ESEIAAT

Escola Superior d'Enginyeries Industrials, Aeroespacial i Audiovisual de Terrassa
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Cubesat Constellation
Astrea

Report

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Students:

Cebrián Galán, Joan
Foreman Campins, Lluís
Fuentes Muñoz, Óscar
Herrán Albelda, Fernando
Martínez Viol, Víctor
Pla Olea, Laura
Puig Ruiz, Josep
Tarroc Gil, Sergi
Urbano González, Eva María
Fontanes Molina, Pol
Fraixedas Lucea, Roger
González García, Sílvia
Kaloyanov Naydenov, Boyan
Morata Carranza, David
Pons Daza, Marina
Serra Moncunill, Josep Maria
Tió Malo, Xavier

Customer: Pérez Llera, Luís Manuel

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EMPTY

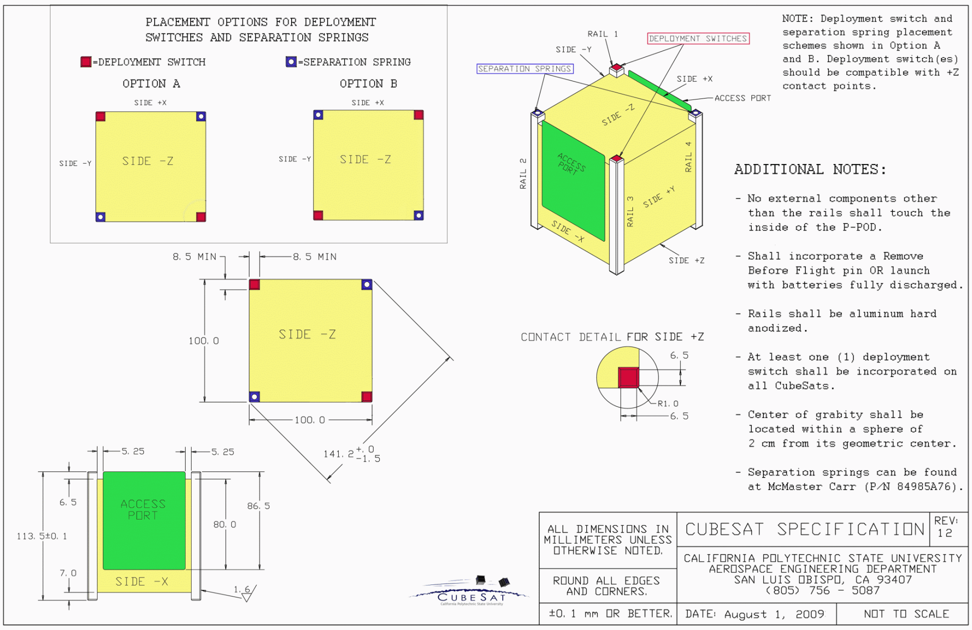

Figure 2.1: Dimensions of a 1U CubeSat [?]

2.1.1 Structure

EMPTY

2.1.2 Deployments

EMPTY

2.1.3 Thermal protection

The thermal protection system protect the CubeSat from thermal shocks. The satellite must remain in a optimal range of temperatures,despite the external temperature. It consists of various insulating materials and thermal conductors in order to maintain it within acceptable temperatures.

2.1.4 Study of the commercial available options

EMPTY

Brand and model	Features and description	Money (€)
Solar Panels		
Fabricant 1	EMPTY	2000000
Chuscas 1	EMPTY	20000
Truñaas 1	EMPTY	20000
Cuescas 1	EMPTY	20000

Table 2.1: Options studied

Of all the options in 2.2, we have chosen the following options.

2.2 Electrical Power System

The Electric Power System of the satellite must provide and manage the energy generated efficiently in order to have all the systems operating under normal conditions. The Electrical Power System of a Cubesat is, probably, the most fundamental requirement of the satellite payload, since a failure of it results in a mission failure. High level functions of the EPS are to control and distribute power to the Cubesat, to suppy a continuous source of electrical power for the duration of the mission or the service provided by Astrea, to protect the satellite against bus failiures and to monitor and communicate the system status to the on-board computer. The role of the EPS is very diverse and the following subsystems have to be analyzed in detail.

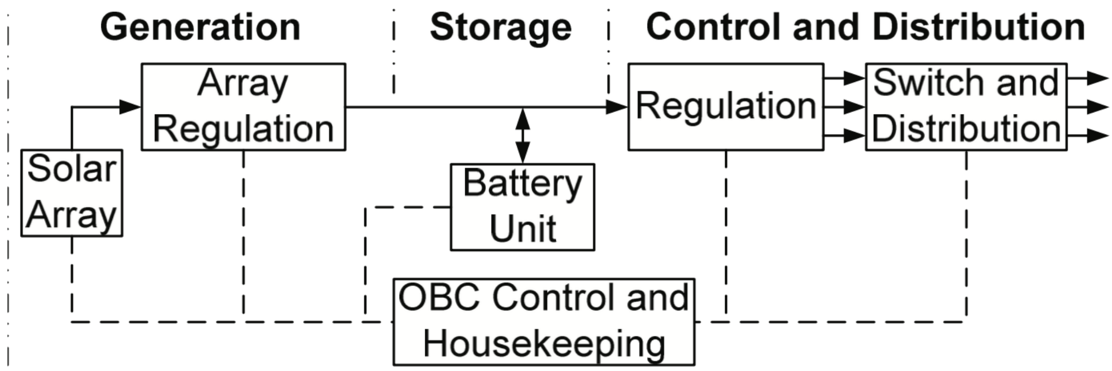

Figure 2.2: Basic schematics of the EPS [?]

2.2.1 Solar arrays

The primary source of electrical power has to be photovoltaic cells, given the size of the CubeSat.

2.2.2 Batteries

Batteries give power the different subsystems when solar arrays do not, due to not receiving sunlight

2.2.3 Power management

2.2.4 Study of the commercial available options

Several commercial options have to be studied. The table provided below organizes some information about the different options purchased.

Brand and model	Features and description	Money (€)
Solar Panels		
Fabricant 1	EMPTY	2000000
Chuscas 1	EMPTY	20000
Truñaas 1	EMPTY	20000
Cuescas 1	EMPTY	20000

Table 2.2: Options studied

Of all the options in 2.2, we have chosen the following options.

2.3 Propulsion Systems

EMPTY

2.3.1 Motivations

There is a big risk of a collision with space debris while a spacecraft is operating in LEO. The Inter-Agency Space Debris Coordination Committee to the United Nations (section 5.3.2 'Objects Passing Through the LEO Region'): "Whenever possible space systems that are terminating their operational phases in orbits that pass through the LEO region, or have the potential to interfere with the LEO region, should be de-orbited (direct re-entry is preferred) or where appropriate manoeuvred into an orbit with a reduced lifetime. Retrieval is also a disposal option." and "A space system should be left in an orbit in which, using an accepted nominal projection for solar activity, atmospheric drag will limit the orbital lifetime after completion of operations. A study on the effect of post- mission orbital lifetime limitation on collision rate and debris population growth has been performed by the IADC. This IADC and some other studies and a number of existing national guidelines have found 25 years to be a reasonable and appropriate lifetime limit."

2.3.2 Study of the commercial available options

EMPTY

2.4 Communication module

100kbps:

1mbps:

¿solo 9600bps?:

Links interesantes universidades:

2.5 Payload

EMPTY

2.5.1 Antenna and communication system

The communication system allows us to realize the reception and trasmission of data, voice signals, etc. It consists of a group of transponders, that are the combination of a transmitter and a receiver and whose functions are receiving, separating, amplify, process, reamplify and retransmit signals.

The telemetry subsytem analyses the information about the ground station and other sensors of the satellite in order to monitor conditions on board. It allows report to ground station about the conditions of the on board systems.

The command and control subsystem allows the ground station to control the satellite.

2.5.2 Data Handling Systems

EMPTY

2.5.3 Study of the commercial available options

EMPTY

2.6 Attitude and control systems

Attitude and orbital control subsystem is needed to enable the satellite to keep a specific position within its orbit and to control the antennas in order to remain oriented to assigned area, because the satellite tends to change its orientation due to torque. The AOCS receives telecommands from the central computer and acquires measurements (satellite attitude and orbital position) from sensors.

2.6.1 EMPTY

EMPTY

2.6.2 EMPTY

EMPTY