SDI Test Takes Measure of Potential Targets

The most costly and complex SDI experiment conducted so far gathered basic data on what potential targets might look like to antimissile defenses, but it was marred by malfunctions

An elaborate Strategic Defense Initiative (SDI) experiment, code-named Delta 181, emerged from shrouds of classification onto the front pages of the newspapers last week. In a 12-hour series of maneuvers, a satellite bristling with sensors tracked a variety of objects apparently designed to mimic Soviet rockets and nuclear warheads as they hurtled through space.

The experiment, which cost $250 million, is the most complex and expensive SDI test conducted so far. It consisted of a minutely choreographed set of observations designed to provide data on what potential targets would look like to space-based defenses.

The primary purpose of the experiment was to see whether energy radiating from warheads after they have been released in space could be detected at different wavelengths and against a variety of backgrounds, including the cluttered background of the earth's radiation. This information will be important for one of the most difficult tasks facing space-based missile defenses—to track thousands of warheads and distinguish them from decoys and debris flying alongside them.

Data from the experiment will feed into the design of heat-seeking rocket interceptors that would be deployed on orbiting battle stations and fired at Soviet rockets and warheads. It could also be important for the design of satellites that would track potential targets and relay information to the battle stations.

Colonel Leonard Otten, an assistant director of the Pentagon's SDI Organization, described the test as "a very successful mission" at a press conference the day after the launch. It was not a total success, however. A long wavelength infrared sensor failed, leaving what could be an important gap in the data. Defense Department spokesmen have downplayed the seriouness of the failure, noting that there were other infrared sensors on board. But outside experts point out that they operated at shorter wavelengths and that infrared data is particularly important for the design of heat-seeking interceptors. The Defense department has also confirmed a report in the magazine *Aviation Week and Space Technology* that onboard computers failed to complete a complicated tracking maneuver that was regarded as a secondary objective of the test.

The experiment involved a 6000-pound satellite launched by a Delta rocket from Cape Canaveral. Once in orbit, the satellite ejected 14 different objects, trained its sensors on them, and went through a series of maneuvers to view them against a variety of backgrounds. The Pentagon has not revealed details of the objects released, but 10 of them are believed to be designed to simulate nuclear warheads and decoys.

The suite of sensors was configured to see what the targets look like across the spectrum, from long wavelength infrared to ultraviolet. The satellite also contained a conventional microwave radar and two laser radars, or ladars.

Another aim of the experiment was to gather data on the shape and characteristics of rocket plumes in the vacuum of space. This information is essential for developing a capability to destroy Soviet booster rockets while their engines are still firing and before they release their warheads in space.

It has long been known that as rockets climb through the atmosphere their exhaust plumes gradually spread out. The higher the altitude, the broader the fan formed by the plume. An earlier SDI experiment indicated, however, that when rocket engines are fired in space, the exhaust plume completely envelops the spacecraft.

This complicates the task of locating a relatively cold booster rocket in the midst of hot exhaust gases. As Major Andrew Green, the project manager of the Delta 181 experiment, put it, "you don't win any points by hitting the plume" with an interceptor missile when the target is the booster rocket itself.

To gather more data on what rocket plumes look like in space, the Delta 181 satellite fired off four small rockets while in orbit and again viewed them with its multispectral sensors against a variety of backgrounds. In addition, it tracked a small sounding rocket fired from a launch pad in Hawaii as it sped through the atmosphere into space.

Unlike many other SDI tests, the Delta 181 experiment has raised few concerns among the program's critics about possible conflicts with the 1972 Antiballistic Missile Treaty. This is because it is purely a research exercise designed to gather baseline data. It did not involve any actual weapons tests.

Indeed, there are no weapons yet that could be tested against targets in space. As Otten pointed out, SDI researchers have "pitifully little data" on what potential targets look like, and this is "the first quantitative step" toward acquiring critical information.

For some SDI critics, the Delta 181 experiment, for all its technical accomplishments, underscores the problems still facing the program. "Spending $250 million collecting target signature data indicates how much time and how much money they still have to go," says John Pike of the Federation of American Scientists. ■

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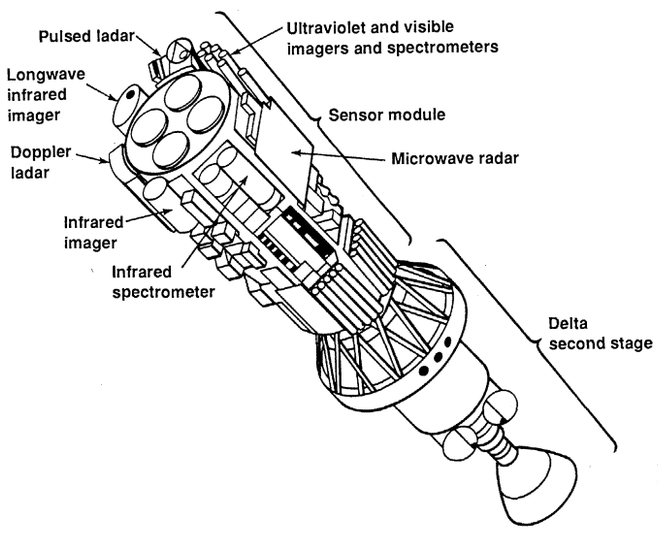

Holly Bishop

A $250-million experiment.

The array of sensors aboard the upper stage of a Delta rocket were trained on 14 objects in space and a rocket launched from Hawaii. The aim was to gather data on what warheads and rockets look like to antimissile defenses. The long wavelength infrared sensor failed to work.