

SUBORBITAL MICROGRAVITY PLATFORM

A reusable way to access microgravity for your experiments.

Main Aspects

The Suborbital Microgravity Platform (SMP) provides conditions for microgravity experiments when launched by sounding rockets. It communicates with Ground Stations to transmit telemetry data and video in real time and receive, decode and distribute remote controls for experiments. The SMP provides a microgravity environment with acceleration lower than $0.2mg$ ($2.10^{-4}g$). The SMP design has a modular mechanical/electrical philosophy to allow independent equipment design, assembling and testing before subsystems integration and system final compatibility tests.

Architecture Description

The SMP primary structure is composed of a set of modules made of aluminum, which are fixed by flanges.

The SMP consists of 6 subsystems: Structure, Service, Rate Telecommand and Data Handling (RCDH), Telemetry and Telecommand (TM/TC), Separation and Recovery.

Structure Subsystem

It is the set of mechanical parts that constitutes the whole structure of the SMP.

Service Subsystem

Is responsible for the timing of the events and for the power conditioning and distribution.

TM/TC Subsystem

The TM/TC is composed for a telemetry transmitter, a video transmitter, a remote control receiver, three video cameras and a set of antennas.

RCDH Subsystem

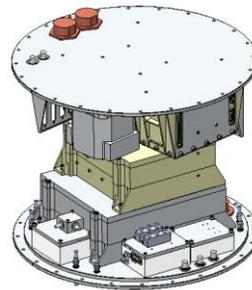
Controls the angular velocities, acquires and processes data for telemetry, receives, decodes and distributes commands both for the experiments and for service functions via the umbilical connector during the pre-flight phase and by telecommands during the flight phases.

Separation Subsystem

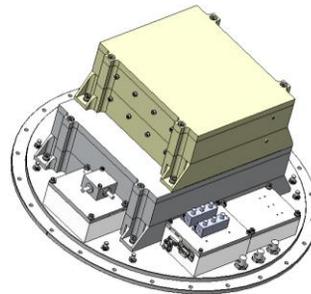
Responsible for the Nose Cone ejection, Yoyo releasing and the separation of the sounding rocket. This subsystem uses two solenoid valves for each event: one acts directly on the pistons and the other loads and unloads the nitrogen gas tanks.

Recovery Subsystem

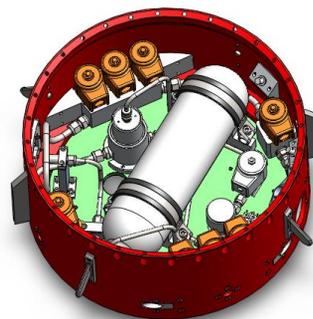
It is a set of mechanisms and parachutes to reduce the landing speed. This subsystem employs two actuators driven by commands sent by a Control Block.



Control Module



RCDH Subsystem



Cold Gas Unit





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Suborbital Microgravity Platform (SMP)

Technical Specifications

Number of experiment modules: a minimum of 2 and a maximum of 5 experiment modules can compose a mission dedicated SMP configuration.

Apogee: the SMP can be subjected to a ballistic trajectory with an apogee of 300 km.

Experiment mass: each experiment can reach a total mass of 30 kg and the total experiments mass shall not exceed 75 kg.

Acceleration: the SMP can withstand a longitudinal peak acceleration of 15 g.

Microgravity period: the rate velocity of the SMP can be controlled during a period of 8 minutes.

Shelf life: 5 years (except batteries).

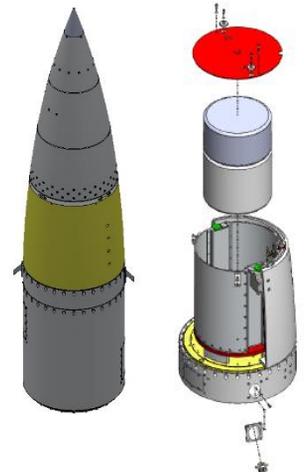
Experiment Modules can be airtight unless window for later access to the experiment is needed. Access windows have a secondary structure fixed to the module to provide greater rigidity.

There are three sizes for experiment modules, according to mission specification.

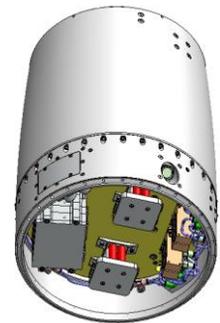
All SMP equipment and experiments are installed in baseplates.

Balancing rings are used for ballast, whenever necessary. Plates and balancing rings are part of the secondary structure of the SMP.

The SMP incorporates redundancy (independent batteries, Event Sequencer) to generate the commands for yoyo actuation, SMP separation and for the recovery phase.



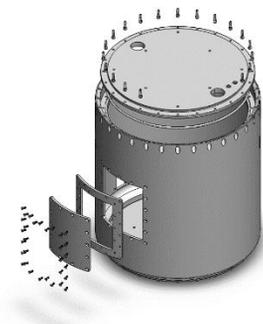
Recovery Subsystem



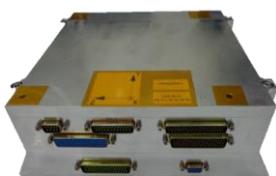
Control Block



Balancing Ring



Experiment Module



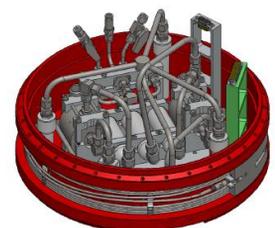
Onboard Computer



IMU



GPS



Separation Subsystem