



FreeSPACE Experiment Development Guidelines

NASA Wallops Flight
Facility
Wallops Island, VA
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Introduction

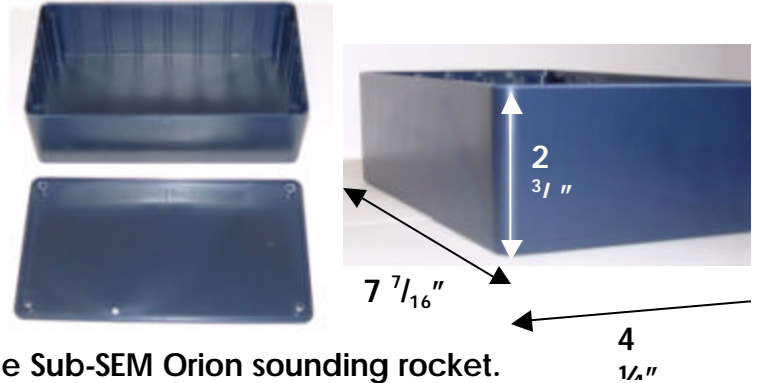
The participants in the NASA Explorer Schools program at Goddard Space Flight Center are offered an opportunity to fly FreeSPACE experiments in the nosecone of a single stage Orion sounding rocket. NSIP Sub-SEM student experiments are the primary instruments on this payload. Self-contained, with no interfaces to resources such as power or data in the payload, the experiments fit in a structure specially developed for small passive payloads.

Dimensions

The entire experiment must fit inside an enclosure with dimensions:

$7 \frac{7}{16}$ " L x $4 \frac{1}{4}$ " W x $2 \frac{3}{8}$ " D

(NASA will provide the experiment box.)



Location in the rocket

The experiments will be attached to a rack and installed in the nosecone of the Sub-SEM Orion sounding rocket.

Experiment

Environment

- ?? The nosecone is pressurized to 14.7 lbs/in².
- ?? The rocket will be on the launch pad for approximately three days before launch. Ambient temperatures in June can reach 85 – 90 degrees Fahrenheit.
- ?? The vehicle will spin at a rate of approximately four revolutions per second (rps) in flight.
- ?? There is significant vibration onboard the vehicle. Make sure that the experiment is secured inside the experiment box.
- ?? Flight duration, from launch to impact, is approximately 15 minutes. The parachute is deployed at approximately T + 6 min.
- ?? The experiment will impact in the water.



Nosecon

Requirements and limitations

- ?? Experiment groups must provide their own power and data collection systems for active experiments. These systems must fit inside the experiment box.
- ?? There is no access to the outside of the nosecone. Sensors measuring the outside environment are not possible.

?? No live animals, other than insects, are allowed.

?? No hazardous items or chemicals are allowed.

?? Experiments are installed into the nosecone several days prior to launch.
No access to the experiments is provided after installation.

?? Launch may occur any day, June 9 – 11, 2004.

Things to think about

For *active experiments*, i.e. experiments that will actively collect data during the flight, the following should be considered:

Experiment activation mechanism.

How is the experiment activated, i.e. started? Timing function on a computer (PDA)? G-switch?

How is the experiment reset? In the case where the rocket is not launched on the first attempt, the experiment either needs large amount of data storage or the ability to reset and start over again the next day.

Active experiments have never before flown inside the nosecone of the Sub-SEM payload, therefore no data exists on the actual environment. Some potentially measurable variables include temperature, pressure, and radiation. What is the temperature inside the nosecone? How about the temperature along the inside surface of nosecone from the tip to the base? Pressure; how well sealed is the nosecone? Radiation; does radiation at altitude penetrate the nosecone?

The simplest experiments that can be flown are *passive experiments*. Passive experiments include exposing items to the vibration environment and acceleration loads. The analysis is done by viewing the experiment materials post flight.

Sources for Sensors and Data loggers

Provision of this listing is not an endorsement nor representative of a preference, by NASA, for any of the listed companies.

<http://www.pasco.com/PASPORT/>

<http://www.ibutton.com/ibuttons/thermochron.html>