

“Learn Space by Doing Space”

A Hands-On Approach to Cadet Satellite Procurement at the Air Force Academy

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In 1997, Principal Deputy Assistant Secretary of the Air Force for Acquisition and Management Darleen Druyun announced 11 “Lightning Bolt Initiatives,” designed, among other things, to develop superior acquisition strategies. Lightning Bolt No. 10, “Reducing Cycle Times,” aimed to reduce the time from requirements definition to contract award. In this article, the methodology used to apply this initiative to the U.S. Air Force Academy Small Satellite (SmallSat) program is discussed.

SmallSat Program

The SmallSat Program Office, located at the U.S. Air Force Academy (USAF) in Colorado Springs, Colo., gives cadets the opportunity to “learn space by doing space.” Led by an interdisciplinary team of military and civilian academicians from three academic divisions (engineering, basic sciences, and social sciences), top cadets are designing, building, and testing a nano-satellite (extremely small). This nano-satellite, dubbed FalconSat-2, is currently ahead of schedule for delivery to the National Aeronautics and Space Administration (NASA) in summer 2002, with a launch date scheduled on the Space Shuttle Atlantis (STS-114) for Jan. 16, 2003. Air Force Col. Eileen Collins, a former Associate Professor at the Academy, will command the Shuttle, while Air Force Lt. Col. James Kelly, a 1986 graduate of USAFA, will pilot the Shuttle.

Martin is an Assistant Professor of Management, Sellers is Director of the SmallSat Research Center, and Green is an Associate Professor of Management at the U.S. Air Force Academy, Colorado Springs, Colo.



Top cadets at the U.S. Air Force Academy are designing, building, and testing a nano-satellite dubbed FalconSat-2 (FS-2). FS-2 is currently ahead of schedule for delivery to NASA in summer 2002, with a launch date scheduled on the Space Shuttle Atlantis (STS-114) for Jan. 16, 2003. Pictured from left are key leaders on the FalconSat-2 Program Team: Air Force Lt. Col. Jerry Sellers, Director, Small Satellite Research Center; Cadet First Class Luke Sauter, Cadet Chief Engineer, FalconSAT-2; Cadet First Class Jereme Estes, Cadet Program Manager, FalconSat-2; and Air Force Capt. John Martin, Director of Support and Logistics, FalconSat-2. In the center is the FalconSat-2 nano-satellite.

The Small Satellite Program is a two-semester course taught and administered by the Department of Astronautical Sciences. While working with the interdisciplinary team, cadets have the opportunity to gain real-world experience with satellite design, assembly, integration, testing, and operations. Their activities mirror those of a traditional program of office in almost every aspect except size.

The Drivers

What drove the development of this capstone course? One very obvious reason was to give cadets an experience whereby they could culminate three

years of rigorous core courses from the four academic divisions and apply the various theories learned to a real-life situation with scenarios similar to those encountered by Air Force officers. Whether the cadets become pilots, scientists, program managers, or contracting officers, many of these future officers will hold positions involved in the design and procurement of major weapons systems—the FalconSat-2 program uniquely prepares cadets to take on these responsibilities.

In the FalconSat-2 program, a cadet program manager is selected who has “cra-

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dle-to-grave” responsibility for program completion. Also, other cadets perform functional duties such as engineering, documentation, production, test, logistics, and program control.

Another reason for the adoption of this course is that FalconSat is ranked 21 of 34 essential programs by the Department of Defense Space Experiments and Review Board (SERB). The Air Force Office of Scientific Research (AFOSR) contributes funding to FalconSat because of their keen interest in the payload, which is designed to measure and record plasma depletions in the ionosphere. The FalconSat program depends on generous funding from the AFOSR and the Space and Missile Systems Center Space Test Program (SMC-STP). The team also benefits from significant access to resources at the Air Force Academy, including lab supplies as well as machine and electrical shop support and expertise.

Challenges

FalconSat-2 faces challenges that are not faced by traditional acquisition programs.

Turnover

First, the cadet team is composed mostly of seniors (“firsties”). As a result, new

CADET FIRST CLASS JEREME ESTES

*U.S. Air Force Academy
Major: Management*



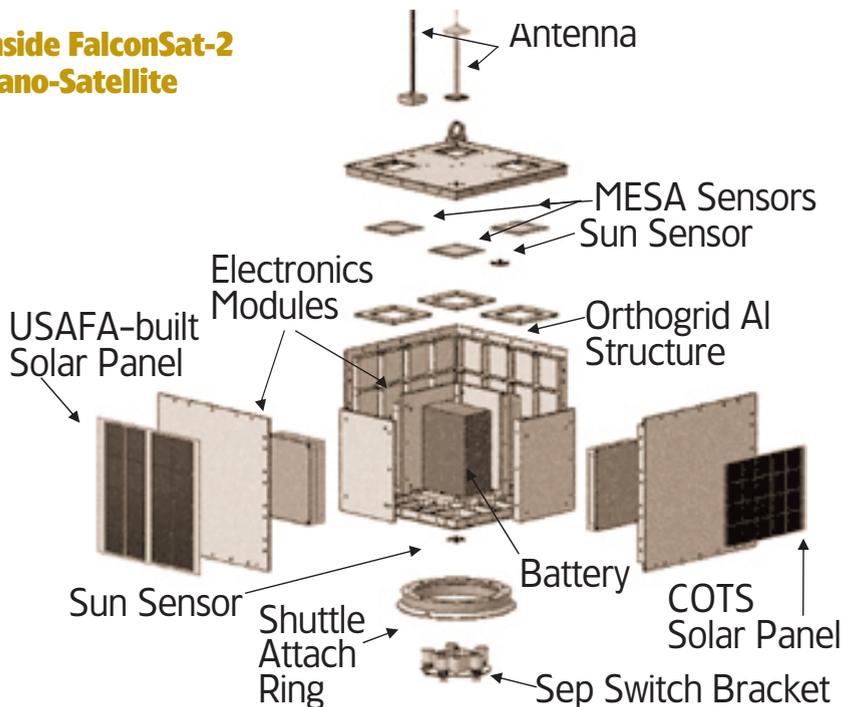
Cadet Estes is the Cadet Program Manager for the FalconSat-2 program and academically ranked the No. 1 management major of over 180 seniors at the Air Force Academy. Additionally, he earned the distinction of Outstanding Management Major.

A 1995 graduate of Norman High School in Norman, Okla., Estes served the Air Force for over two years as an enlisted medical technician before his acceptance into the Academy through the Leaders Encouraging Airmen Development (LEAD) program.

During his cadet career, Estes was a Soaring Instructor Pilot, completed the SCUBA open water certification program, and earned his jump wings.

Estes is currently leading 1,000 cadets as second group commander. Selected as a recipient of the graduate scholarship program, Estes will attend the University of Pittsburgh where he will earn a Master’s in Business Administration degree. Following graduate studies, Estes will serve the Air Force as a contracting officer.

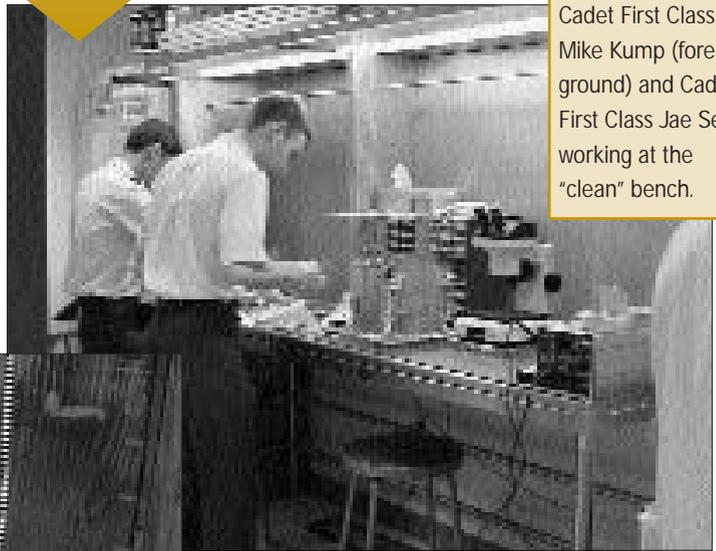
Inside FalconSat-2 Nano-Satellite



"FIRSTIES," JUNIORS, EXPERIENCED FACULTY WORKING TOWARD SUMMER 2002 DELIVERY DATE OF FALCONSAT-2 NANO-SATELLITE "IT TAKES A TEAM"



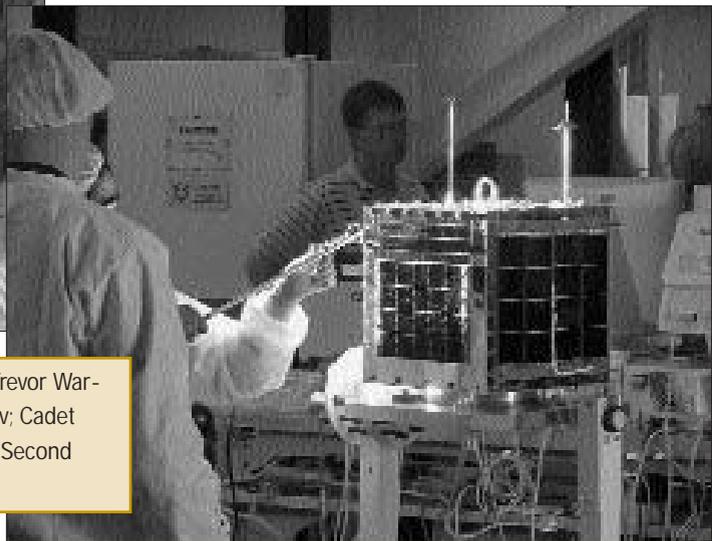
Cadet First Class Jereme Estes, FalconSat-2 (FS-2) Program Manager, and Cadet First Class Luke Sauter, FS-2 Chief Engineer, are pictured with the FS-2, which is scheduled for launch by NASA in January 2003.



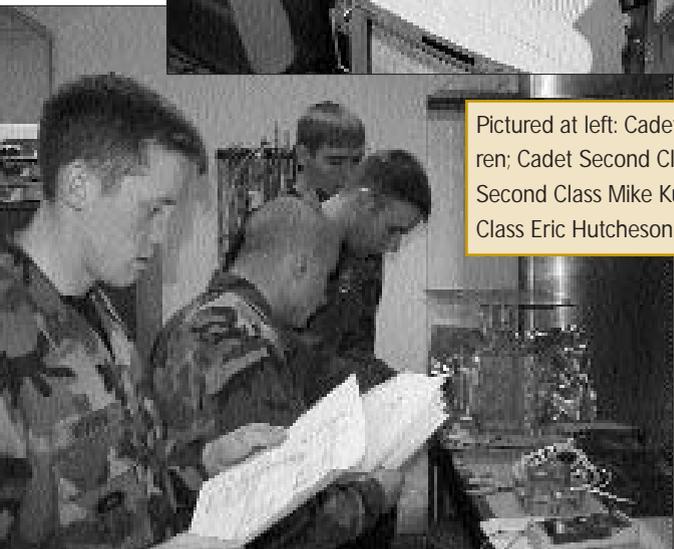
Cadet First Class Mike Kump (foreground) and Cadet First Class Jae Seo working at the "clean" bench.



Cadet First Class Jennifer Vettese (left) and Cadet First Class Kim Sugrue work inside the "clean" room.



Pictured at left: Cadet Second Class Trevor Warren; Cadet Second Class "GT" Gotchev; Cadet Second Class Mike Kump; and Cadet Second Class Eric Hutcheson.



Pictured above are members of the FalconSat-2 Program Team working on the nano-satellite in "the clean room." The clean room is an environmentally controlled area with filtered air to ensure no more than 10,000 particles per cubic cm of dust. Clean rooms serve two purposes: 1) they provide a clean, dust-free environment for the assembly of flight hardware, and 2) they provide controlled access to a room where all entering must wear special clothing and gloves. This creates the mental discipline to work carefully around expensive hardware.

At approximately 4 percent of the contract award cost as a fee for service, the General Services Administration Indefinite Delivery/Indefinite Quantity contract procurement method has proved to be a fair value and extremely efficient as well—and definitely in the spirit of Lightning Bolt No. 10, “Reducing Cycle Times.”

students have to literally fight a steep learning curve each academic year, while the interdisciplinary team of advisors spends valuable resources training the new group of cadets.

While using a nearly all-senior approach to staffing certainly has disadvantages, there are incredible advantages as well. FalconSat-2 gains a group of cadets that have proven themselves on academic and leadership aspects of cadet life during their first three years at the Academy. Additionally, these cadets understand the theories they have learned from their rigorous core courses and are ready to apply them in the FalconSat-2 project.

Recognizing the challenges of training a new staff each year, FalconSat-2 has begun integrating juniors into the course. This approach allows the seniors to train their replacements during their final term of study, and also gives the juniors real on-the-job training instead of “trial by fire.” Additionally, as FalconSat-2 approaches their summer 2002 delivery date, rather than stretch the al-

ready thin student resources even more so, the increased trained staff of juniors can handle the inevitable surges in workload.

Procurement

Perhaps the single greatest challenge is maintaining the aggressive delivery date with NASA. This drives the procurement strategy. After considering a variety of procurement options, a final decision was made.

The procurement involves anything from spectrum analyzers and connectors to solar panels and major nano-satellite subsystem components. Combine these unique requirements with an initial delivery date of less than one year, and it is easy to understand why locating a fast and reliable procurement method is a cornerstone to the success of FalconSat-2.

The initial choice in the FalconSat procurement strategy was to consider a robust acquisition methodology. Since the lead time was short, combined with a lack of staff, the notion of conducting a traditional source selection was abandoned. In addition to time and staffing constraints, the team felt that a more viable method existed that would also take into consideration the program staff constraints and the limited budget (under \$1 million). With such fiscal constraints, a traditional source selection involving a large program office staff would not be practical.

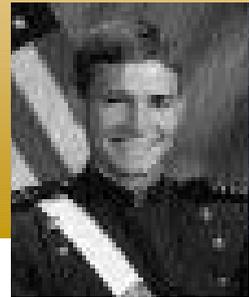
A traditional source selection would have involved assembling a team, including a contracting officer, recorder, program manager, technical experts, and support staff. Considering the FalconSat-2 program management team is part-time—the bulk of their time is spent in the classroom providing instruction in their academic disciplines—scheduling time for the team to meet would be improbable, not to mention unfair to potential bidders who could not reach the team on a consistent basis.

Lightning Bolt No. 10 Strikes

As a result of these budget and schedule constraints, the FalconSat Program

CADET FIRST CLASS LUKE SAUTER

*U.S. Air Force Academy
Major: Astronautical
Engineering*



Cadet Sauter is the Cadet Chief Engineer for the FalconSat-2 program and academically ranked the No. 1 major in Astronautical Engineering. A 1998 graduate of Eaton High School in Colorado, Sauter earned a direct appointment to the Air Force Academy.

Cadet Sauter has excelled during his Air Force Academy experience, earning the Superintendent's Pin six of eight semesters for outstanding performance academically, militarily, and athletically. In summer 2001, Sauter conducted summer research at NASA's Jet Propulsion Laboratory, aiding NASA engineers in determining the extent of communication issues with the next generation of MARS landers.

During the last year, he has written and presented four papers at national conferences. After graduation, Sauter will attend the Massachusetts Institute of Technology on a Draper Labs Fellowship. Following his studies, he will serve the Air Force as an engineer.

Office decided upon an Indefinite Delivery/Indefinite Quantity (ID/IQ) contract vehicle. An ID/IQ contract is similar to a Sears Catalog in that the program office examines a contract schedule to determine if the right mix of goods (equipment) and engineering services are available, and then sends the appropriate funds, along with a statement of work, so that a source selection can be convened.

While the abbreviated process described here sounds simple, this is not always the case. Procurement efforts began in late 2000 when the FalconSat Program Office first approached a government agency with specific requirements. While the intent of their ID/IQ contract was rapid delivery for space requirements, slowly the FalconSat Program Office learned that this would not be the case for this particular situation.

Whether the actual reason was due to the relatively low-dollar requirement (competing with much higher budget programs) or because getting the actual hardware on the equipment tables proved to be a unique challenge, is still unclear. After time passed without a request for proposal (RFP), the FalconSat Program Office considered two other risk-reduction strategies. One option was to use the local base contracting shop for all procurement. The other option, which we eventually implemented, is discussed next.

General Services Administration ID/IQ—The Perfect Solution

The General Services Administration Information Technology (GSA-IT) group based in Denver, Colo., was the perfect fit for the FS-2 program. In fact, this successful partnership is what has kept FS-2 on schedule and within budget to date, while meeting the required performance criteria.

In March 2001, the FalconSat Program Office placed a call to the GSA-IT office requesting their assistance with the satellite subsystem requirements. From the beginning of our first association and ensuing business relationship, it was ob-

vious to our staff that this would be a story laden with success.

GSA quickly established FS-2 as a customer in their system, reviewed and approved the statement of work, and sent requirements out “on the street” for bids. After only 15 days, a proposal was received that met technical and budget expectations. In early June 2001, the FalconSat Program Office awarded a contract for the satellite subsystems and integration.

Not only was GSA used for the satellite subsystem requirements, they were approached for other equipment, including spectrum analyzers and solar panels. GSA quickly introduced other vendors that could meet the requirements, and after the RFP period was complete, the FalconSat Program Office selected those vendors capable of meeting cost, schedule, and technical performance criteria.

Using the ID/IQ contract was definitely an innovative way to approach acquisition for FalconSat-2. Rather than spending valuable resources on the acquisition, the faculty team has focused their time and energy where they are most important—to the cadets putting the satellite together. With such a tight delivery schedule, not much of a buffer can be allowed for slips in schedule. However, the faculty mentors stand ready to support the cadets in the most efficient way possible.

Next Step—Lift Off

Where does the FalconSat-2 program go from here? Active involvement with the contractor and GSA office will help to ensure successful delivery of the satellite components. Additionally, other needed items will continue to be procured. The plan is to use this tried and true method of partnering with GSA for future purchases as well. At approximately 4 percent of the contract award cost as a fee for service, the GSA ID/IQ contract procurement method has proved to be a fair value and extremely efficient as well—and definitely in the spirit of Lightning Bolt No. 10.

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Of course, not all procurement efforts will meet with the success that FalconSat-2 has enjoyed. But the cadets at USAFA learned first-hand about acquisition and logistics excellence, and the benefits to be derived from considering an alternative strategy that will ultimately help reduce programmatic risks and raise the potential of a successful acquisition program.

See you in space!

Editor's Note: As we go to press, NASA, due to unforeseen circumstances, has temporarily postponed the January 2003 launch from the Space Shuttle of the FalconSat-2 nano-satellite. The new launch date has not yet been released. The authors welcome questions or comments on this article. Contact Sellers at jerry.sellers@usafa.af.mil. Contact Martin at john.martin@usafa.af.mil. Contact Green at steve.green@usafa.af.mil.