HASP Payload Specification and Integration Plan

Payload Title: NOx and O_3 Sensor Technology Development and Atmospheric Experimentation

Payload Class: (Small) Large (circle one)

Payload ID: 7

Institution: University of North Dakota

Contact Name: Joshua Peterson - or - Dr. Ronald Fevig

Contact Phone: +1 (701) 740-7833 -or- +1 (520) 820-3440

Contact E-mail: joshua.peterson2@und.edu -or- rfevig@aero.und.edu

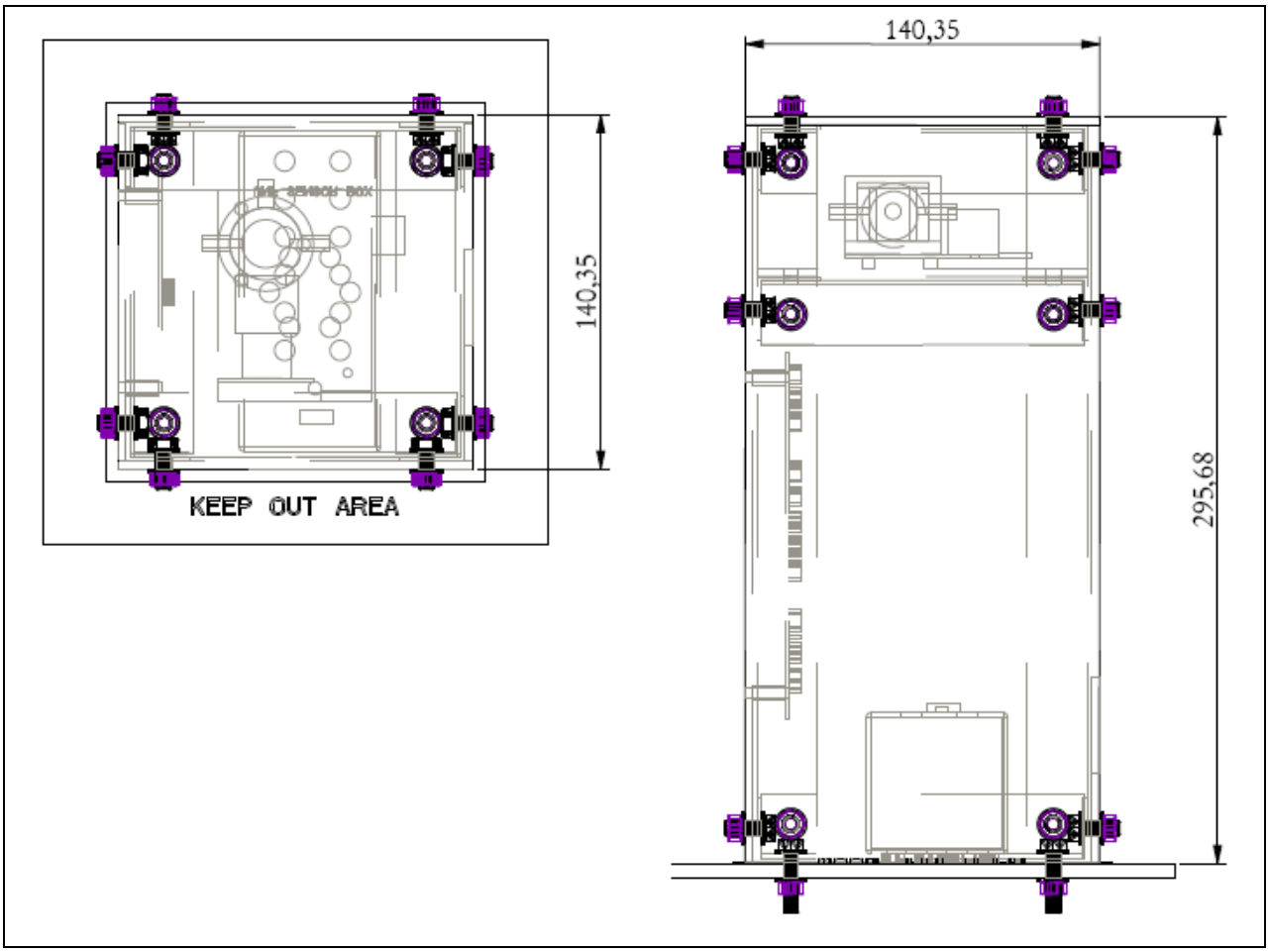
Submit Date: 01-Jun-2009

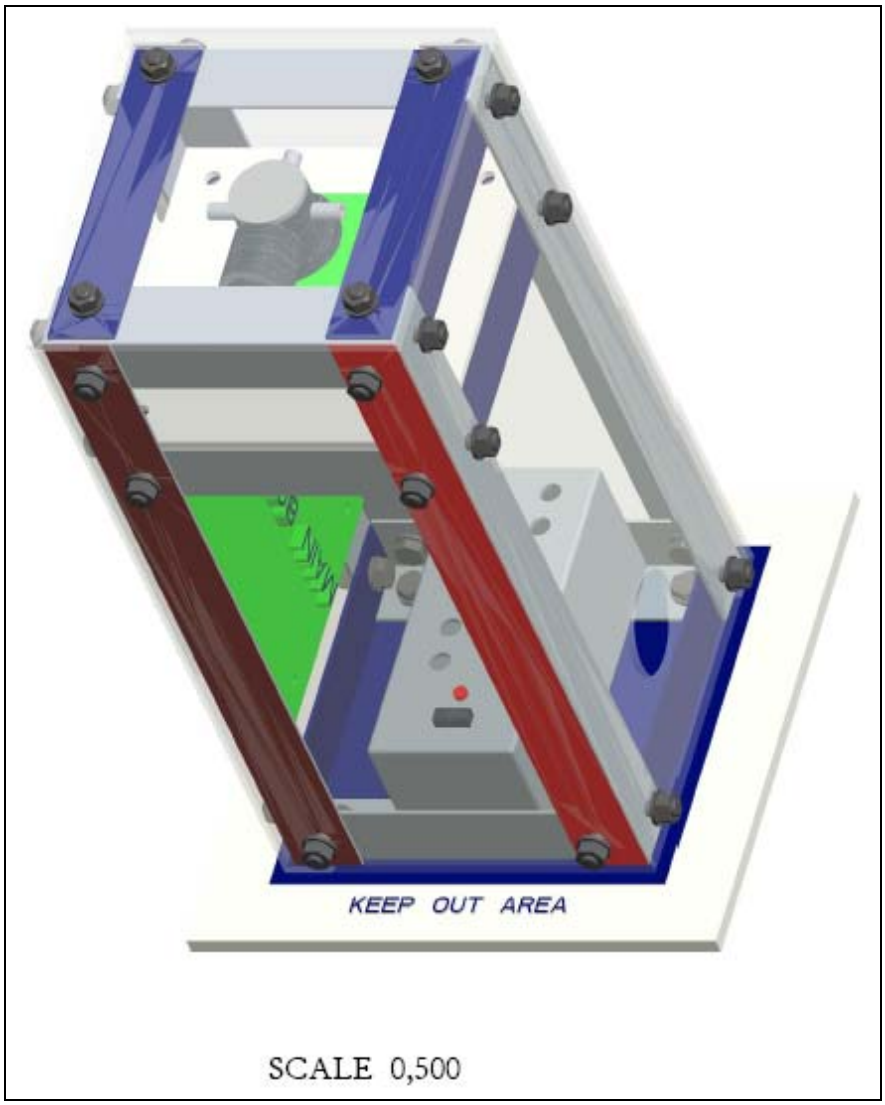
I. Mechanical Specifications:

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

~2.5 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)**


140,35
140,35
KEEP OUT AREA
295,68



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

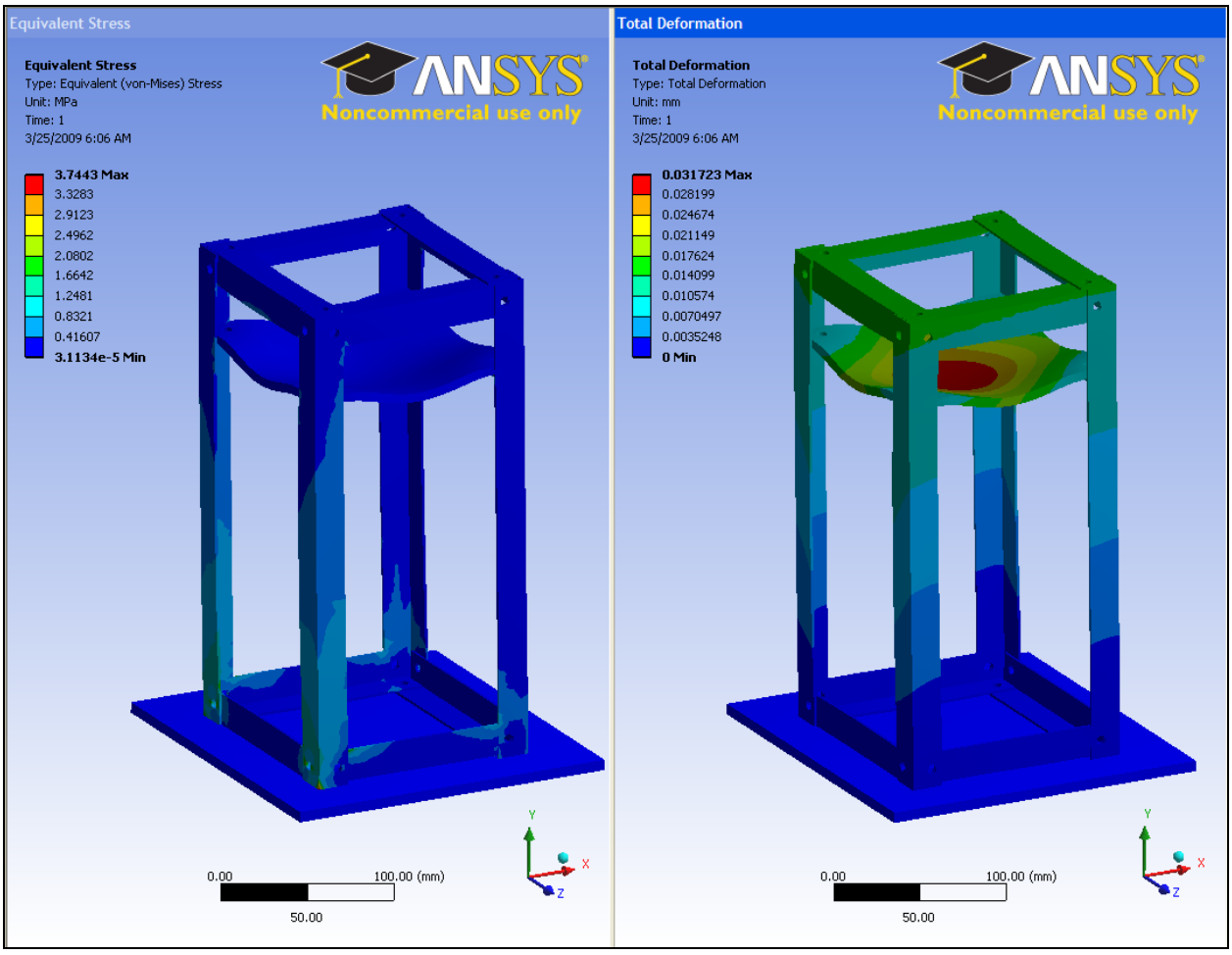
D. Other relevant mechanical information

The payload structure comprises of Al 6061 angel frames and PVC walls 1/8" thick. The PVC plates are attached to the Al 6061 framework by M6 bolt, washer and nut assemblies. The footprint of the payload is limited to less than 30 cm in height (~29cm), and is ~15cm x 15cm. The complete payload assembly will be mounted on the HASP mounting plate with 4 M6 bolt, washer, and nut assemblies.

One of the PVC walls has the PCB mounted from inside and a sensor box will sit at the bottom of the payload. We will have an optical particle counter on the second level inside the payload.

The complete payload assembly will be wrapped up with multiple layers of Mylar (space) blanket for insulation. The insulation will have reflective silver surface facing inside to assure maximum thermal insulation.

Please refer the attached stress analysis images of deformation and stress gradient satisfying 10 g vertical and 5 g horizontal accelerations.

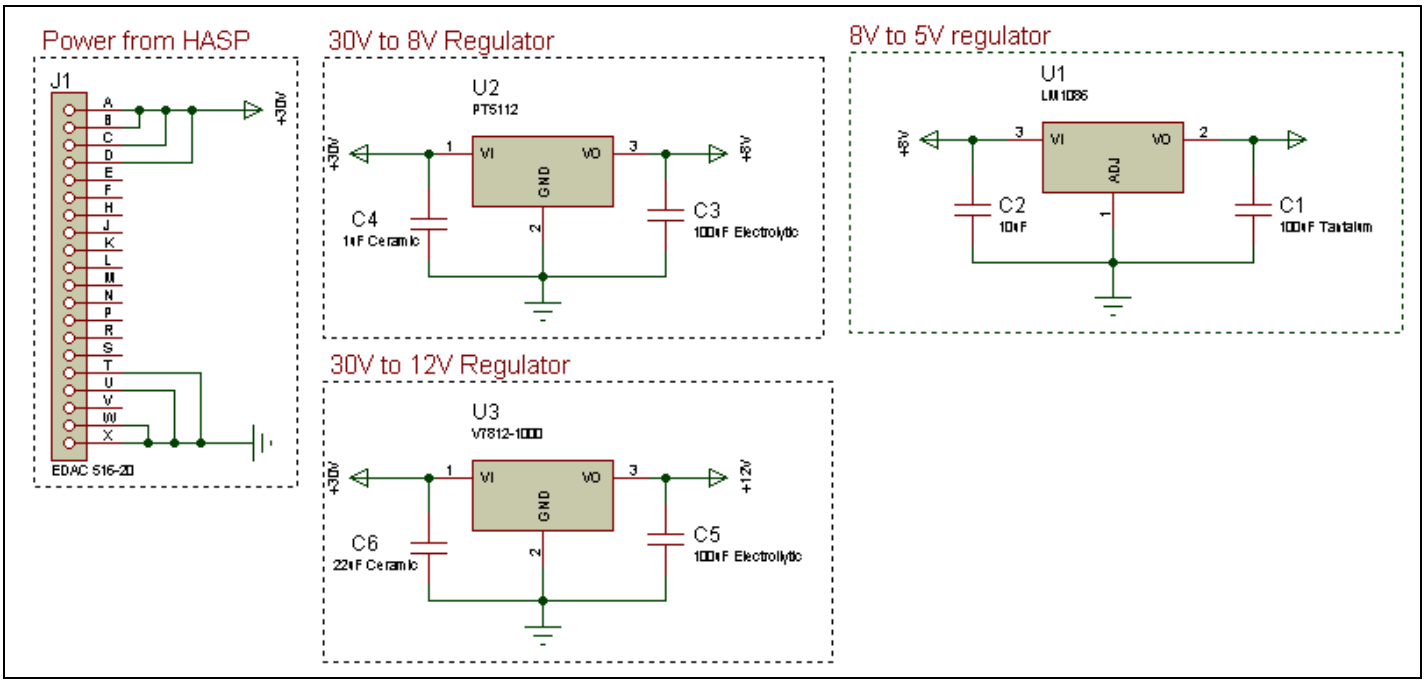


II. Power Specifications:

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.



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.

No

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.

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.

No

F. Other relevant uplink commanding information.

V. Integration and Logistics

A. Date and Time of your arrival for integration:

Will be available at anytime on or after Monday August 3rd

B. Approximate amount of time required for integration:

~1 hr

C. Name of the integration team leader:

Joshua Peterson

D. Email address of the integration team leader:

joshua.peterson2@und.edu

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

Shannon Paper <shannon.paper@gmail.com>; Kaiwalya Telang <telang.kaiwalya@gmail.com>; Nirmalkumar Patel <npatel@unf.edu>; Joshua Peterson <Joshua.peterson2@und.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.