OHB SWEDEN

SATELLITE SYSTEMS

RAMSES

EGSE and Mission Control system

RAMSES

Rocket and Multi Satellite EMCS System

OHB Sweden's RAMSES offers a highly capable satellite control, monitoring and test software solution used throughout industry leading space and rocket programs. RAMSES is suitable to be used during the development, integration, validation and operational phases of missions. Its ease to customize to different missions, an open network interface and easy integration to third-party software make RAMSES one of the most cost-effective EMCS tools out on the market.

Derived from over 30 years of experience in the space industry and used today inhouse by OHB Sweden since 2006, RAMSES is a well established EGSE and Mission Control System (MCS) tool based on three main key concepts:

Availability Easy to adapt, deploy and featuring an open network interface with all levels of data available to any user.

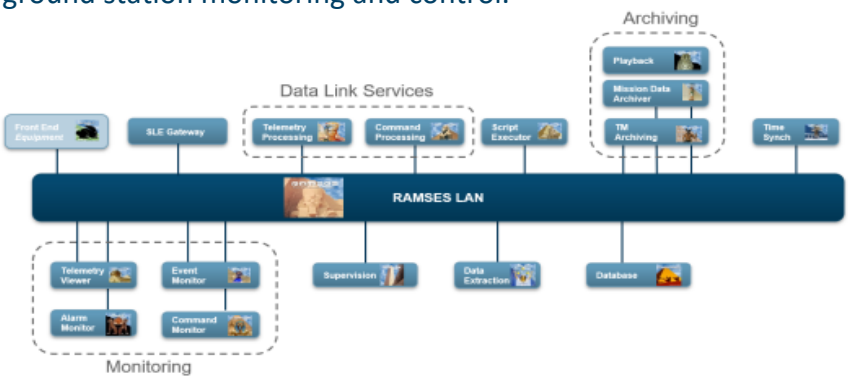
Flexibility Seamless integration to spacecraft simulators and other external equipment for acquisition and transmission of data

Cost-effectiveness Running on ordinary PC's or servers with no recurring hardware costs and the capability of using the same system from AIT to operations.

Standards	ECSS	SPEL, PLUTO, PUS TM/TC (rev C)
	CCSDS	• Space Packet Protocol • Space Link Extension • Space Data Link Security Protocol • TM/TC Space Data Link • TM/TC synchronization and channel coding • COP-1
Functionality		Monitoring, commanding, distribution, archive, time correlation, control procedures, performance evaluation, system supervision, database management
PUS support		1, 3, 5, 9, 11 & 22

The main concept of RAMSES is an open network interface and loosely coupled modules offering complete spacecraft and ground station monitoring and control.

RAMSES during satellite AIT at OHB Sweden

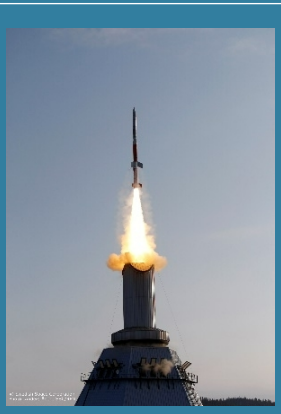


RAMSES Network Architecture

Heritage and use-cases

RAMSES has been used for over 15 years by a large variety of sounding rocket and satellite programs, from AIT to actual operations.

Sounding Rockets



Maser launch from Esrange (SSC)

Satellites

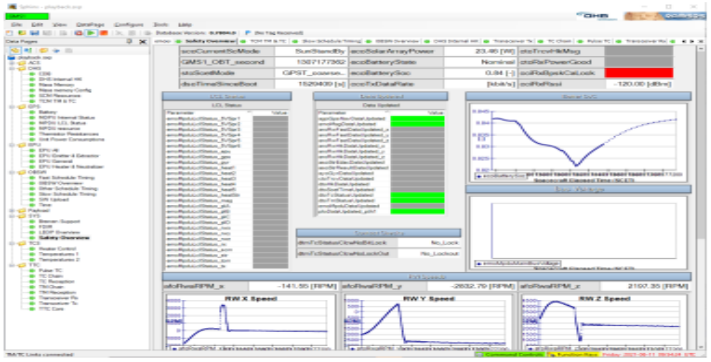
PRISMA from OHB Sweden (2010), RAMSES demonstrated as a multi-satellite MCS

RAMSES

Rocket and Multi Satellite EMCS System

Monitoring

Enables for any data or telemetry to be processed, extracted, calibrated, limit checked, verified, and displayed. Supports synthetic/derived parameters. Provides alphanumeric, graphic and mimics displays, as well as functionality for monitoring data associated with commanding (including verification of command execution stages and modelling of on-board time-tag buffers and queues).



RAMSES Telemetry viewer

System Supervision

Monitors and logs the status of the system, the traffic on the network, and all executing nodes in real-time as well as historically by managing mission archive contents.

Time correlation

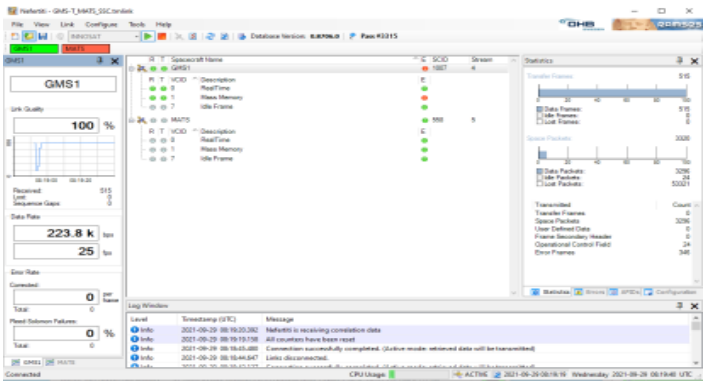
Maps the spacecraft elapsed time to and from UTC (NTP/GNSS). Provides the possibility to set a simulated time in the entire system for running test scenarios.

Commanding

Provides the functionality for preparation, validation, transmission, verification, and logging of commands. Commands can be destined to any commandable element located in space or on ground, such as spacecraft simulators or other external equipment.

Data Archive

Provides the functionality for creating, managing, and maintaining mission archives. The archives may be accessed internally by other control system elements or externally through data distribution. Data formats are compatible with third-party tools such as Microsoft® Office Excel and MATLAB® enabling for data exportation.



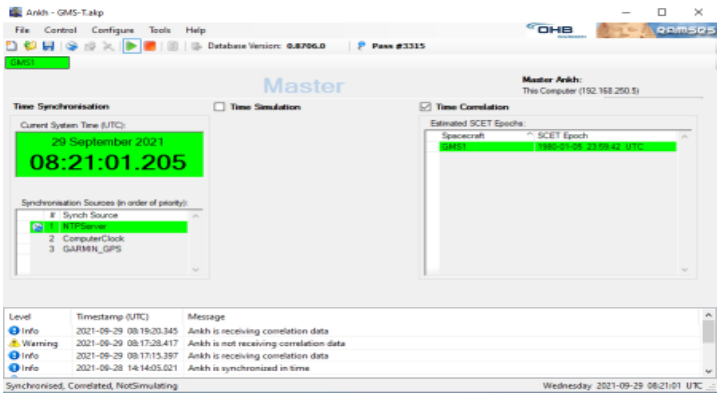
RAMSES TM CCSDS processor

Control Procedures

Automates the execution of flight control procedures, enabling for automation of spacecraft testing. Suitable for validation of procedures. Provides automation scripting with the ECSS PLUTO language, including a procedure development and execution environment.

Data extraction

Serves external requests for distributing raw or calibrated data on-line or off-line. Recorded real-time data can be replayed at any required speed. Includes a gateway distributing data to remote users over an internet link.



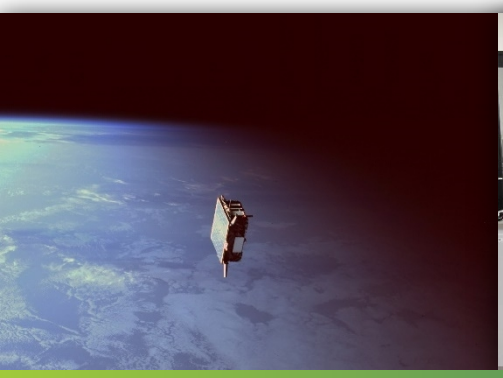
RAMSES time correlation (NTP/GNSS)

Operational Database Management

Maintains the operational database needed within the executable environment of the system. The operational database defines the characteristics of all mission specific data subjected to processing functions.

Performance Evaluation

Provides the functionality to evaluate spacecraft performance. In addition to the functionality provided by RAMSES, third-party tools such as MATLAB® and Python can be seamlessly integrated into the system for performing on-line or off-line processing including trend analysis on data.



SATELLITE SYSTEMS

About OHB Sweden AB

OHB Sweden AB is a subsidiary of OHB SE, one of the three leading space companies in Europe. At OHB SE around 3000 specialists and system engineers work on key European space programs.

OHB Sweden AB specializes in high-tech solutions for satellite systems. These include amongst others small satellites, AOCS and propulsion subsystems.

Certified against ISO 9001:2015

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