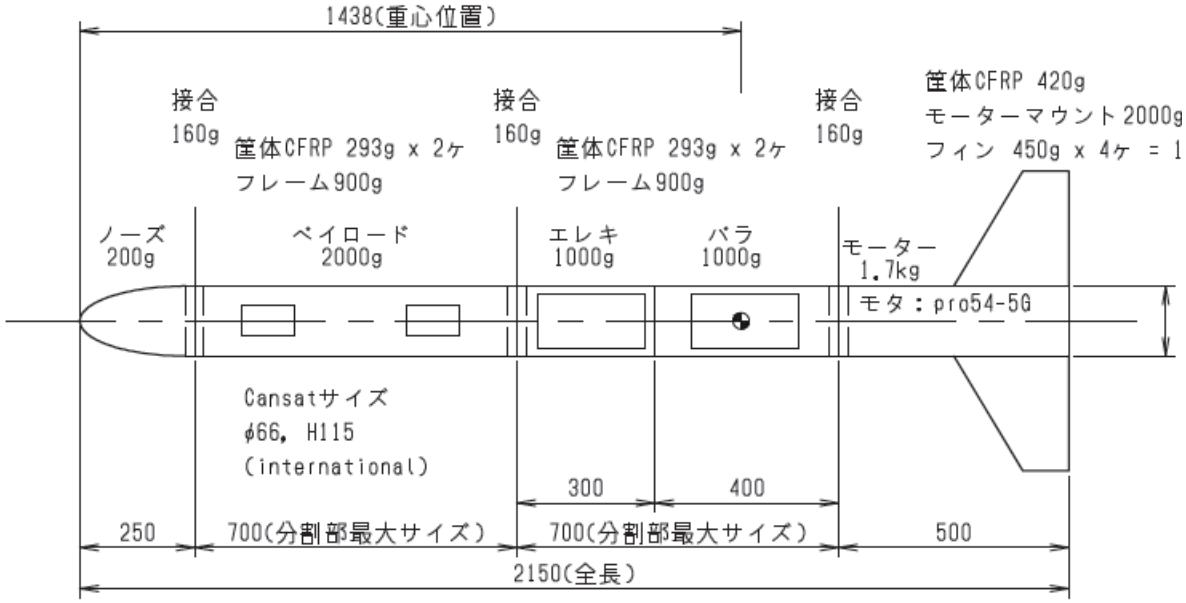
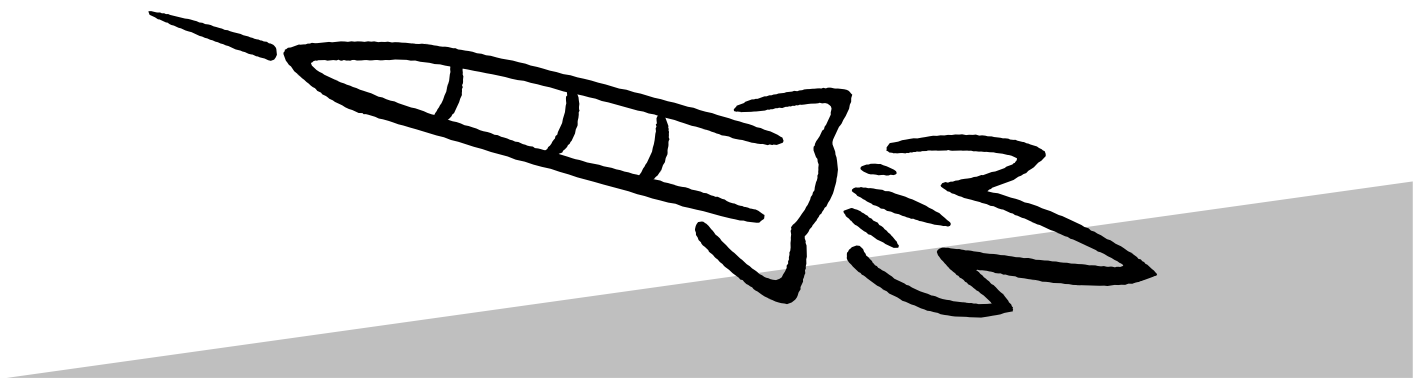
UCK-14 Project Report of C'Space 2014



23/Aug/2014 ~ 30/Aug/2014 at Biscarrosse, France

Espace Club de Kansai

CHAPTER 1
Project Outline



Orientation of C’Space 2014

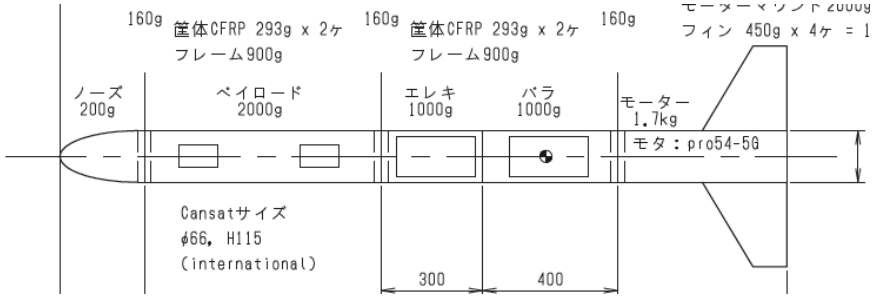
The team UCK had built many model rockets and took part in C'Space many times. But we broke off activity and didn't build any new rocket after C'Space 2009. In 2012 the team was renewed with new members and decided to participate in C'Space 2014. Some of the new members have some experience in C'Space, project management, and rocket building. Based on the experience, we try to make both the rocket and project more refined this time.

We aim to standardize CanSat deployment mechanism in order to hold a CanSat or Rocket Campaign by ourselves in the future. The rocket itself is designed so that each section can be independently developed without difficulty and that a section leader can learn system design and management easily.

For us, C'Space 2014 is the opportunity where we can build our first rocket and CanSat toward the above stated goal.

Outline of the productions

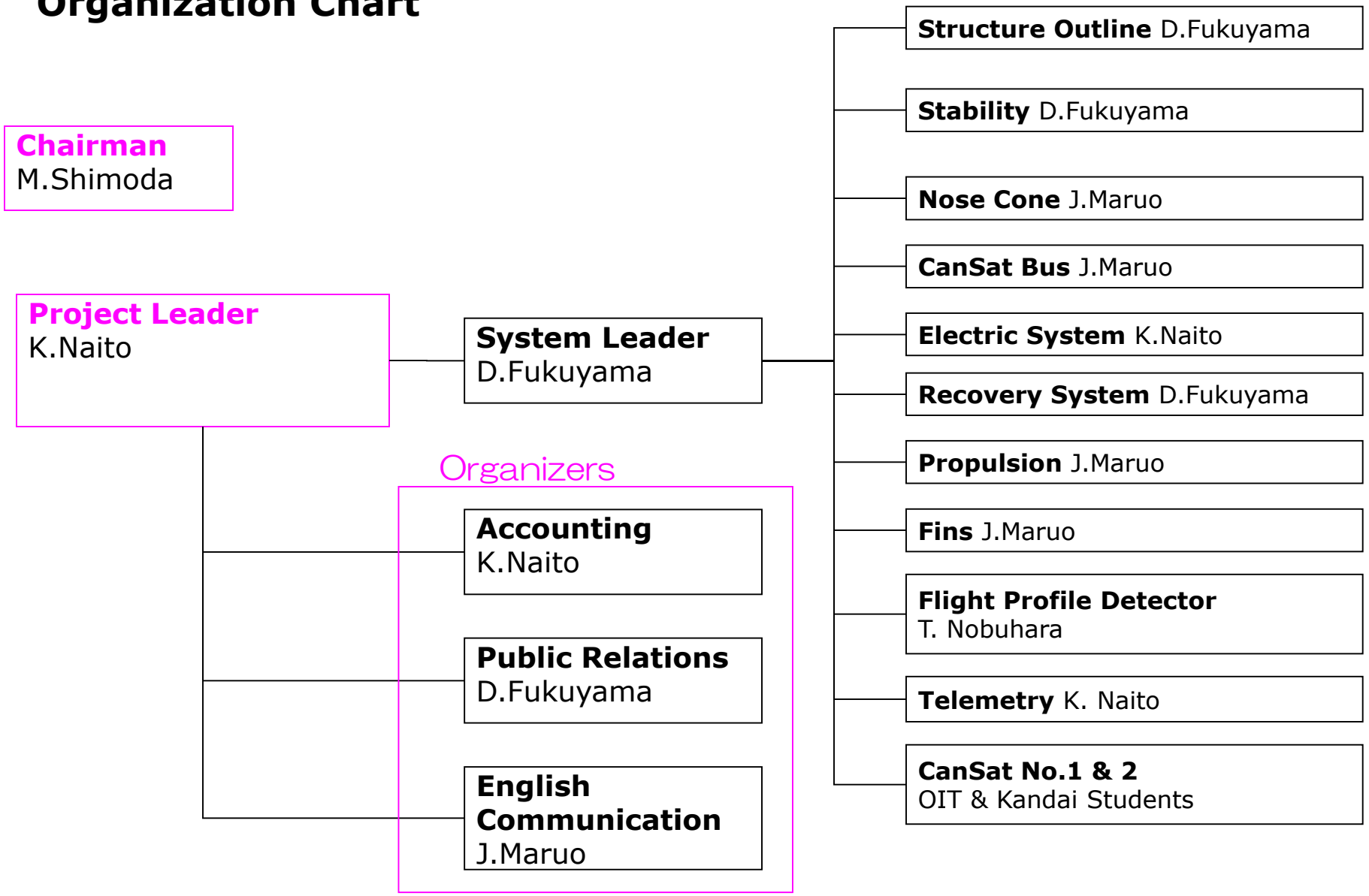
Rocket system for the “Experimental Rocket Campaign” in C’Space



2 CanSats

One for both CanSat Competition & Rocket Campaign
Another for Rocket Campaign

Organization Chart

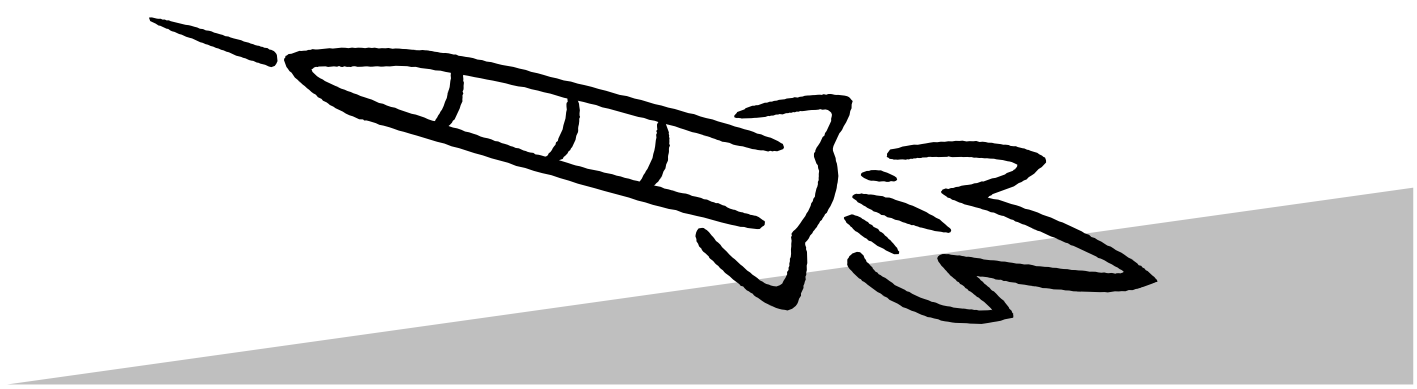


Schedule

	2013	2014 Jan. – Mar.	2014 Apr.	2014 May	2014 Jun.	2014 Jul.	2014 Aug.	2014 Sep.	2014 Oct
Gathering of Members	→	→	→						
CanSat Team Activity			→	→	→	→	→	→	→
System Design & Manufacturing		→	→	→	→	→	▲ Finish		
intermediate survey				▲	Jerome Coming				
System Test							→		
C'Space 2014 Campaign							→		
Report After C'Space								→	→
End of Project									▲

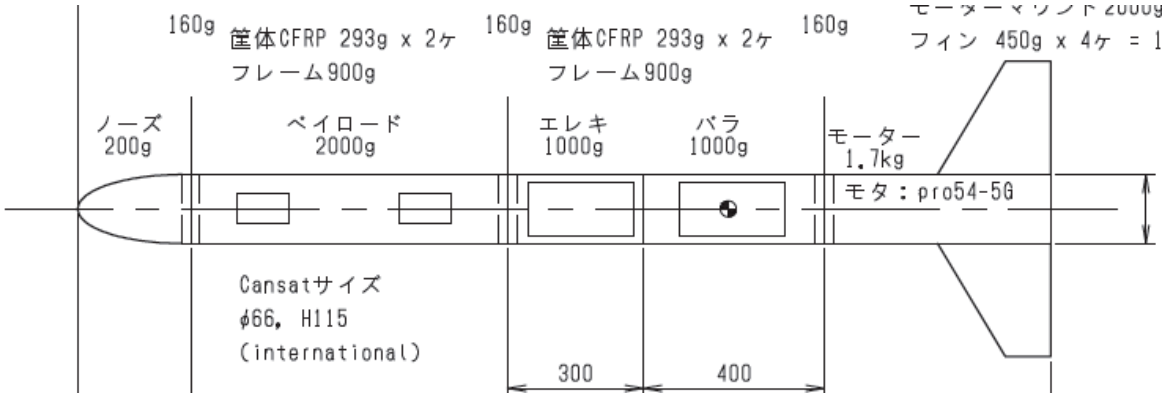
CHAPTER 2

Rocket System Designing



Outline & Characteristics

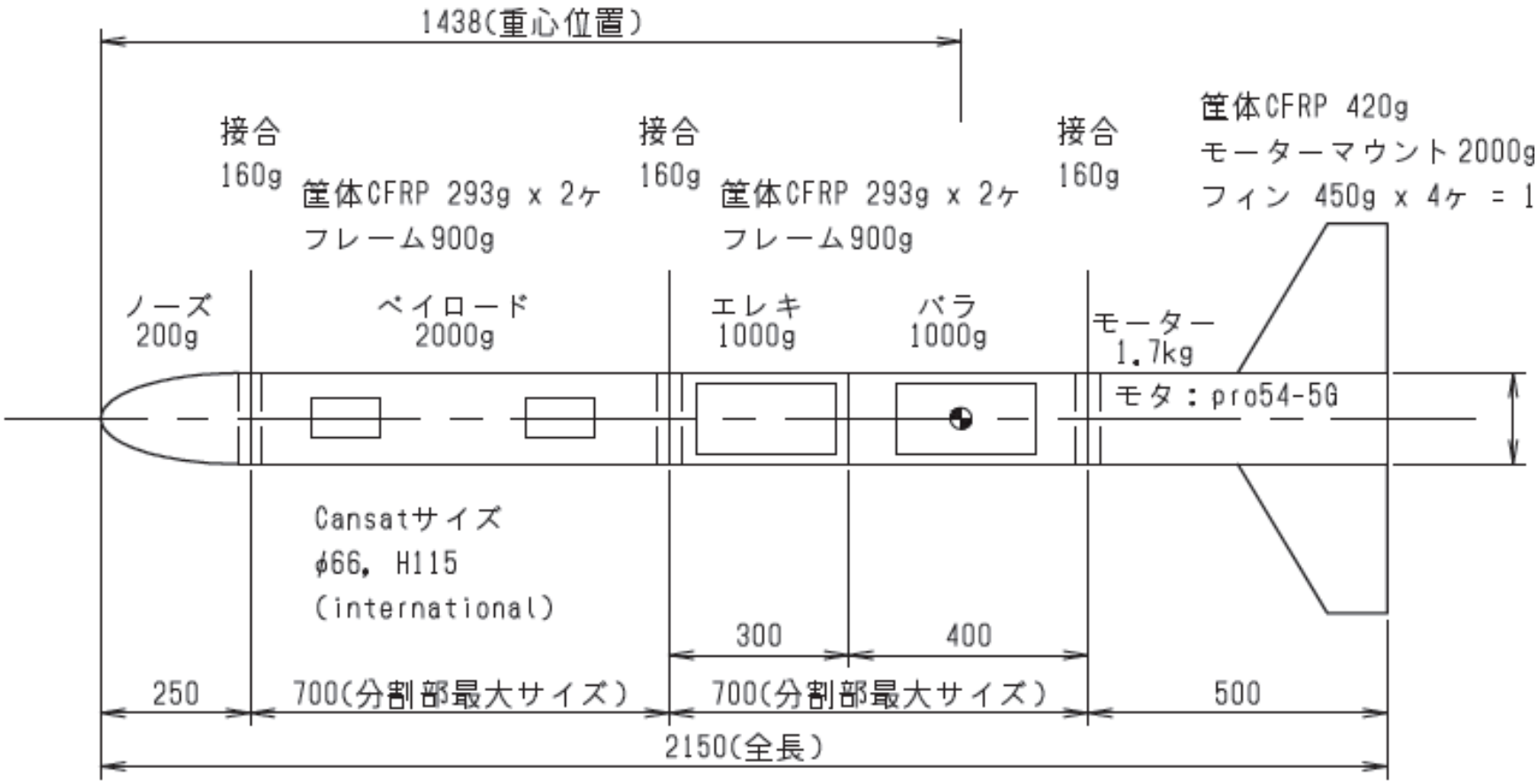
Through this project we aim to standardize CanSat ejection mechanism in order to welcome other teams' CanSats into our rocket in the future. The rocket itself is designed so that each section can be independently developed without difficulty and that a section leader can learn system design and management easily.
Based on this design concept, we adopted the structure which consists of frames and rings. The frames have the interface to fix mechanical parts and electric parts of the rocket. What is more, in order to make the developing and assembling processes easier, the CFRP shells can be detached from the frame structure.
From the view point of electrics, the system is split into several electric boards and each board has only one or few functions to develop the small subsystems independently.



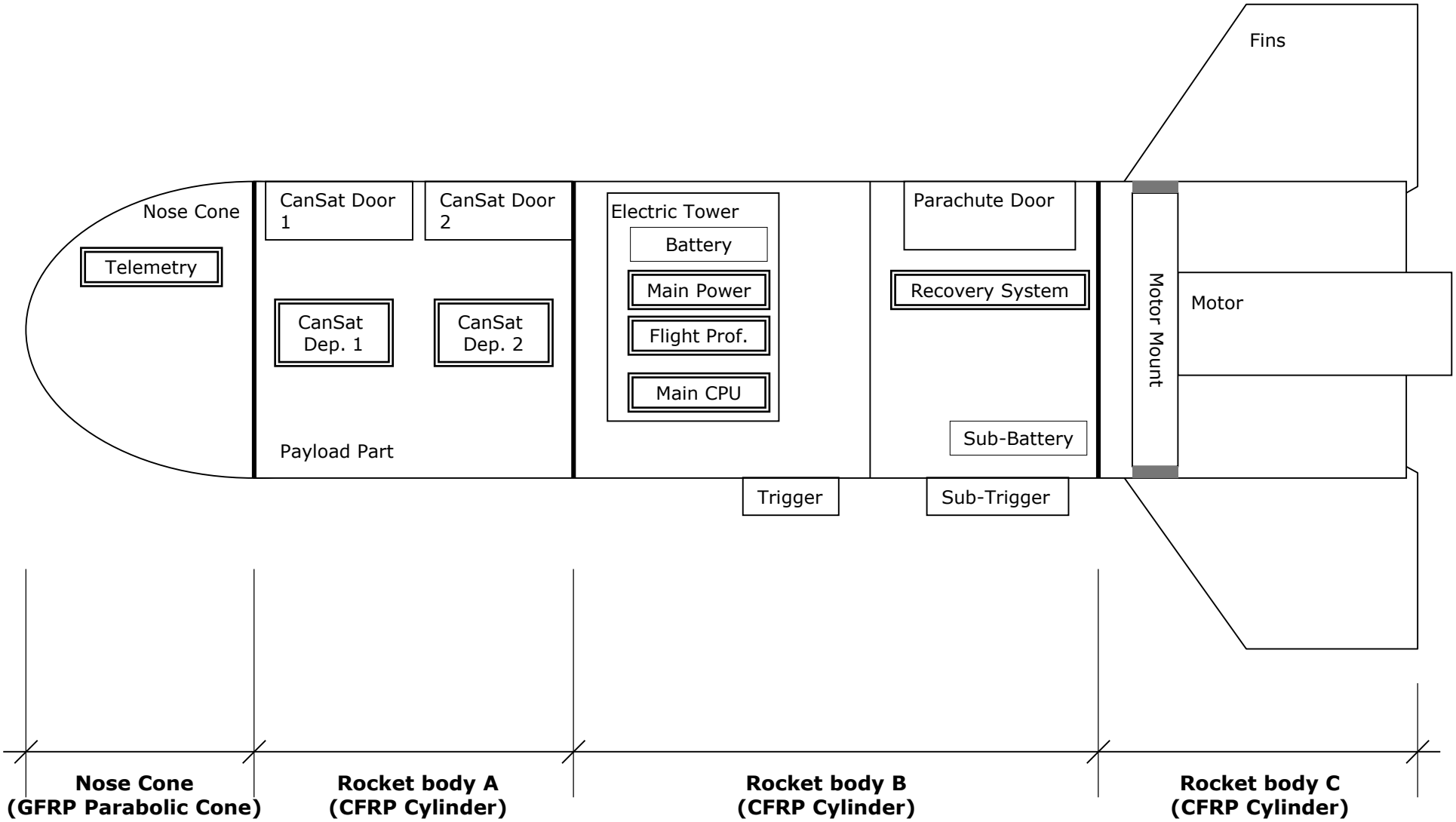
Missions

1. Ejection of 2 CanSats
2. Detection of the Flight Profile

Shells and Frames of the Rocket

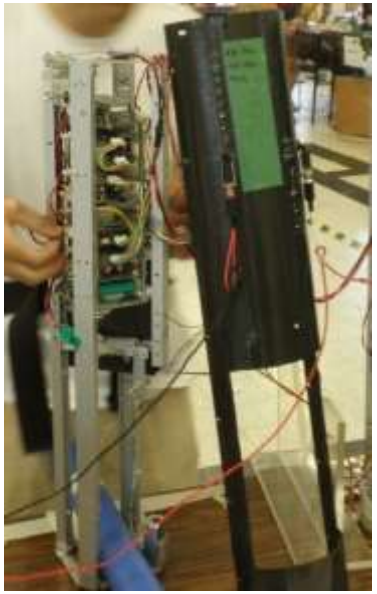


Parts of System

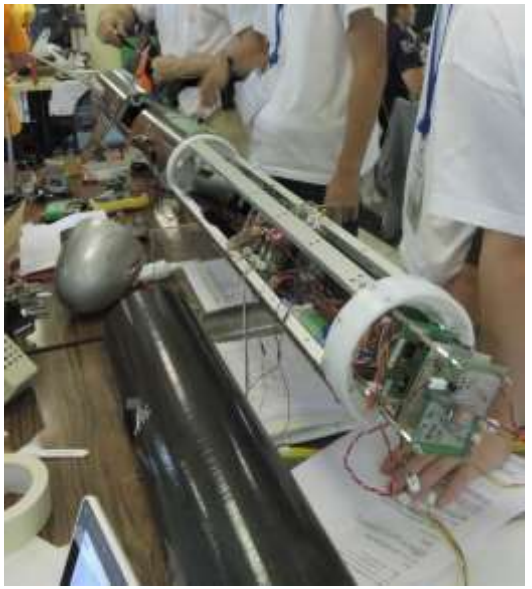


Rocket Structure

Overall View



Electric Boards
& frame structure(1)



Electric Boards
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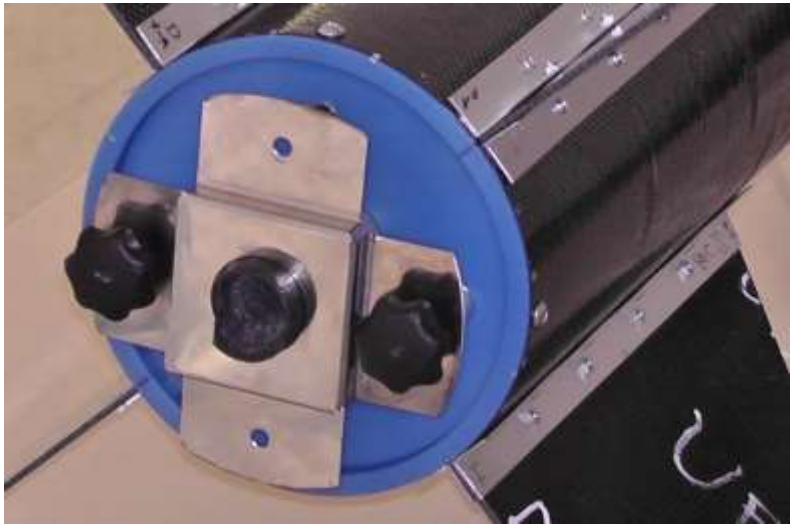
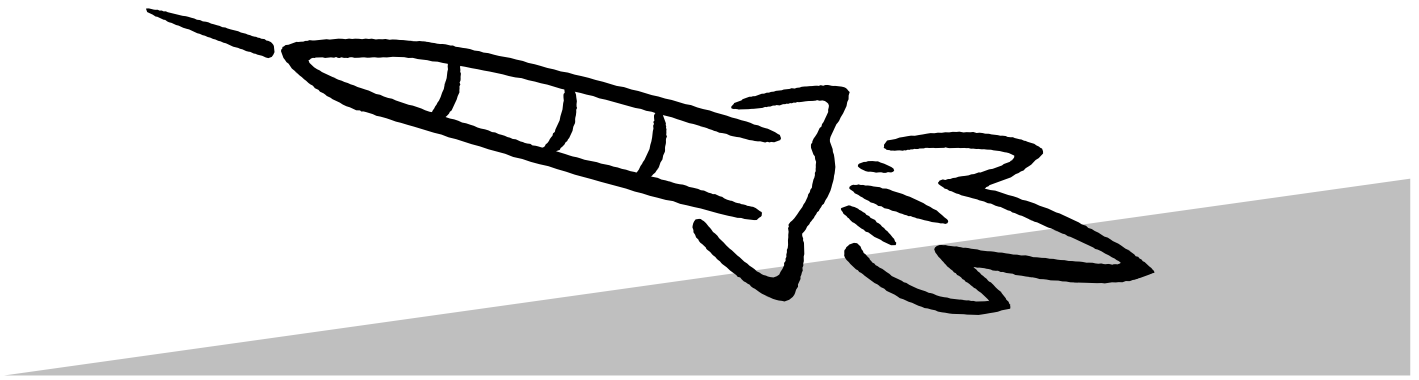
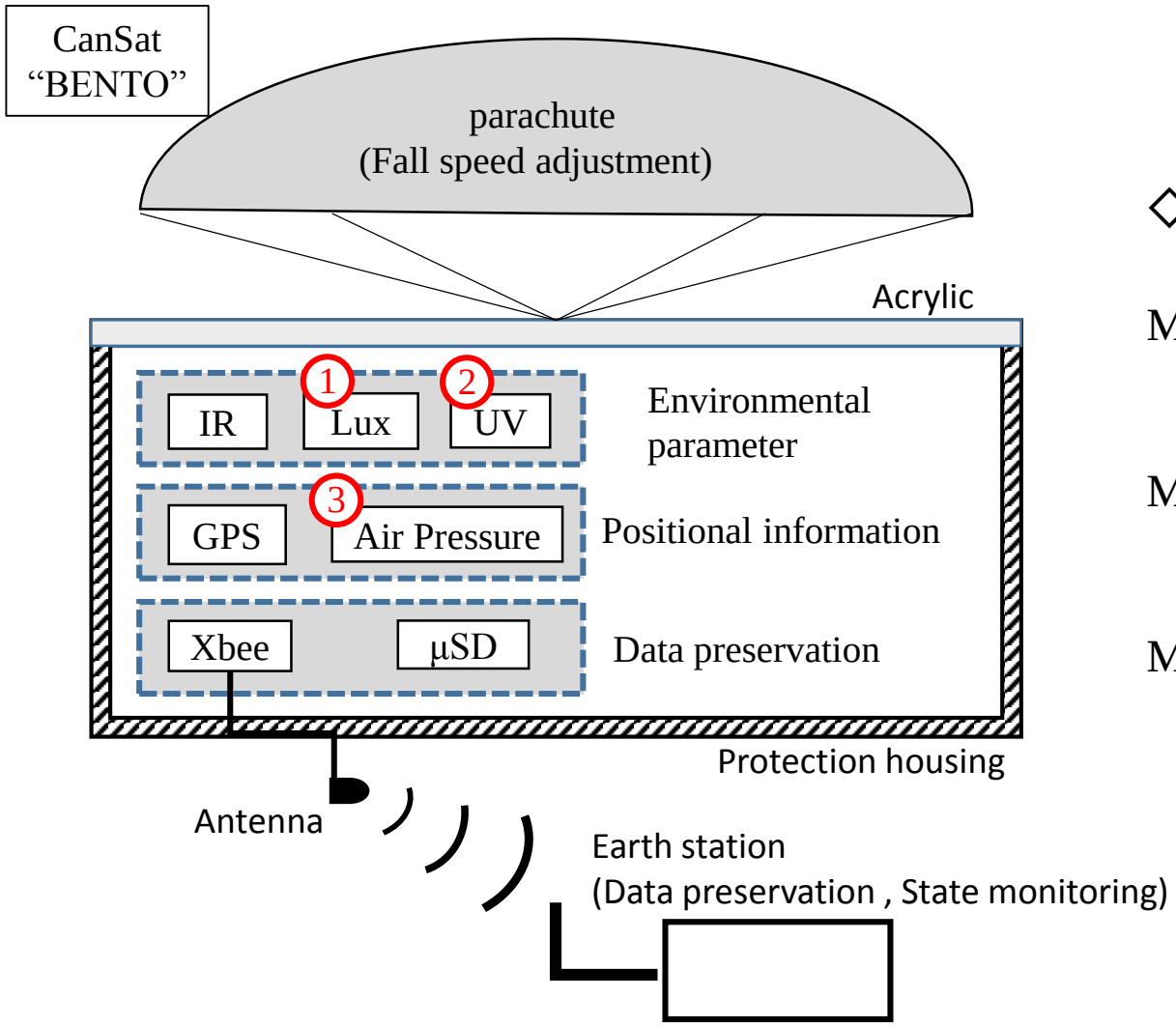


Motor Mount

CHAPTER 3
CanSat System Designing



Outline & Missions



◇ Missions

Mission①
Measurement of the Infrared light and Lux

Mission②
Measurement of the UV

Mission③
Measurement of the Air pressure

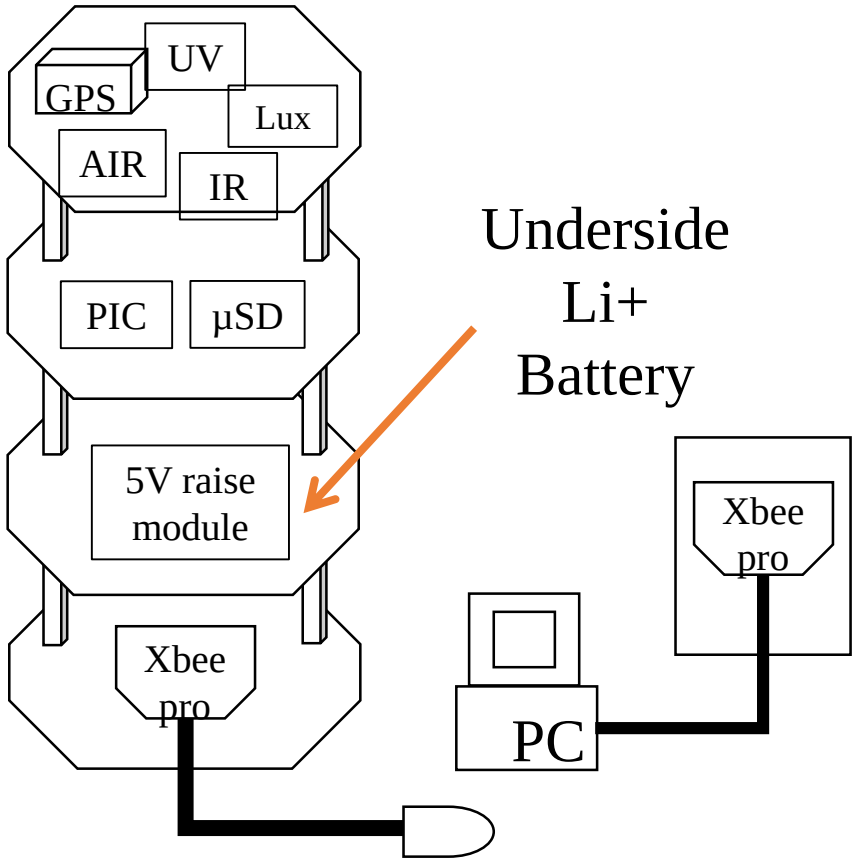
System Block Diagram

1st Stage
UV sensor, IR sensor, and Lux sensor are equipped .
Each sensor is located on the upper stage.
The cover of CanSat is made from the acrylic which has high permeability for UV, IR, visible light.

2nd Stage
After deciding the arrangement of 1st, 4th, and 3rd stages, the rest is located here.

3rd Stage
We lowered the center of gravity by locating battery as low as possible and raised the stability at the time of the fall.

4thStage
We adopted Xbee as a communication module.
An antenna of Xbee should be placed outside of the can.



CanSat Assembly & Naming

← A board and a parachute are already attatched

The structure of our CanSat whose stages are piled up resembles to the Japanese traditional lunch box" BENTO"

Traditional lunch box →

Any radio wave doesn't work until the moment of the fall ①

We want to make use of the experience of C'Space 2014 for various CanSat projects in future.

What we aimed this occasion is the design that could be adapted for different release mechanisms flexibly.

It is an ideal way for this design to detect the moment of the fall by a sensor and software without fixing any trigger for release mechanism.

We examined which sensor equipped in our CanSat can detect the moment of the fall.

Mark	Sensor	Remarks
○	Lux sensor	A value greatly changed at a prior test
△	UV sensor	UV enters into the box
?	IR sensor	Not examined
×	Air pressure sensor	Software is complicated, and there is no certainty

Voltage of the Lux sensor in the release mechanism

= 1 V

Voltage of the Lux sensor in the control room

= 3 V

⇒ The difference is 2 V

We set the threshold as 2V

Any radio wave doesn't work until the moment of the fall ②

How to stop the Xbee communication;

The beacon signal is usually working if the switch is on.

It is necessary to go into sleep mode to stop the beacon signal.

High / Low of the 13pin of Xbee should be switched to be in sleep mode.

As explained on the previous slide, if the voltage of Lux sensor:

More than 1V	⇒	13 pin High (check if sleep mode is off)
Less than 3V	⇒	9 pin Low (turn sleep mode on)

Thus, we can control the radio wave at will for sure!!

Overall view of CANSAT

Internal construction of CANSAT