indicates a sound system.

G. List all expected integration steps:

- **a) Successfully interface the payload to platform.**
    - **a. Mount to platform**
    - **b. Interface with communication/power system**

H. List all checks that will determine a successful integration:

- **a) Perform communication and data checks.**
- **b) Successfully execute command set.**
- **c) Monitor system to ensure proper operation.**

I. List any additional LSU personnel support needed for a successful integration other than directly related to the HASP integration (i.e. lifting, moving equipment, hotel information/arrangements, any special delivery needs…):

N/A

J. List any LSU supplied equipment that may be needed for a successful integration:

Standard set of wrenches, soldering station, multimeter, oscilloscope, and a heat gun.

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Cell: 904-200-2855

HASP-NASA Project

Ozone sensors system

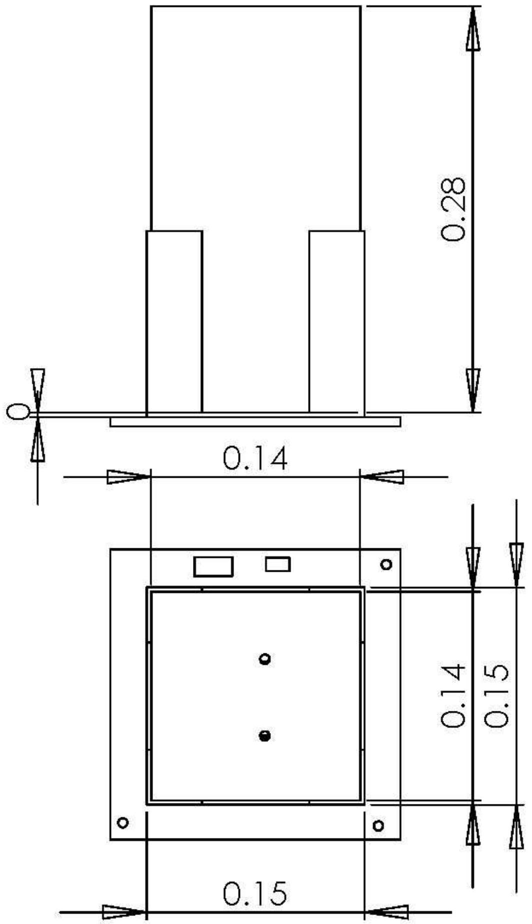
The following items will be used in the system

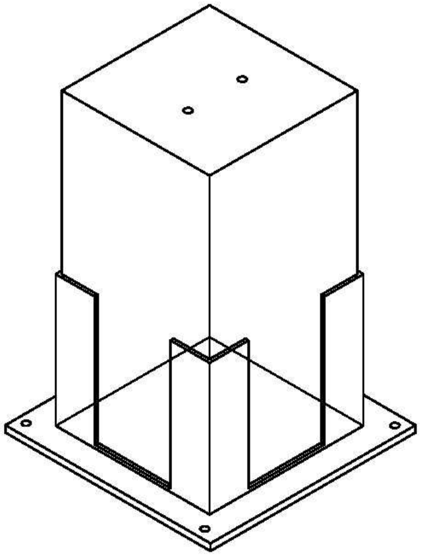
Sr.No	Item	Mass (Grams)	Dimension (cm)
1	Metal Case	111.80	12.7cm x5.6 cm x5.6 cm
2	Circuit board	14.50	13.0cm x 4.2 cm
3	24 Sensors slide	4.60	7.5 cm x 2.5 cm
4	6 metal clips	8.40	
5	Fan with wires	12.00	
6	25 pin cable	36.00	
7	heater with wire	1.60	
8	Thermocouple	1.90	
9	2x 9V Battery for heater	96.00	
10	1x9V battery for Fan	48.00	
11	Screwws and nuts	10.00	
	Total mass (grams)	**344.80**	

Flexible Heater (Kapton)
Make: Omega
Cat. No. KHLV-0504/10
Dimension: 1.2 cm x 9.00 cm
www.omega.com
Watt Density: 10W/in squared

Note: Heater can generate temperature of about 130 degree C at 18.0 volts.

Surface Mounted Thermocouple
Make: Omega
Part# SA1-T
www.omega.com
Type: T (Copper -constantan)
Insulated: Teflon coated
Length of wire: 36 inch





NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
FRACTIONAL±
ANGULAR: MACH± BEND ±
TWO PLACE DECIMAL ±
THREE PLACE DECIMAL ±
INTERPRET GEOMETRIC TOLERANCING PER:
MATERIAL
FINISH
DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	N. A	
CHECKED	K. A.	
ENG APPR.		
MFG APPR.		
Q.A.		

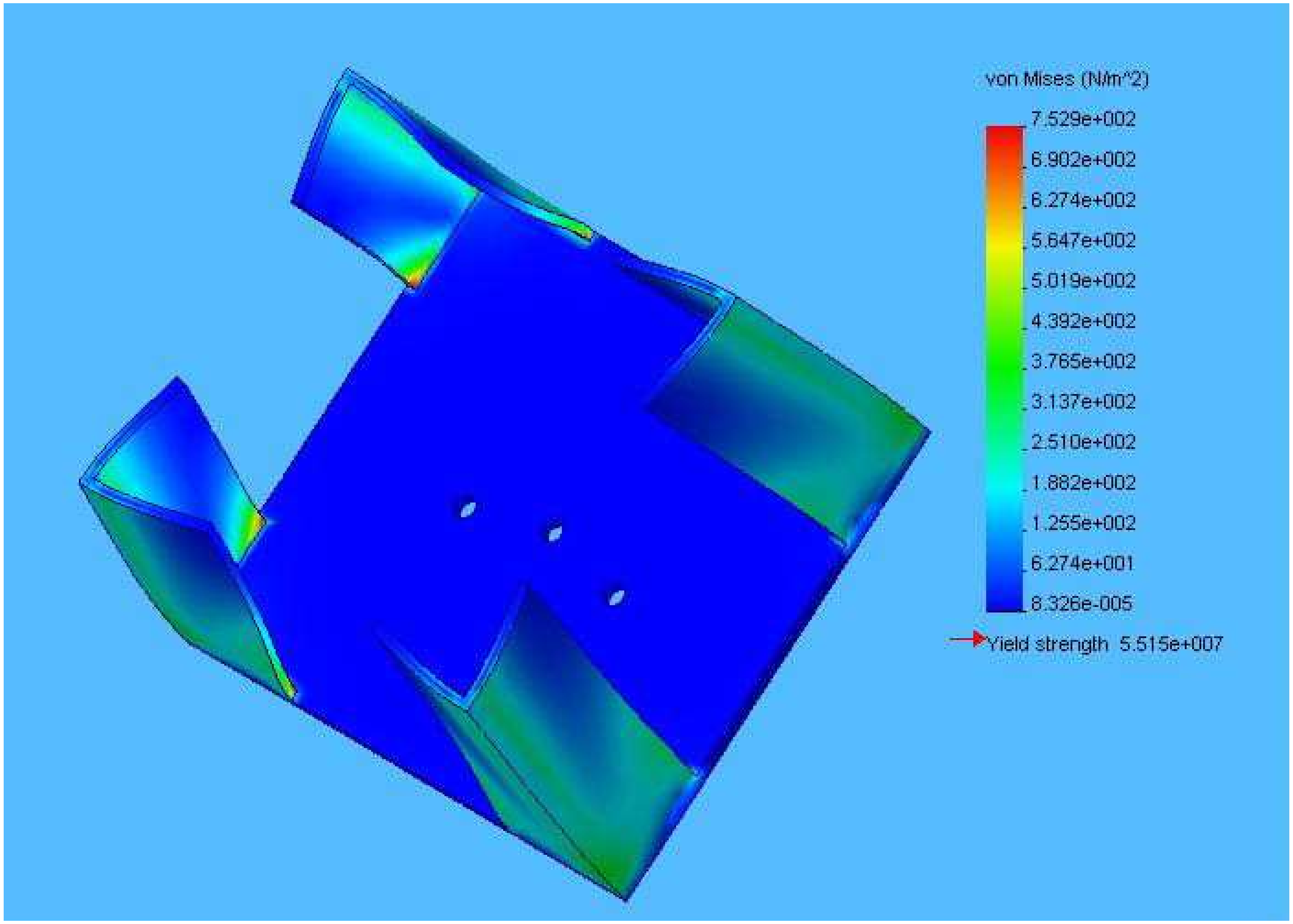
COMMENTS:

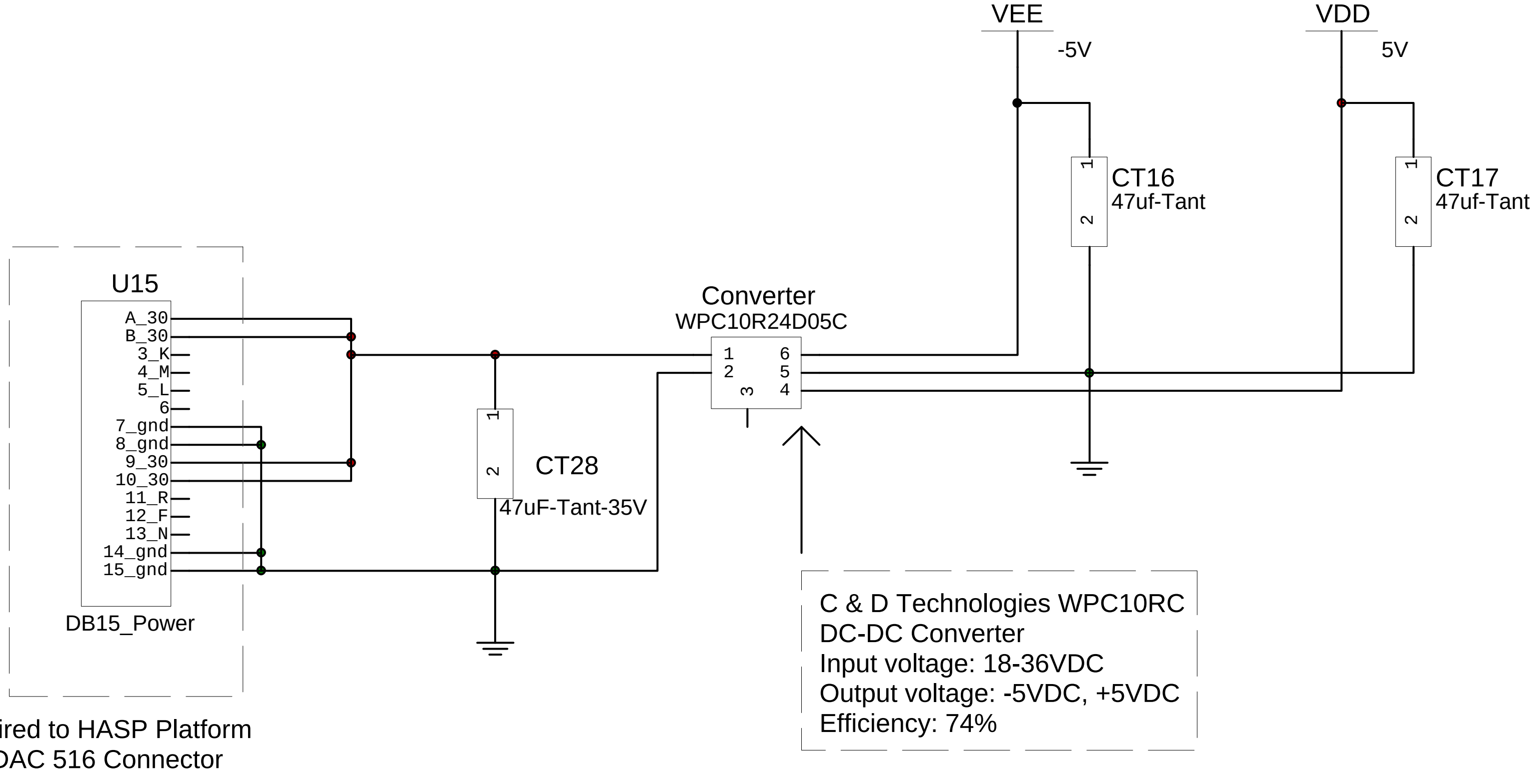
TITLE: UND HASP - Mechanical Overview

SIZE **A**
DWG. NO. UND #7
REV

SCALE: 1:5
WEIGHT:
SHEET 1 OF 1

5 4 3 2 1


von Mises (N/m^2)
7.529e+002
6.902e+002
6.274e+002
5.647e+002
5.019e+002
4.392e+002
3.765e+002
3.137e+002
2.510e+002
1.882e+002
1.255e+002
6.274e+001
8.326e-005
Yield strength 5.515e+007



C & D Technologies WPC10RC
DC-DC Converter
Input voltage: 18-36VDC
Output voltage: -5VDC, +5VDC
Efficiency: 74%

Wired to HASP Platform
EDAC 516 Connector

University of North Dakota
High Altitude Student Platform
Grand Forks, ND

THE UNIVERSITY OF NORTH DAKOTA

Title: PowerDiagram	Desc.: PowerDiagram	
Designed by: KBA	Document No: 0001	Revision: 1.0
Checked by:	Date: 2008-05-23	Size: A
Approved by:	Sheet 1 of 1	