



Springer Aerospace Technology

Jens Eickhoff *Editor*

The FLP Microsatellite Platform

Flight Operations Manual

 Springer

Flp Microsatellite Platform Operations Technology

Xiaozheng Xu



Flp Microsatellite Platform Operations Technology:

The FLP Microsatellite Platform Jens Eickhoff, 2015-12-10 This book represents the Flight Operations Manual for a reusable microsatellite platform the Future Low cost Platform FLP developed at the University of Stuttgart Germany It provides a basic insight on the onboard software functions the core data handling system and on the power communications attitude control and thermal subsystem of the platform Onboard failure detection isolation and recovery functions are treated in detail The platform is suited for satellites in the 50 150 kg class and is baseline of the microsatellite Flying Laptop from the University The book covers the essential information for ground operators to controls an FLP based satellite applying international command and control standards CCSDS and ECSS PUS Furthermore it provides an overview on the Flight Control Center in Stuttgart and on the link to the German Space Agency DLR Ground Station which is used for early mission phases Flight procedure and mission planning chapters complement the book *Space Operations* Craig Cruzen, Michael Schmidhuber, Young H. Lee, 2022-03-15 This book includes a selection of reviewed and enhanced contributions presented at the SpaceOps 2021 the 16th International Conference on Space Operations held virtually in May 2021 The chapter selections were made based upon their relevance to the current space operations community The contributions represent a cross section of three main subject areas Mission Management management tasks for designing preparing and operating a particular mission Spacecraft Operations preparation and implementation of all activities to operate a space vehicle crewed and uncrewed under all conditions and Ground Operations preparation qualification and operations of a mission dedicated ground segment and appropriate infrastructure including antennas control centers and communication means and interfaces The book promotes the SpaceOps Committee s mission to foster the technical interchange on all aspects of space mission operations and ground data systems while promoting and maintaining an international community of space operations experts

A Combined Data and Power Management Infrastructure Jens Eickhoff, 2022-02-10 This book describes the development and design of a unique combined data and power management infrastructure for small satellites This new edition became necessary because in the frame of the system s impressive evolution from an academic prototype to one of today s most advanced core avionics many elements were upgraded to their next technology generation and diverse new components complement the upgraded design All elements are presented in updated respectively new chapters This modular infrastructure was selected by the Swiss start up ClearSpace SA for ESA s first mission ClearSpace 1 to remove space debris Furthermore it is the baseline for the Thai national satellite development program and is used by an increasing number of universities worldwide for research studies

Distributed Operation of a Military Research Micro Satellite Using the Internet, 2004 PICOSat is a micro satellite carrying four research payloads for the United States Air Force two ionosphere measurement payloads a vibration damping system and a polymer battery It was built by Surrey Satellite Technology Ltd SSTL under contract to the Space Test Program of the United States Air Force and is based upon SSTL s standard

microsatellite bus PICOSat was launched in September 2001 and is operated by SSTL from its control center in Guildford UK under contract to the USAF To increase the data return from the mission a second groundstation was installed at the USAF Academy in Colorado Springs which is remotely controlled from the SSTL operations center via the open Internet SSTL provides low cost access to space with its range of nano micro and mini satellites and this philosophy requires low cost spacecraft operations Networking a number of low cost groundstations via the Internet can provide a cost effective solution to increase the data return from the mission and increase operations flexibility This paper will discuss the PICOSat spacecraft and the operations concept for operating the mission An overview of the protocols will be presented along with the issues regarding the use of the open Internet for control of a spacecraft

Systems-Level Feasibility Analysis of a Microsatellite Rendezvous With Non-Cooperative Air Force Institute of Technology (U,ALLEN R. TOSO,2025-05-22 The United States is very dependant upon the use of space Any threat to our ability to use it as desired deserves significant study One such asymmetric threat is through the use of a microsatellite The feasibility of using a microsatellite to accomplish an orbital rendezvous with a non cooperative target is being evaluated This study focused on identifying and further exploring the technical challenges involved in achieving a non cooperative rendezvous A systems engineering analysis and review of past research quickly led to a concentration on the guidance navigation and control GNC elements of the microsatellite operation While both the control laws and orbit determination have been previously evaluated as feasible the integration of the two remained in question This research first validated past efforts prior to exploring the integration Impulsive and continuous thrust control methods and linear and nonlinear estimator filters were all candidate components to a potential system solution A simple yet robust solution could not be found to meet reasonable rendezvous criteria using essentially off the shelf technology and algorithms Results reveal a simple linear filter is a misapplication and will not at all work A nonlinear filter coupled with either a continuous or impulsive thrust controller was found to get somewhat close but never close enough to attach to the target satellite Successful GNC subsystem integration could only be achieved for a very simple case ignoring orbit perturbations such as the earth's oblateness A top level system architecture for a non cooperative rendezvous microsatellite has been developed The technical complexity however requires more complex algorithms to solve the rendezvous problem This work has been selected by scholars as being culturally important and is part of the knowledge base of civilization as we know it This work was reproduced from the original artifact and remains as true to the original work as possible Therefore you will see the original copyright references library stamps as most of these works have been housed in our most important libraries around the world and other notations in the work This work is in the public domain in the United States of America and possibly other nations Within the United States you may freely copy and distribute this work as no entity individual or corporate has a copyright on the body of the work As a reproduction of a historical artifact this work may contain missing or blurred pages poor pictures errant marks etc Scholars believe and we concur that this work

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Mechanical Adaptations of an Existing Microsatellite Platform to Address Emerging Space Applications

Braden Gordon Hommy,2018 As more organizations look to microsatellite constellations to achieve increasingly diverse goals spacecraft designs must continuously adapt to meet these new goals while simultaneously leveraging flight heritage To accommodate the needs of these future missions an iterative redesign of the flight proven Next generation Earth Monitoring and Observation microsatellite platform was performed This thesis presents the overall design of the bus for a sample three spacecraft formation flying mission with a strong focus on the mechanical aspects of the system This work covers the development of the platform from the structural design phase through to qualification flight integration and system level acceptance testing The successful implementations of an electromagnetic interference mitigation strategy and a structural design that allows for a flexible and robust assembly process are detailed The design of a mass dummy system and subsequent qualification of the structure is also described Finally aspects of assembly and testing of the spacecraft are discussed

Design and Implementation of a Telemetry System for Microsatellite Operations

Xiaozheng Xu,2020 Small satellites generate lots of telemetry data on orbit These telemetry data are important for monitoring the health of spacecraft validating design and planning operations As more small satellites are being launched into space an integrated telemetry system is needed to store access and display telemetry data This thesis presents the author s work in designing and implementing such a system This telemetry system greatly facilitates checking telemetry data and provides a platform on which automated telemetry monitoring and autonomous operations can be implemented First a PostgreSQL database and a back end interface are described followed by the front end components which include a graphical user interface and a visualization tool with Grafana Then tools that insert data into the database are presented along with performance benchmarking Finally use cases of the telemetry system are presented including but not limited to telemetry monitoring and telemetry analysis

Microsatellite Wiring Harness and Attitude Hardware Development for the Defiant Platform Matthew Douglas Laidlaw,2020 Resilient and effective hardware is essential for sustained satellite operation Any hardware that exists on a satellite must be well designed and undergo rigorous testing to be suitable for space flight The DEFIANT platform is a microsatellite design that facilitates assembly and integration to shorten the development time of new satellite missions In this thesis the design of a wiring harness for the DEFIANT microsatellite platform is presented in detail followed by unit level testing and analysis of two attitude sensors and one attitude actuator The wiring harness design methodology will be discussed emphasizing the simplistic design for effortless satellite integration and achieving repeatable and consistent assembly results through a straightforward manufacturing process In addition various attitude determination and control sensors and actuators present on the DEFIANT platform are tested and analyzed to quantify performance and survivability

for operation in space Throughout this thesis the author will be assessing the impact on the system level design and assembly of a satellite that stem from unit level hardware designs or test and analysis results

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