

Special Edition

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U.S. Navy Successfully Destroys Errant NRO Satellite with Aegis Theater Missile Defense System



The launch of NROL-21 aboard a Boeing Delta 2 on December 16, 2006. Photo: United Launch Alliance.

On February 20, 2008, the [United States Navy](#) successfully targeted and destroyed a defunct satellite owned by the [National Reconnaissance Office](#) (NRO). Officially, the action was taken because the uncontrollable satellite contained a large fuel tank filled with 450 kilograms (1,000 pounds) of frozen hydrazine, a highly toxic chemical fuel used mostly for spacecraft maneuvering thrusters. The hydrazine went unused because the satellite, launched in December 2006, promptly failed upon release from its launch vehicle. President George Bush made the decision to attempt to bring down the satellite because the hydrazine posed an unacceptable risk in his estimation. Independent assessments of this risk, however, demonstrate that potential death, injury, or damage to property was extremely low.

The imaging satellite, designated NROL-21L (catalogued as USA 193), was targeted during the last few weeks of its orbital journey, as natural decay was expected to bring it down during the first half of March. The missile used was a modified [Raytheon](#)-built RIM-161 Standard Missile-3 used for the [Missile Defense Agency](#)'s (MDA) Aegis theater missile defense system. The missile consists of three stages, the third of which carries a kinetic warhead, the element that actually separates and intercepts the target using infrared sensors. The system has been tested 14 times against short- and medium-range target missiles, with 12 successes. The missile was launched by a Ticonderoga class cruiser, the *USS Lake Erie*, supported by two Navy destroyers.

Targeting the satellite presented significant technical challenges. The Navy modified three of the remaining 21 SM-3 missiles in the inventory to handle this special mission. Details of this modification remain classified, but generally focused on enabling the IR sensor to more accurately detect the cold NRO satellite, slightly warmed by sunshine. Velocity also presented a major problem. David Wright of the

[Union of Concerned Scientists](#) tells [New Scientist](#), "This interceptor is really intended for missiles traveling at three to four kilometers per second; the satellite they're going to be shooting at has a speed of seven to eight kilometers per second."

Policy Implications

More critical than the actual technology involved, however, is the policy implication. China launched an anti-satellite system towards one of its own weather satellites, FY-1C in January 2007. That satellite, however, was orbiting at an altitude of 865 kilometers, quite a bit higher than the NRO satellite being discussed here. The world reacted negatively since this test generated a huge amount of orbital debris that can cause significant trouble for low Earth orbit (LEO) traffic for decades to come. The United States was particularly outraged and lodged several protests, and the United Nations took up the matter in the form of accelerated discussion and negotiations for the development of an orbital debris mitigation protocol, still ongoing.

The United States Government should be commended for notifying the world in advance about its intentions to shoot down a falling satellite with a ballistic missile. The announcement demonstrated an openness about a sensitive subject appropriate for a democratic society and for seeking a measure of international transparency regarding an otherwise sensitive subject.

However, the [Secure World Foundation](#) is concerned that using a ballistic missile in this manner after the United States roundly chastised the Chinese government for its anti-satellite test just over a year ago sends completely the wrong message to the world community. Few observers will appreciate the difference between the United States using a missile to hit a U.S. secret satellite orbiting at about 210 kilometers and the Chinese hitting their non-operational weather *(continued next page...)*

Fact Check

Planning for mission to destroy satellite:
January 4, 2008

Public first informed of satellite reentry:
January 29, 2008

Order by president authorizing mission:
February 12, 2008

Targeted Satellite:
NROL-21 (USA 193)

Missile Launch Platform:
USS Lake Erie

Missile:
Raytheon RIM-191 SM-3

Orbital altitude at time of intercept:
130 miles (209 kilometers)

Orbital velocity of NROL-21:
7-8 km/sec

satellite at 850 kilometers. Even though the debris from the U.S. anti-satellite action will quickly “wash out” of the atmosphere in small bits, as opposed to the many decades it will take for the debris from the Chinese test to do the same, this distinction will go unappreciated by most observers.

The U.S. action looked very much like an anti-satellite (ASAT) test to many observers and represents an escalation of tensions over the use of weapons against orbiting objects. In conducting this operation, [U.S. Air Force](#) officials learned a considerable amount about using missiles to destroy LEO satellites. It also gives validity to what some observers have long speculated - that the U.S. missile defense program is just a few steps away from a de facto ASAT system, using the same sensors, missiles, and launch platforms. These modified ASAT interceptors are presumably indistinguishable from standard missile defense interceptors and thus potential American adversaries must assume that all such equipped Aegis cruisers are also ASAT platforms. This represents a drastic change in the American stance on operational ASAT systems.

Further, the U.S. rationale for the event was suspect. U.S. officials claim it was to protect the populace from potential damage because the satellite carries a large amount of hazardous hydrazine propellant. However, the percentage of populated versus unpopulated area is extremely small and the chances of damage to life or property similarly small. Larger satellites with hydrazine, albeit in smaller amounts, have fallen in an uncontrolled manner before from orbit with no injury or loss of human life and minimal property damage. Even the breakup of the *Space Shuttle Columbia* over Texas in January 2003 resulted in no loss of life, injury, or property damage.

Just a few weeks before they announced the interception, military and NASA officials were downplaying the risk of danger to Earth’s population from this satellite, even as there was a classified Presidential order in early January to go ahead with the weeks of testing and modification to prepare for the interception.

An additional lesson to be taken from this event is on information and access to it. Before the announcement of the interception, almost all of the information on this object was being released to the media by amateur satellite observers from around the world. Indeed, the question should be asked if it were not for their efforts, would the world even know about this falling satellite and its potentially harmful payload? The United States has long maintained the belief that it can prevent potential adversaries from knowing about its space capabilities and activities by refusing to release any information. But today several countries including China, Japan, Germany, and France operate tracking radars and telescopes outside America’s control. And there is an ever-growing number of backyard researchers beholden to no official government policy or data restriction agreements.

Perhaps the development of these other sources of information means it is time for the U.S. to re-think their space situational awareness data sharing policy. For if falling satellites do present a threat to humanity, shouldn’t America set the example and take a leadership role?

Wouldn’t it be wonderful if instead of adopting an “exceptionalist” stance, the U.S. assumed leadership by inviting all spacefaring nations in the decision process before making a decision?



The USS Lake Erie. Photo: US Navy.



Vice Chairman of the Joint Chiefs of Staff Marine Gen. James E. Cartwright (left), and Deputy Defense Secretary Gordon England follow the progress of a Standard Missile-3 as it races toward a non-functioning National Reconnaissance Office satellite in space over the Pacific Ocean on Feb. 20, 2008. **Defense Dept. photo by U.S. Air Force Tech. Sgt. Adam M. Stump.**



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