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Annual Report of the Secretary of Defense, Operational Forces, pp. 17-20:

Antimissile Defenses

The primary nuclear threat confronting the United States today consists of intercontinental ballistic missiles (ICBMs) and submarine-launched ballistic missiles (SLBMs) rather than manned bombers. While defense against such a missile attack requires much the same capabilities as an antibomber defense--namely, receiving warning and tracking, intercepting, and destroying the delivery vehicle-the problem is vastly more complex because of the shorter time periods and higher speeds involved. Progress made in this area during the year included further improvements in warning and significant advances in the development of an effective anti-ballistic missile (ABM) system.

Warning of a land-based missile attack is provided primarily by the Ballistic Missile Early Warning System (BMEWS). All three BMEWS stations-at Clear, Alaska; Thule, Greenland; and Fylingdales, United Kingdom-were operational during fiscal year 1965, while work to increase their coverage and reliability was underway. A major improvement in our detection capabilities, the development of an over-the-horizon (OTH) radar, was announced by the President on September 17, 1964. This new technique, based on bouncing radar or radio waves off the ionosphere, enables us to detect distant missile launchings shortly after takeoff through changes in the reflective pattern caused by the missile passing through the upper atmosphere. The experimental stations constructed in connection with the development program provided an early operational capability.

With respect to submarine-launched missiles, contract negotiations were initiated to modify selected air defense radars along the east, west, and Gulf coasts of the United States to improve their detection capabilities against this type of attack.

Information on satellites continued to be acquired through the North American Air Defense Command's (NORAD's) space detection and tracking system (SPADATS). The destruction by fire in January 1965 of a new phased-array radar being constructed at Eglin AFB, Florida, as part of SPADATS will delay the operational availability of this advanced equipment.

The development of an effective anti-ballistic missile (ABM) defense system has been pursued as a matter of the highest priority for many years. While various technical and operational problems remain to be solved, progress to date on the Army's NIKE-X has fostered confidence in the ultimate feasibility of this system. As currently conceived, NIKE-X would be composed of a new Multifunction Array Radar (MAR); Missile Site Radars (MSR); long-range ZEUS missile; new, quickly reacting, high acceleration, short-range SPRINT missiles; and advanced data processing and control elements. System components could be hardened to render them less vulnerable to direct attack. The MAR

is being designed to perform functions that formerly required four different radars-the detection and acquisition of targets; discrimination between warheads and decoys; tracking the target; and guiding the interceptor vehicles. The MAR radar beams will be directed electronically rather than mechanically, thus providing a capability for tracking multiple targets practically simultaneously. The lack of this capacity had been a major limitation of the earlier NIKE ZEUS system. An experimental prototype MAR was tested at White Sands Missile Range, New Mexico, during the year. The development of the new SPRINT missile advanced as an unguided launching of a two-stage prototype in March 1965 closely matched the specifications for acceleration and propellant burning rates. The NIKE-ZEUS had demonstrated its capability for intercepting incoming warheads in tests during the previous year.

Supplementing the NIKE-X development effort is the basic research on missile defense carried on through Project DEFENDER, sponsored by the Department's Advanced Research Project Agency (ARPA). It includes comprehensive investigations of missile phenomenology as well as studies of advanced phased-array radars and high acceleration missile interceptors.

Assuming that satisfactory solutions are found to the remaining technical and operational problems of NIKE-X, the eventual decision on production and deployment will have to be based on a close scrutiny of all aspects of our defense posture and those of our potential opponents. For example, what weight should be given to the fact that improvements in our defenses can be quickly offset by increases in enemy offensive forces, since the cost advantages greatly favor offensive systems? Moreover, since a balanced, integrated combination of strategic offensive forces, area defense forces, terminal defense forces, and passive protective measures is required for an effective defense in depth, what additional programs must be initiated if NIKE-X is deployed? How extensive should such a NIKE-X deployment be? Pervading all these questions is the uncertainty of what our potential enemies will actually do--what kind of force will they build, what kind of attack might they launch, how effective would their weapons be? Pending greater clarification of these issues, the Department's recommendation, approved by the Congress, called for the augmentation of our assured destruction capability as outlined earlier, the deferral of the NIKE-X deployment decision, and the allocation of ample funds for continued development of ABM defenses on a most urgent basis.

For defense against hostile satellites, two weapon systems reached operational status during the summer of 1964--one a modification of the Army's NIKE-ZEUS and the other of the Air Force THOR. Both successfully demonstrated their intercept capability against U.S. satellites and were placed under the operational control of the Continental Air Defense Command, the U.S. component of NORAD.

Annual Report of the Secretary of the Army, Research and Development, pp. 200-201:

Firepower

As the 1965 fiscal year opened, the Army took over from the Navy the Kwajalein Test Site in the Pacific, where controlled experiments are conducted to produce data for the design and development of the NIKE-X defensive system and for offensive systems as well. The NIKE- X development program progressed in 1965 with testing of missile, radar, and support equipment. Tests of the Multifunction Array Radar (MAR) were started at White Sands Missile Range, New Mexico, in July 1964, where ballistic targets and aircraft have been successfully tracked, validating the design concept of the equipment. A "pop-up" ejection mechanism to launch the SPRINT, a high acceleration missile that is part of the NIKE-X system, was successfully tested in above-ground and launch-cell configurations. In March 1965 the Army announced the almost perfect test flight of the first SPRINT propulsion test vehicle at White Sands. Development of suitable hardened electric power systems for the NIKE-X system is entering the engineering test phase, and concepts are being studied for the use of diesel engines and gas turbines as prime movers in the generating plants.