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SENSOR TECHNOLOGY ADVANCES PUSH SDI FORWARD

(Updating *Backgrounder* No. 557, "Technology Speeds the Strategic Defense Initiative Timetable," January 13, 1987.)

The Strategic Defense Initiative keeps pressing ahead. One of the most important advances has been in developing new sensors for detecting, tracking, and monitoring enemy Intercontinental Ballistic Missiles (ICBMs). These tasks of the Surveillance, Acquisition, Tracking and Kill Assessment program--or SATKA--are among the most crucial and delicate in the SDI system. They consist of:

◆◆ **Surveillance**--maintaining a constant and detailed surveillance of potential enemy ICBM launch sites to provide warning of a Soviet strike;

◆◆ **Acquisition**--searching for, detecting, and locking on to the launched ICBM;

◆◆ **Tracking**--tracking the ICBM to determine its destination and mission and relaying this data to SDI battle management stations; and

◆◆ **Kill Assessment**--assessing the success, under battle conditions, of SDI anti-missile attacks to determine which targets are still active.

The SATKA program is geared to develop three "sensor suites," or one group of sensors for each of the stages in an enemy ICBM's flight. Each "sensor suite" requires specific types of sensors to accomplish its mission.

Boost-Phase Sensors

Designed to detect the launch of an enemy ICBM, these sensors will provide essential early-warning, initial tracking, and targeting information to other sensors in the system. The Boost Surveillance and Tracking System (BSTS) is the core of SATKA's research. Current work focuses on developing better sensors, enhancing survivability, and establishing efficient manufacturing techniques. Some of the major advances recently made in these areas include:

◆◆ Advances in semiconductor crystal technology have lead to increased production of high-performance long wavelength infrared detectors for spaceborne and airborne sensors. Long wavelength sensors are crucial for detecting ICBM boosters at great distances.

◆◆ Production of high powered transmit/receive modules has been increased. These are necessary to test the reliability of sensors and their ability to withstand radiation in a nuclear environment.

◆◆ Initial design specifications for the space-based radars necessary for boost and post-boost phase surveillance have been completed. Space-based radars are essential for tracking ICBMs in the mid-course of their flights.

Mid-course Surveillance and Discrimination Sensors

This group of sensors uses the information from the BSTS to track ICBMs as they rise into space, travel through their mid-course flights, and deploy their warheads. The Space Surveillance and Tracking System (SSTS) is the focal point of this research. Work here concentrates on ground demonstrations and space-based surveillance and tracking experiments. Major SSTS technological advances include:

◆◆ A dramatic breakthrough in the cooling systems of infrared sensors has been made. These sensors, essential to the success of SSTS, generate intense heat. Advances in super-cooling will greatly increase their operational lifetime.

◆◆ New transmittors have been designed that will increase effectiveness of laser radars for targeting and discriminating between decoys and real warheads in space. Tests of these transmittors have been held and some production begun.

Terminal Phase Sensors

These sensors will receive the data from the SSTS, track the warheads as they fall to earth, determine their targets, and provide targeting coordinates to terminal interceptors. The Airborne Optical Surveillance (AOS) System, an aircraft-based sensor system, will accomplish this. AOS signals will be transmitted to Terminal Imaging Radars, which will provide the final precise targeting information to the ground-based anti-ICBM missiles. Recent advances in these programs include:

◆◆ SATKA has already produced much of the AOS system hardware, completed the software for tracking and discrimination, modified the Boeing 767 carrier plane, and developed tests to evaluate the AOS system.

◆◆ Preliminary design for the Terminal Imaging Radar has been completed.

These surveillance systems will be SDI's eyes and ears. The progress achieved so far demonstrates the ability of the Strategic Defense Initiative Organization and its scientists to develop sensitive and critical systems. Congressional budget cuts, however, already have forced cancellation of tests essential to SDI surveillance and tracking development. It is these cuts, not the limits of available science, which thwart a U.S. defense against nuclear attack.

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