Advanced Nano-Sat Power Technology: TechSat-1

1.1 Program Objective

The program objective is to increase the power available on Cubesat-like platforms and demonstrate the technology necessary to develop nanosats with significant and consistent power available to operate high-capacity payloads. The specific goal is to develop a CubeSat platform that generates 50 Watts of power and has the capacity to store and control 75w/min/orbit.

Morehead State University and Kentucky Space have partnered with Radiance Technologies, I-3, Tethers Unlimited and Honeywell to develop a demonstration of related subsystems and ultimately a flight system.

The deliverables of the initial phase include capabilities demonstration of sufficient maturity to warrant follow-on development for space flight.

1.2 Background

Small, tactical nano-scale satellites (TacSats) can provide mission coverage capabilities that are unique, including: access to uninvited territories, pre-hostility coverage of theaters of interest supporting operations preparations, coverage that is beyond the range of most third world force application countermeasures, highly predictable platform access timeline, broad fields of regard and view from orbit, coverage when air superiority/supremacy over enemy territory does not exist, and relatively long-lived platforms that are continuously operating. Nanosats (<10 kg) may enable tactical responsive space operations but they currently generate limited power available for payloads which restricts their utility.

CubeSats are highly standardized nanosats utilizing a form factor of 1U – 10 cm x 10 cm x 10 cm and 1 kg mass. This program targets development of a 3U CubeSat configuration with deployable solar arrays and innovative power generation and control systems designed to meet the power generation and storage objectives defined above.

During initial design and planning phases, SMDC intervened and re-directed the program. During the Army Space Experiments Review Board (SERB) hearing, TechSat-1 was selected for a flight opportunity and combined with two payloads (a dependable multi-processor produced by Honeywell and an innovative power generation system—the Canfield joint—produced by Tethers Unlimited and Tennessee Tech.). Currently defined program phases are outlined below.

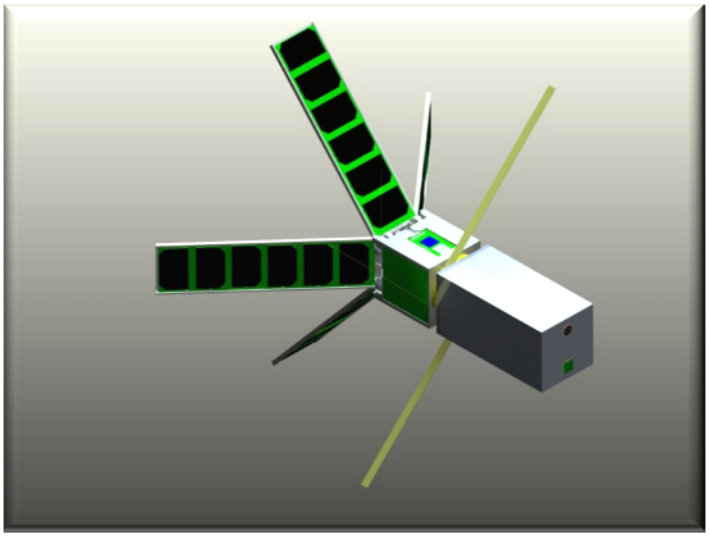

Figure 1.0 Basic Design of TechSat-1

Phases

The program defined herein to design, develop, and demonstrate this capability will be accomplished in three phases:

Phase 1: Subsystems demonstration of increased nanosat power technologies
Phase 2: Flight hardware developed to support space flight demonstration of increased power available on a nanosat
Phase 3: Operational phase of flight demonstration (one-year on-orbit demonstration)

2.0 Role and Areas of Responsibility

The role of each partner is illustrated in Figure 2.0.