



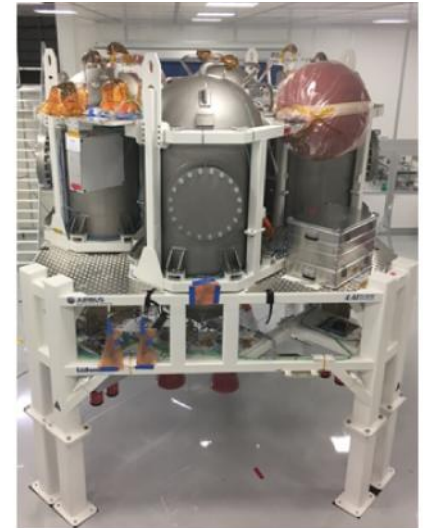
SATELLITE SYSTEMS

EPIC workshop 2017 – trends in Power Processing Units

Alain Demairé

A Long legacy in space missions

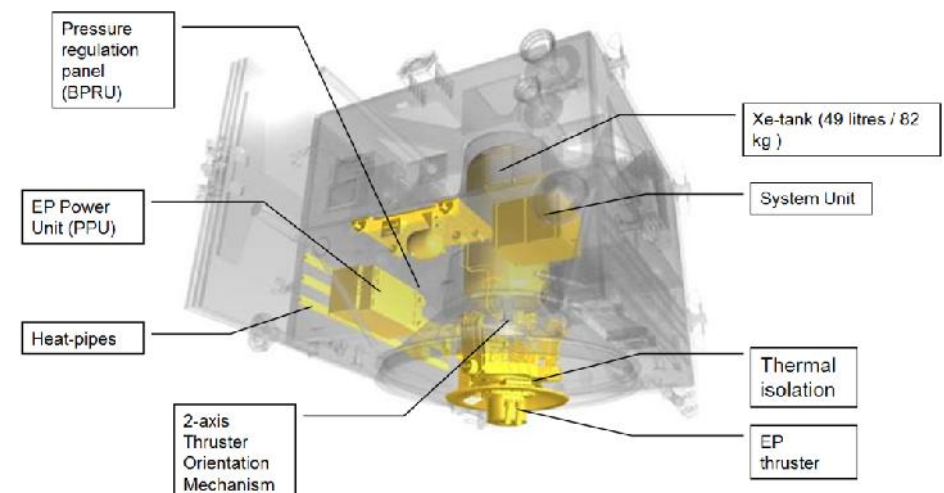
- Former division of SSC with more than 35 years of heritage in Space Business. Since 5 years a part of the pan-European OHB Group.
- Small Satellite Prime and System Integrator as well as supplier of Subsystems to larger satellites.
- Core Competence areas:
 - Complete Space Mission Architecture and Analysis, Spacecraft System Engineering, Integration and Operations
 - Attitude and Orbit Control subsystems
 - Propulsion subsystems
 - Check-Out and Ground Control Systems
- Currently +70 employees, 85% with academic degree and with an average of 13 years experience of space systems. Since three years in new facilities in Kista, Stockholm.
- A turnover of 170 MSEK with 85% on export.
- Major ongoing programs/projects:
 - Sweden (Missions for Swedish National Space Board (SNSB)): InnoSat Satellite Development, The MATS Mission, InnoSat 2 Study, Operations of Odin
 - Europe (Subsystems to ESA and Primes/Operators): ELECTRA, EDRS, Small GEO, Solar Orbiter, Euclid, Biomass, Orion PQM (ESA/NASA), SARah



A Promotor of Electric Propulsion

Adoption of the Hall Effect Thruster Technology in the 1990's with Smart-1 mission which was launched on September 27th, 2003

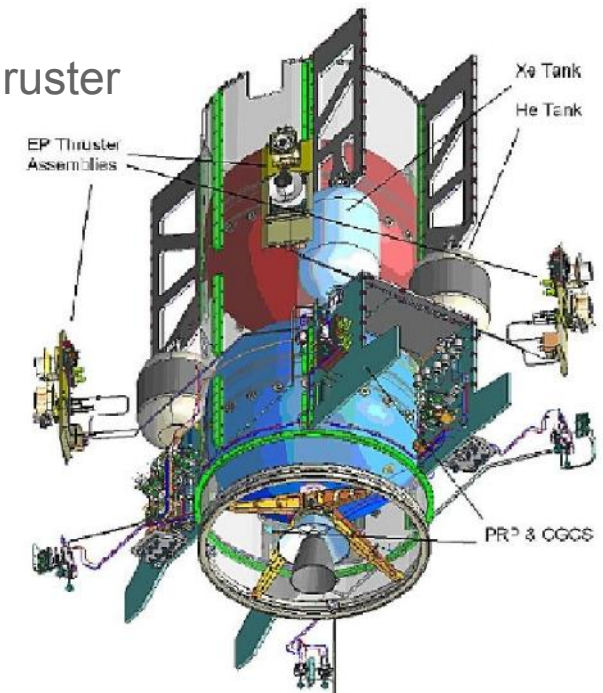
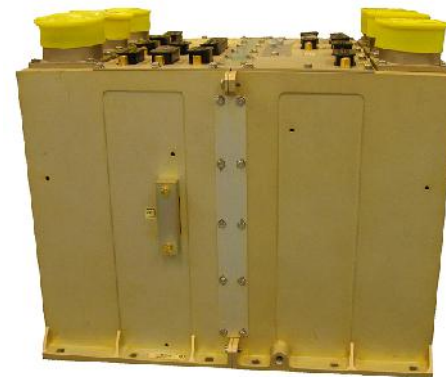
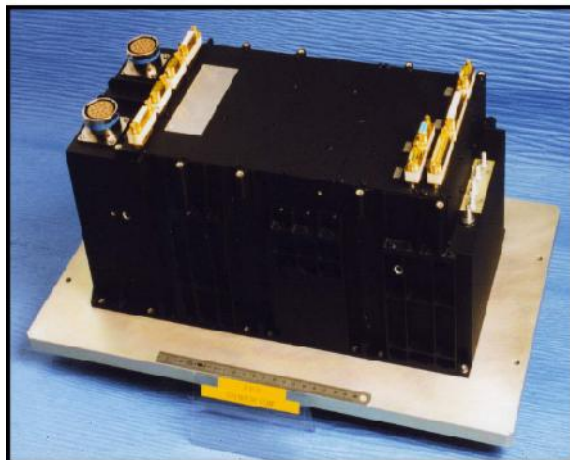
- PPS-1350 / ETCA PPU based subsystem
 - Established a record in Total Impulse at the time
 - Controlled ramp-up ignition
 - Tunable operating point
 - Bang-bang pressure regulator with complete FDIR features
 - Total depletion of the subsystem
 - Perfect control of the thrust direction by gimbaled steering mechanism



A Complex technology to stay Focused on economics

Building upon Smart-1 OHB-Sweden addressed the telecommunication market with SGEO-1 (Hispasat 36W-1) launched in January 2017 under OHB-SY as Prime

- Fixed SPT-100 Yamal configuration (patented station acquisition)
 - Combined Cold Gas Thrusters for detumbling and safe mode
 - Extensive characterization tests (plume, end to end, EMI, ignition verification)
 - Operating point slightly off the nominal qualified one
 - Introduction of Thruster Switching Unit between PPU and Thruster
 - Thorough consolidation of compliances
 - Fully documented User's manuals and complete FDIR



A PPU technology with potential saving if...

Architecture can be easily adapted over a wide range of missions

Thermal and radiation margins for sensitive components are better understood

Cost of: components can be reduced (adapted screening?)

Tests do not need to be repeated and can be merged in just a few

Thrusters and spacecraft interfaces can gain robustness in PPU costly driving interfaces (ignition, transient, EMC...)