

72320 Roversystemtechnik
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**Phase 0/A-Study of a Rover Mission
on the surface of the Jupiter moon:
Europa: INSPIRE**

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Symbols

a	nm	Constant for the Geometry of a Porous Media
h_{Ice}	km,m	Ice Crust Surface Thickness on Europa
T_{Surface}	K	Surface Temperature on Europa
ϵ	-	Emissivity
ρ_{Ice}	$\frac{\text{kg}}{\text{m}^3}$	Inner Encoder Ring Diameter

Abbreviations

PCDU	Power Control and Distribution Unit
2D	Two Dimensional
3D	Three Dimensional
IMU	Inertial Measurement Unit
IRS	Institute of space Systems at the University of Stuttgart
ESA	European Space Agency
SPENVIS	SPace ENVironment Information System

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3.4 Payload

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3.6 Electrical Power System

The EPS (Electrical Power System) is the subsystem responsible for the electrical power supply of INSPIRE. It consists of four fundamental parts, which are the energy source, the PCDU unit (Power Control and Distribution) and the Energy Storage as well as the rover subsystems as the consumers.

3.6.1 EPS Budget and Overview

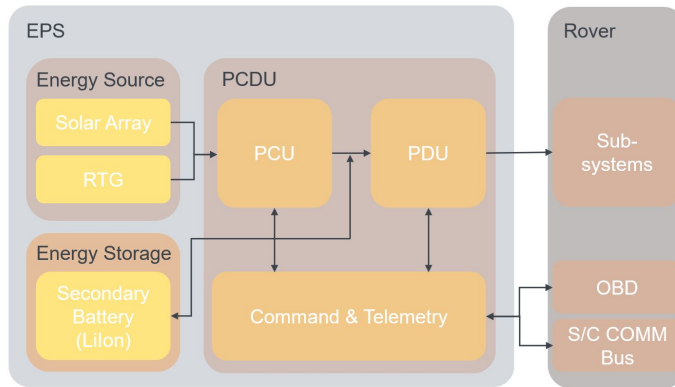


Figure 3.1: Functional Flow Chart for the EPS Subsystem

3.6.2 EPS Power Control and Distribution

3.6.3 Energy Source

3.6.4 Energy Storage

3.7 Radiation

Compared to the radiation environment near Earth the radiation environment near Jupiter is multiple times stronger. It has the highest radiation levels of any planet in our solar systems [Platzhalter]. In order to survive these harsh environmental conditions, special emphasis must be placed on the radiation protection. In Figure 3.2, the average trapped proton and electron fluxes on Europa's orbit around Jupiter are shown in comparison to the outer Van Allen radiation belt around Earth. However, in contrast to the Van Allen radiation belt, the duration within the radiation environment on Europa cannot be minimised and the rover has to be designed to withstand the entire mission duration of 30 days.

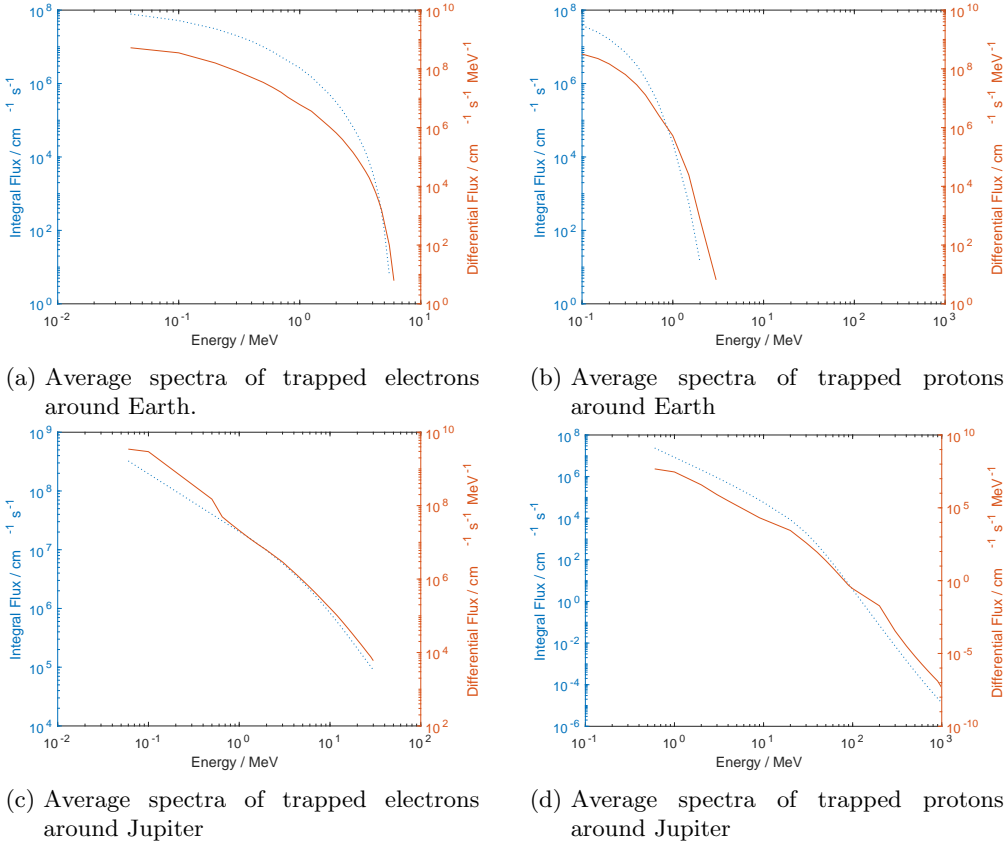


Figure 3.2: Average trapped proton and electron fluxes on an orbit around earth at 25,000 km, through the outer Van Allen radiation belt, and on Europa's orbit around Jupiter.

In order to design and evaluate different radiation protection approaches, different calculations have to be performed. For this purpose the ESA SPace ENVironment Information System (SPENVIS) is used [Platzhalter]. All calculations and figures in section 3.7 are performed with SPENVIS unless otherwise stated.

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Lander System

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4.1 Storage Configuration

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Appendix

A Appendix 1

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