Satellite Capture Mechanism

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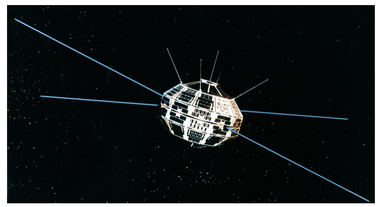
Background

Canada's first spacecraft, Alouette-I, was launched in 1962 with the objective of studying the Earth's atmosphere.

- Alouette-I operated for 10 years and 1 day
- A symbol of Canada's space heritage

The **Alouette Capture Mission (ACM)** seeks to **retrieve Alouette-I** from low Earth orbit.



Alouette-I, Credit: Canadian Space Agency

SCM Main Constraints

Mass: **<500 kg**

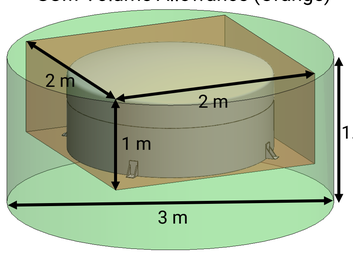
Stowed Volume: **2m x 2m x 1m**

Atmospheric preservation: **Maintain Alouette-I in a vacuum**

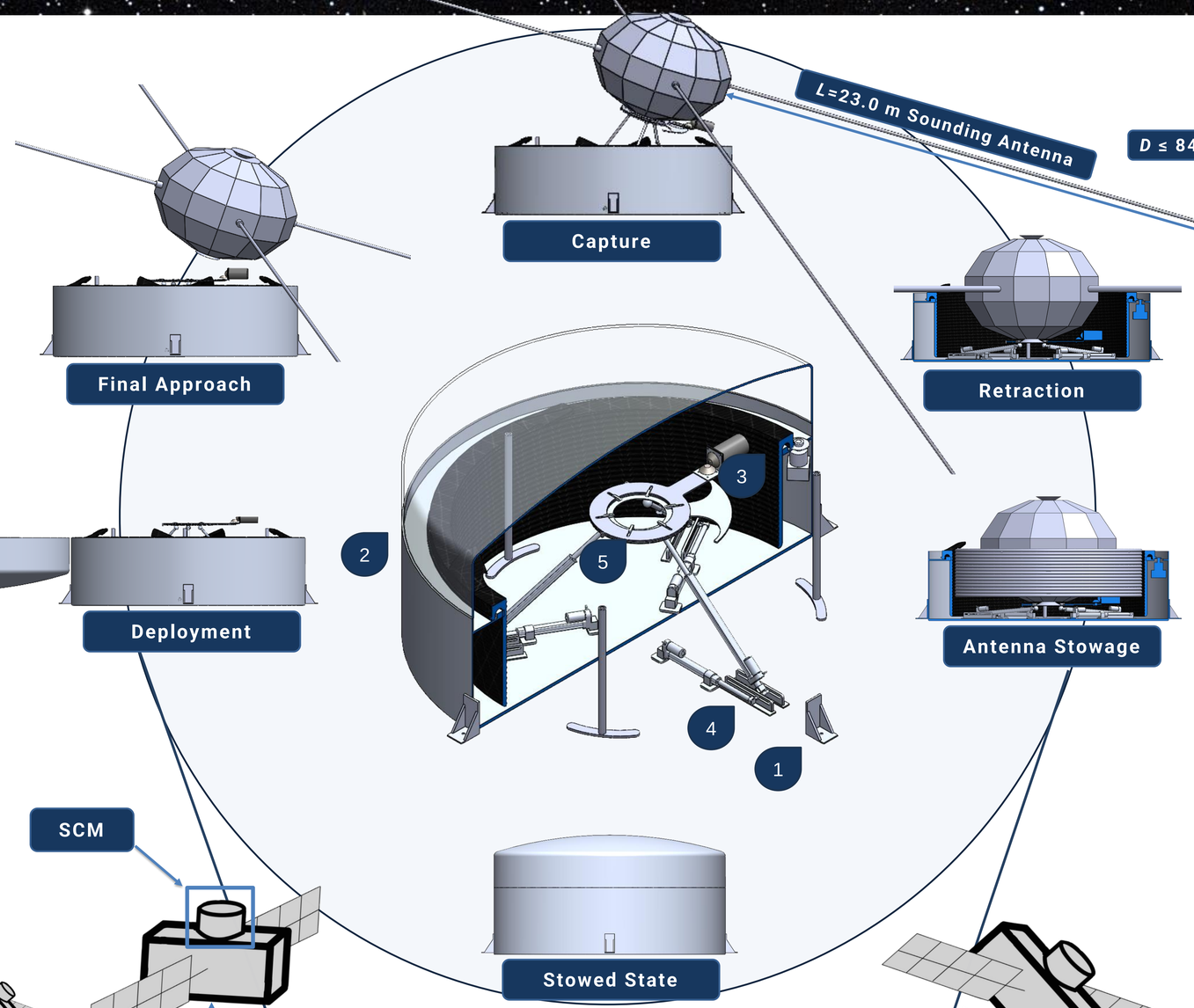
Alouette preservation**: Maintain Alouette-I in museum condition**

Antenna retention: **Retrieve the 23 m and 46 m sounding antennas without inducing plastic deformation**

SCM Volume Allowance (Orange)

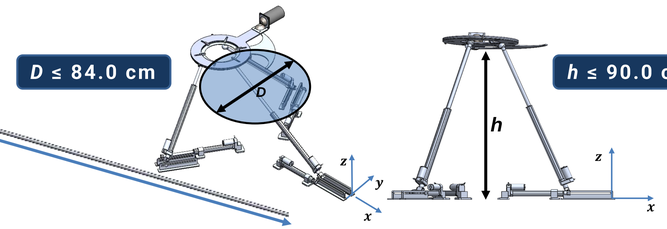


Transfer Vehicle Volume Allowance (Green)



Design Highlights

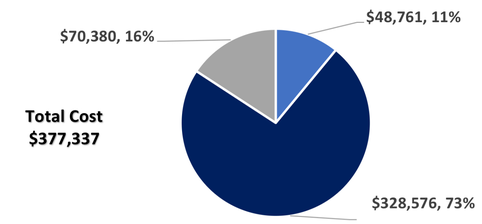
6 Degree of Freedom System



System Components

1. Interface Bracket: **Interface with transfer vehicle**
2. Pressure Vessel: **Stow and protect satellite**
3. Antenna Stowage Ring: **Bend and stow antennas**
4. Linear Actuators: **Move catch plate to satellite position**
5. Catch Plate: **Capture satellite**

Cost Analysis



- **Commercial off the Shelf (COTS)**
- **Custom Components**
- **Engineering Cost**

Objective

Design a Satellite Capture Mechanism (SCM) to capture and preserve the Alouette-I satellite in its found state in low Earth orbit for transit back to Earth.

ACM Launch

T+ 0, Mission Start

Transfer vehicle launch aboard Falcon 9 rideshare, orbital insertion and rendezvous

SCM Operational Phase

On the order of hours to days: from rendezvous to stowage

ACM Re-Entry

Transfer vehicle maneuvers for re-entry, heat shield protects SCM for recovery

~T+ 1 Year, Mission End