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ADVANCING SPACE EDUCATION: DESIGN, DEVELOPMENT, AND TESTING OF A UHF/VHF
SUBSYSTEM FOR THE APSCO SSS-1 MICROSATELLITE MISSION

Abstract

The Asia-Pacific Space Cooperation Organization (APSCO) has launched the Student Small Satellite (SSS) project, with the aim of providing practical training in space technology and satellite engineering to students and faculty from APSCO Member States. This educational initiative is geared towards enhancing space education systems within the organization. The SSS project offers hands-on experience in satellite design, development, and implementation for university students, involving the creation and launch of three satellites: SSS-1, a 30kg microsatellite, and SSS-2A and SSS-2B, both 3U CubeSats, forming an in-orbit small constellation for technology demonstration and experiments. The APSCO SSS system, comprising these three satellites, signifies a significant advancement in promoting space education and practical satellite engineering expertise throughout the Asia-Pacific region.

This research paper presents a detailed exploration of the cost-effective design, development, and testing of the telemetry and telecommand subsystem operating in the UHF/VHF frequency band for the APSCO SSS-1 microsatellite mission. The subsystem incorporates a UHF band telemetry transmitter, a VHF band telecommand receiver, and a deployable UHF/VHF dipole antenna. The primary objective is to present a design facilitating students across diverse universities to derive benefits and construct their telemetry and telecommand subsystems for microsatellite missions. The paper offers comprehensive insights into link budget analysis, structural considerations, thermal analysis, integrated testing procedures, and subsequent test results. Additionally, practical lessons and experiences gathered from the study are presented. This research significantly contributes to the field of satellite engineering by providing valuable insights and empirical data relevant to the telemetry and telecommand subsystem design. Moreover, it aligns with the educational objectives of the APSCO SSS project, facilitating knowledge dissemination and fostering expertise in space technology among students in the region.