



# XSS-11 micro satellite

The Experimental Satellite System-11 (XSS-11) micro satellite demonstrates a new class of low-cost spacecraft weighing approximately 100 kilograms with the goal to explore a variety of future military applications such as space servicing, diagnostics, maintenance, space support and efficient space operations. Micro satellites, such as the XSS-11, offer affordable platforms to demonstrate key capabilities including rendezvous and proximity operations, autonomous mission planning, as well as other enabling space technologies. The XSS-11 operates under the Air Force's Experimental Satellite System's Micro Satellite Flight Demonstration Program within the Air Force Research Laboratory (AFRL).

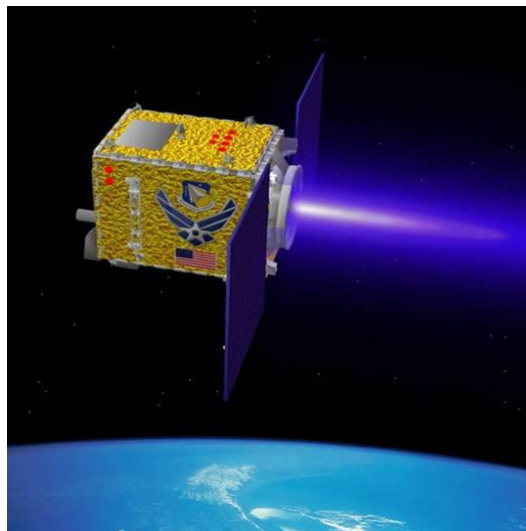
## Features

The XSS-11 micro satellite was successfully launched aboard a Minotaur I rocket on April 11, 2005. AFRL's Space Vehicles Directorate has employed XSS-11 to demonstrate synergistic technologies and operations necessary to enable the development of space systems needed to meet Air Force Space Command's future capabilities. These technologies and operational concepts, as well as the lessons learned will be documented and transferred to the operational community to facilitate development of future operational concepts and systems.

After completing systems checkout of the Minotaur I upper stage, the micro satellite successfully demonstrated rendezvous and proximity operations with the expended rocket body. As of fall 2005, it has accomplished more than 75 natural motion circumnavigations of the expended launch vehicle. During its projected 12 to 18-month flight, the spacecraft will conduct rendezvous and proximity maneuvers with several US-owned, dead or inactive resident space objects near its orbit, as well as will exhibit more autonomy as the project continues. In addition, in November 2005,

the XSS-11 project was selected for *Popular Science's* 2005 Best of What's New Award in the Aviation and Space category.

During its historic, groundbreaking mission, the XSS-11 program will develop, as well as demonstrate capabilities and technologies necessary to efficiently plan, evaluate, and safely oversee a variety of autonomously conducted rendezvous and proximity operations. The performed advancements will enhance Air Force Space Command's possible future missions. It will also reduce the size and complexity of future space ground stations.



## Background

The XSS-11's mission focuses on increasing the level of autonomy, maneuverability, and complexity of mission operations that can be planned and safely executed. The successful flight of the XSS-11 spacecraft continues the evolution of a technology that promises to reduce satellite size, which in turn will decrease launch costs and extend the capabilities of future space missions.

Lockheed-Martin Astronautics, Waterton, Colo., serves as AFRL's structure, propulsion, and systems support contractor

for XSS-11. The team also includes Broad Reach Engineering; Tempe, Ariz.; Octant Technologies, San Jose, Calif; Draper Laboratory, Cambridge, Mass.; and SAIC, San Diego, Calif.. Another key XSS-11 player has been the Air Force's Space Test Program, administered by the Space and Missile Systems Center's Detachment 12, which has provided launch, as well as on-orbit command and control oversight.

In the coming weeks and months, the micro satellite will continue its rendezvous and proximity mission, but the next event date and participating resident space object will be determined at a later date based on schedule and which U.S.-owned dead or inactive object best meets the mission requirements. Nevertheless, the XSS-11's accomplishments in its initial months of flight have laid the groundwork for future success.



Photograph of the upper stage of the Minotaur I launch vehicle taken from the XSS-11 spacecraft at a distance of 0.5 kilometers. (Air Force Photo)