

ANNEX ONE
TO
NONREIMBURSABLE SPACE ACT AGREEMENT
BETWEEN
THE UNIVERSITY OF HAWAII
AND
NASA AMES RESEARCH CENTER
FOR
SMALL SATELLITE RESEARCH

In accordance with the terms and conditions set forth in the Nonreimbursable Umbrella Space Act Agreement No. SAA2-402547 (“Umbrella Agreement”), the Parties hereby agree as follows. Each capitalized term used in this Annex, but not defined herein, shall have the meaning ascribed to it in the above referenced Umbrella Agreement. Any references to a paragraph or an Article in this Annex shall refer to the corresponding paragraph or Article of the Umbrella Agreement unless specifically stated otherwise in this Annex. The provisions of the Umbrella Agreement are hereby incorporated into this Annex by reference. In the event of a conflict between the Umbrella Agreement and this Annex concerning the meaning of its provisions, or the rights, obligations and remedies of the Parties, the Umbrella Agreement is controlling.

ARTICLE 1. PROJECT OVERVIEW

NASA Ames Research Center (“NASA” or “NASA ARC”) will perform collaborative research and development with the University of Hawai‘i, through its Hawaii Space Flight Laboratory (“HSFL”), which is a joint program between the College of Engineering and the School of Ocean and Earth Science and Technology at the University of Hawaii at Manoa. NASA ARC and HSFL will work together to develop small spacecraft and small spacecraft systems to support the HawaiiSat Technology Demonstrator Mission (“HawaiiSat Mission”). NASA ARC will provide an Attitude Determination and Control Subsystem (“ADCS”) and provide space systems engineering insight and oversight to reduce mission risks and assist HSFL in meeting HSFL’s project schedule.

HSFL’s mission is to promote space engineering and scientific research for the exploration of space; to develop and operate small spacecraft; to accelerate the validation of new space technologies; to provide workforce training in all aspects of unmanned space missions; and to promote synergistic collaborations between educational, governmental, and corporate institutions interested in space exploration. Through the HawaiiSat Mission, HSFL will have the opportunity to develop HSFL’s first technology demonstrator spacecraft. The HawaiiSat Mission is a joint project between NASA ARC and HSFL under the terms and conditions of this Annex. As this is HSFL’s first nano-satellite demonstrator spacecraft mission, NASA ARC will provide space systems engineering oversight and insight to support HSFL through a full spaceflight project lifecycle.

NASA ARC's Nanosatellite Mission Office ("NMO") has extensive experience in successfully executing spaceflight projects and has access to mission and spacecraft design, systems development and test engineering, and applied manufacturing services. NMO will mentor HSFL throughout the project lifecycle so that HSFL can continue to develop its own capabilities in this area.

NASA ARC is currently developing ADCS for 5kg- to 50kg-size satellites. The collaboration under this Annex will allow NASA ARC to further develop and test ADCS for small spacecrafts in the 50kg class.

HSFL will develop a 50kg-spacecraft platform for the HawaiiSat Mission. This collaboration will allow NASA ARC to have access to the design of this HSFL platform, which will provide a proven 50kg-platform design for future NASA missions. This is expected to reduce NASA's costs and risks for platform development for future NASA missions involving spacecraft up to the 50kg class.

ARTICLE 2. RESPONSIBILITIES

The HawaiiSat Mission consists of four phases:

- Phase A: Concept and Technology Development
- Phase B: Preliminary Design and Technology Completion
- Phase C: Final Design and Fabrication
- Phase D: System Assembly, Integration and Testing, Launch

1. HSFL will use reasonable efforts to:

- a. Coordinate science and technology activities and partnerships.
- b. Design and manufacture the mechanical structure subsystem, including solar panels.
- c. Develop software with the assistance of NASA ARC in providing systems engineering and software QA.
- d. Coordinate, design, and manufacture the thermal subsystem.
- e. Provide ground segment activities and partnerships.
- f. Conduct systems integration and testing, which includes: hardware, software, procedures and facilities to perform the integration, and testing of the mission systems and mission operations.
- g. Coordinate education and public outreach activities and partnerships.
- h. Provide mechanical and electrical interfaces for the ADCS.
- i. Provide components for development of the ADCS.

2. NASA ARC will use reasonable efforts to:

- a. Assist HSFL with the oversight of technical and management efforts to direct and control the safety and mission assurance elements of the HawaiiSat Mission. This includes: design, development, review, and verification of practices and procedures and mission success criteria. This is intended to assure that the spacecraft, ground systems, and mission operations meet performance requirements and function for their intended lifetimes.

- b. Develop the ADCS. Using HSFL’s ADCS components, NASA ARC engineers will work with HSFL to complete the development of the ADCS.
- c. Perform subsystem-level testing of the ADCS and deliver to HSFL an ADCS ready for integration into the HawaiiSat flight system.
- d. Provide mentorship and technical guidance to University of Hawaii professors and students who will be co-located at NASA ARC to work alongside NASA ARC personnel.

ARTICLE 3. SCHEDULE AND MILESTONES

The planned major milestones for the activities defined in the “Responsibilities” clause are as follows:

Preliminary Design Review	Within three (3) months of execution of this Annex
Critical Design Review	Within ten (10) months of execution of this Annex
ADCS Design Delivery	Within ten (10) months of execution of this Annex
Flight Readiness Review	Within eighteen (18) months of execution of this Annex

The first HawaiiSat Mission launch is scheduled for December 2011.

ARTICLE 4. FINANCIAL OBLIGATIONS

There are no provisions requiring the transfer of funds or other financial obligations between NASA ARC and HSFL under this Annex.

ARTICLE 5. TECHNICAL POINTS OF CONTACT

The following personnel are designated as the principal points of contact between the Parties in the performance of this Annex:

NASA ARC

NASA Ames Research Center
 Elwood Agasid
 M/S 213-2
 Moffett Field, CA 94035
 Phone: (650) 604-0558
 Elwood.F.Agasid@nasa.gov

HSFL

University of Hawaii – Hawaii Space Flight Laboratory
 Luke Flynn, Director
 Hawai‘i Space Flight Laboratory
 University of Hawai‘i, POST 501
 Honolulu, HI 96822
 Phone: (808) 956-3154

flynn@hsfl.hawaii.edu

Management Point of Contact:

NASA Ames Research Center
Terence Pagaduan
Congress/Legislative Liaison Specialist
M/S 943-4
Moffett Field, CA 94035
Phone: (650) 604-1181
Fax: (650) 604-0688
Terence.A.Pagaduan@nasa.gov

University of Hawaii – Hawaii Space Flight Laboratory
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(808) 956-6322 (Fax)
(808) 561-5995 (Cell)

ARTICLE 6. TERM OF ANNEX

This Annex becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or April 13, 2013 (approximately three (3) years from the date of the last signature), whichever comes first, unless such term exceeds the duration of the Umbrella Agreement. In no event shall the term of this Annex exceed the term of the Umbrella Agreement. This Annex automatically expires upon the expiration or earlier termination of the Umbrella Agreement.

ARTICLE 7. LIABILITY AND RISK OF LOSS

There are no provisions pertaining to the allocation of liability and risk of loss other than as set forth in the Umbrella Agreement.

ARTICLE 8. INTELLECTUAL PROPERTY RIGHTS – DATA RIGHTS

1. Identification of Proprietary Data and Third Party Proprietary Data and U.S. Government Data

a. In accordance with paragraph 2 of Article 8 Data first produced by Partner under this Agreement, HSFL will provide the following Proprietary Data to NASA to be used in performance of this Annex. This list is not comprehensive, is subject to change during the course of this Annex, and is not meant to supersede any restrictive markings contained in Data provided.

NONE

b. In accordance with paragraph 8 of Article 8 Partner Background Data, HSFL will provide the following Proprietary Data to NASA to be used in performance of this Annex. This list is not comprehensive, is subject to change during the course of this Annex, and is not meant to supersede any restrictive markings contained in Data provided.

NONE

c. In accordance with paragraph 9.b of Article 8 Handling of Data, NASA will provide HSFL with the following third party Proprietary Data or U.S. Government Data, including Software. This list is not comprehensive, is subject to change during the course of this Annex, and is not meant to supersede any restrictive markings contained on Data provided.

(i) Third Party Proprietary Data:

NONE

(ii) U.S. Government Sensitive Data:

NONE

(iii) NASA Software:

NONE

2. In accordance with paragraph 3 of Article 8 Data First Produced by NASA under this Agreement, HSFL requests that the following Data which HSFL considers to be Proprietary Data first produced by NASA under this Annex shall be withheld for a period of one (1) year:

NONE

3. Upon completion of all activities under this Annex, HSFL Proprietary Data, third party Proprietary Data supplied by NASA, and U.S. Government Data shall be disposed of as follows:

HSFL Proprietary Data:

NONE

Third party Proprietary Data supplied by NASA, U.S. Government Data and Software:

NONE

ARTICLE 9. INTELLECTUAL PROPERTY RIGHTS – PATENT AND INVENTION RIGHTS

In accordance with paragraph 8 of Article 9 Related Inventions, the following is a list of related inventions (including related patented computer software) to be used in this Annex:

Partner Related Inventions:

NONE

NASA Related Inventions:

NONE

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ARTICLE 10. SIGNATORY AUTHORITY

By signing below, the undersigned agrees to the terms and conditions of this Annex and the Umbrella Agreement.

NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
AMES RESEARCH CENTER

UNIVERSITY OF HAWAII

BY: _____
Dr. S. Pete Worden
Center Director

BY: _____
M.R.C. Greenwood
President, University of Hawai'i

DATE: _____

DATE: _____

BY: _____
Virginia Hinshaw
Chancellor, University of Hawai'i at Mānoa
University of Hawai'i