1. REVIEW

Flight: BEXUS 28

Experiment: IRISC

Review location: LTU Kiruna / Sweden

Date: 10. Oct 2019

Review Board Members

Stefan Krämer (SSC, Science Services, Payloads)

Experiment Team Members

Diego Octavio Talavera	Anja Möslinger
Harald Magnusson	Niklas Ulfvarson
William Eriksson	Jon Mihkkal Inga

2. GENERAL COMMENTS

2.1. Review Summary

The Review could not be performed as planned since the experiment was not implemented and the software not finished. The PCB for power distribution was just delivered but not finally soldered, the motors driving the telescope gimbal are not delivered yet. The electronics box is not cabled and connectors are not built in.

In general, the team is very far behind the schedule and it will be a challenge to finalise the hardware and software until the beginning of the campaign. There will be very limited time for integrated testing.

The quality of the already integrated hardware is very good. The structural parts manufactured in house by the team are very well designed and manufactured.

2.2. Mechanics

Net Mass (measured)	n/a	kg
Gross Mass (measured)	Not measured	kg

2.3. Electronics

Low Battery Voltage	24	TBD
Average Battery Voltage	28.87V	TBD
High Battery Voltage	31.64	TBD

- Experiment will be supplied by 2 BX Batteries

2.4. Software

Uplink	n/a
Downlink	500kBit/s adjustable

- Ground Station
  - Ground station software ready
- Experiment
  - Experiment software still missing: implementation of star tracker packets and Kalman filter.

2.5. Verification and testing

- Testing very far behind.
- No environmental test performed yet.
- No functional tests performed.

2.6. End-to-end Test

- End to end test was not possible at time of the review.
- Hardware not finished and software not fully implemented.

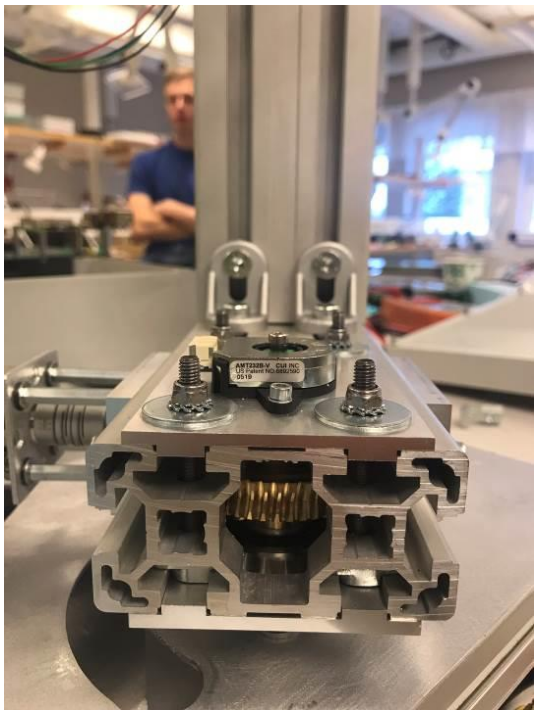
2.7. Launch Site requirements

- Late Access to remove the covers from the cameras and telescope.

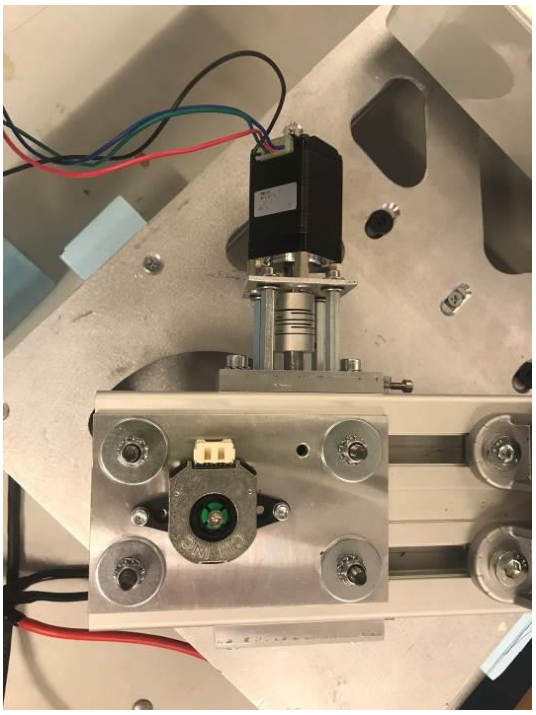
3. PHOTOGRAPHS

Telescope

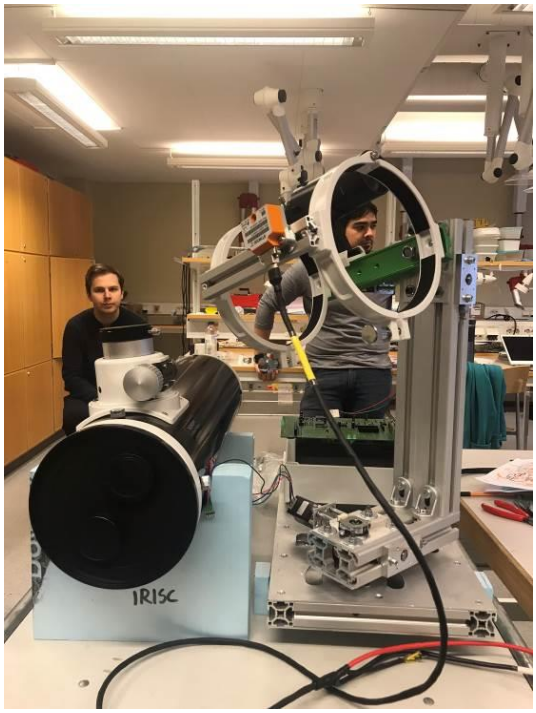
Telescope holder with STIM300 IMU and Star Tracker Telescope



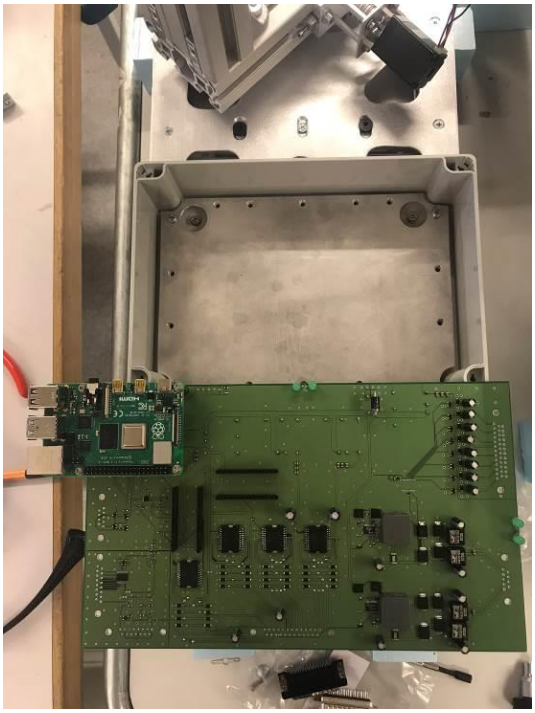
Gear setup



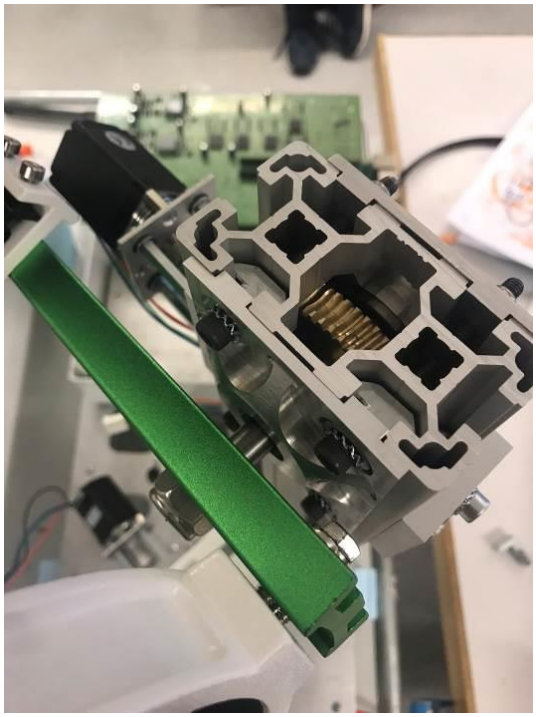
Gear setup with stepper motor



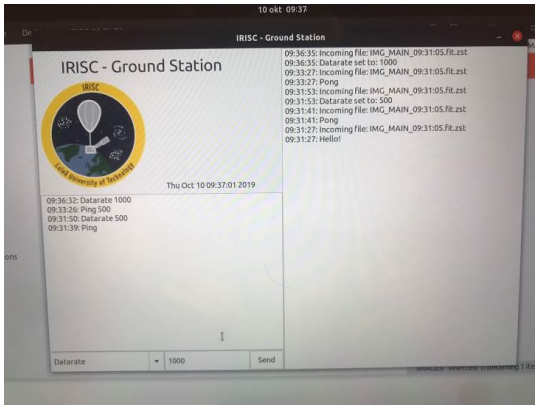
Structure of telescope



PCB with RPi. Power distribution circuit



Gear of elevation axis



Screen shot of Ground Station software

4. REVIEW BOARD COMMENTS AND RECOMMENDATIONS

4.1. Science

- No comments

4.2. Requirements and constraints (SED chapter 2)

- No comments

4.3. Mechanics (SED chapter 4.2.1 & 4.4)

- Mechanics looks really good.
- Well designed and well implemented.
- The selected motors have not been delivered yet. Spare motors have been implemented for now to be able to test. Consider using those motors for flight as far they are qualified by testing.

4.4. Electronics and data management (SED chapter 4.2.2, 4.2.3, 4.5 & 4.7)

- Communication via Ethernet to between RPi and Ground Station.
- Main PCB not finished. Some components are insufficiently soldered and the connectors are still missing.

4.5. Thermal (SED chapter 4.2.4 & 4.6)

- Thermal test not yet performed.
- Focus on best afford thermal test on component level while you continue integrating.

4.6. Software (SED chapter 4.8)

- Ground Station
  - Ground Station is almost finalised.
- Experiment:
  - Star Tracker is almost ready. Last iteration is in computation.
  - Kalman Filter is finished.
  - Implementation of full software pending.
  - Have a test sequence with drives the telescope within the envelope of 90 deg x 120 deg to test the cable feed and make sure that the telescope does not collide with the gondola.

4.7. Verification and testing (SED chapter 5)

- Try to start implemented testing ASAP with all hardware in the loop.
- Test the star tracker algorithm at night and clear sky asap.

4.8. Safety and risk analysis (SED chapter 3.4)

- **No comments.**

4.9. Organisation, project planning & outreach (SED chapters 3.1, 3.2 & 3.3)

- No comments.

4.10. End-to-end Test

- TBD.

5. FINAL REMARKS

5.1. Summary of main actions for the experiment team

- Finalise the implementation.
- Focus integrated testing in every spare minute you have left.
- Try to enable environmental testing if you have still time left.

5.2. Summary of main actions for the organisers

- **Follow Up EAR before Campaign begin.**

5.3. EAR Result: pass / conditional pass / fail

- Conditional pass.

5.4. Next SED version due

The Follow Up of the EAR will take place on 18th of October 2019 at SSC Esrange.

Next SED version to be discussed at campaign.

6. EXPERIMENT ACCEPTANCE REVIEW – EAR

Experiment documentation must be submitted at least five working days (the exact date will be announced) before the review (SED version 4) This will take place upon delivery of the completed experiment to EuroLaunch. The review may take place at either the location of the students' university, or a DLR, SSC or ESA institute.

Content of EAR:

- Team presentation of project status
- Follow-up of IPR action items
- Review of schedule status with respect to REXUS program timeline and upcoming activities
- Demonstration of the fully integrated experiment
- Experiment mass properties determination/discussion
- Mechanical and electrical interface checkout
- Electrical Interface Test (REXUS service system simulator test or BEXUS E-link functionality test)
- Flight Simulation Test (FST) – including a full end to end system demonstration
- Experiment acceptance decision: Passed/conditional pass/failed. If a conditional pass is elected, the immediate action items should be discussed, along with an appropriate deadline(s)