



This group photo, taken in 1968, shows 14 of the 17 MOL astronauts. The first group of eight astronauts was selected in November 1965, the second group of five in June 1966, and the third group of four in June 1967. Following cancellation of the MOL program, seven of the former MOL astronauts became astronauts for NASA, and three later attained general officer or admiral rank. James Abrahamson (top right) became a lieutenant general and Director of the Strategic Defense Initiative Organization. Robert Herres (top left) became a four-star general and Commander-in-Chief of the U.S. Space Command. Richard Truly (bottom right) became a vice admiral and head of the U.S. Naval Space Command. After retiring from the Navy, Admiral Truly joined NASA, serving first as Associate Administrator for Space Flight and later as Administrator.

Antisatellite Systems

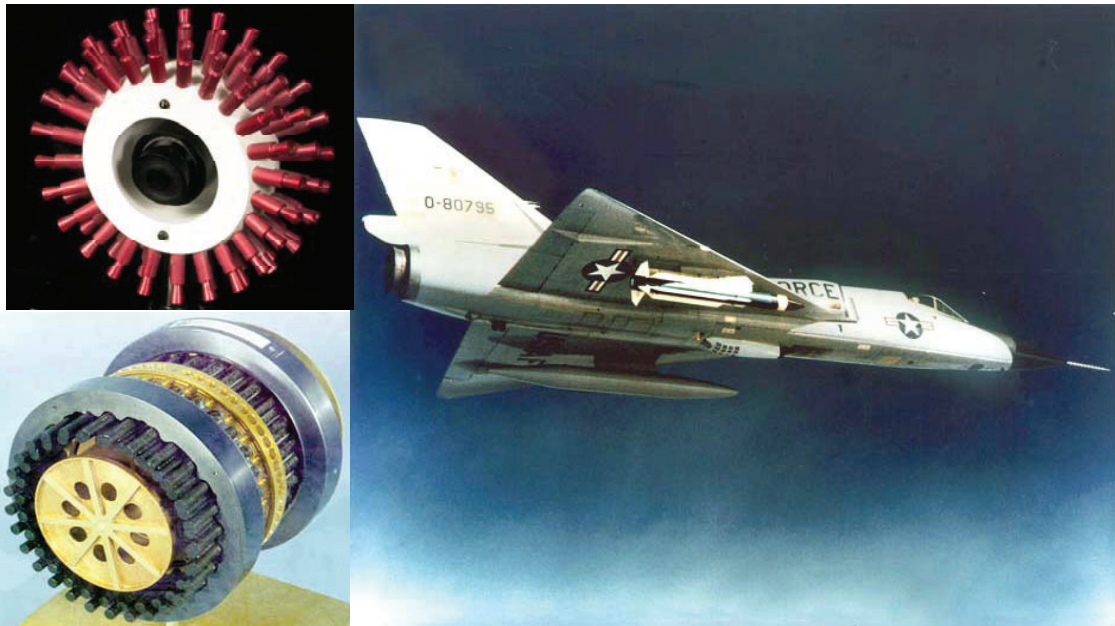
The nation's first operational antisatellite weapon system was known as Program 505. It was developed by the U.S. Army, using Nike Zeus missiles originally designed for an anti-ballistic-missile role. The Army based the missiles on Kwajalein Atoll in the Pacific, conducted tests, and declared the system operational on 1 August 1963. Secretary of Defense McNamara at first kept the system on alert but abandoned it in favor of the Air Force's antisatellite system in 1964.

The Air Force's antisatellite system was brought into being by Space Systems Division during late 1963 and early 1964. A ground-based system known as Program 437, it employed Thor missiles with nuclear warheads which could be shot into space accurately enough to destroy or disable a hostile space-based weapon or satellite. Secretary of Defense McNamara approved the system's development on 20 November 1962. Thor boosters were modified, combined with ground equipment from deactivated Thor missile sites in England, and deployed to Johnston Island in the Pacific. There they were maintained and operated entirely by Air Force military personnel. Four test launches without live warheads took place, the first on 1 February 1964. Only three of them were successful, but the system was declared fully operational on 1 June 1964, with Air Defense Command as the using command. The capability remained in place, though with few dedicated launchers and a temporary loss of warheads, until it was placed on 30-day standby status on 2 October 1970. The launch facilities on Johnston Island were

deactivated on 1 April 1975, and the program was abandoned entirely.⁵¹

While it was still active, however, SSD added a satellite-inspection capability to the system. On 23 May 1963, SSD's higher headquarters, Air Force Systems Command, ordered studies of the possibility of using Program 437's assets to inspect and photograph hostile satellites on orbit. SSD developed such a system, known as Program 437AP (for Alternate Payload), and conducted several test launches from 7 December 1965 through 2 July 1966. Some of the tests were successful in returning photographs of the targeted Agena spacecraft. The system employed cameras and recovery capsules developed by the Corona program. Nevertheless, the Air Force canceled Program 437AP on 30 November 1966.⁵²

During the 1970s, SAMSO began to develop a concept for a follow-on antisatellite weapon system that would not use nuclear warheads. The weapon was actually developed in two successive, related efforts. The first effort was known as Project Spike. It involved launching a two-stage missile from an F-106 aircraft. The missile would release a terminal homing vehicle guided by solid rocket motors on a trajectory to intercept the selected satellite, which it would destroy by impact. The program conducted a static flight test with the ARM missile, fitted with a dummy



The two contractors involved in Project Spike, General Dynamics and Ling-TEMCO-Vought (LTV), designed very different miniature homing vehicles. A plastic model of General Dynamics' vehicle, known as the Gimballed Miniature Vehicle, is shown at top left. A plastic model of LTV's vehicle, which ultimately became the concept for the later Air-launched ASAT, is shown at bottom left. The vehicles were designed to be launched from an F-106 fighter using a standard Anti-Radiation Missile (ARM) shown under the right wing of the F-106 above. Both were designed to destroy a satellite by impact. The many thrusters on both vehicles were necessary to balance them and adjust their trajectories in flight.

⁵¹ Clayton K.S. Chun, Shooting Down a "Star": Program 437, the US Nuclear ASAT System and Present-Day Copycat Killers, Air University Press, April 2000.

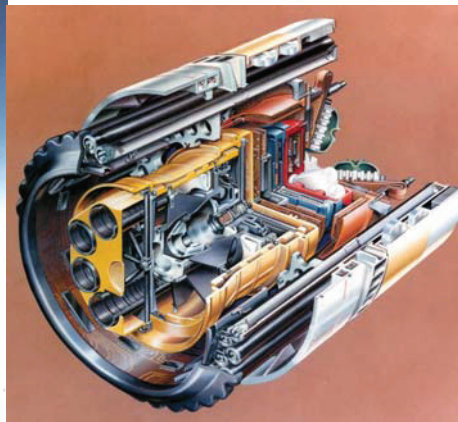
⁵² Much of the information about ASAT programs was provided by Major General Thomas P. Taverney.

payload representing the homing vehicle, mounted on a special rack on the F-106.

Project Spike did not enter the development stage, but its technology and design provided the basis for a later antisatellite development program known as the Air-launched ASAT, which SAMSO began to develop in 1976.⁵³ Like Project Spike, the Air-launched ASAT employed a miniature homing vehicle propelled into space by an air-launched two-stage missile, although in this case the missile was released from an F-15 fighter. The miniature vehicle used a longwave infrared sensor to acquire its target, steered toward the target by selectively firing small rocket motors, and destroyed the target by force of impact. The system achieved a high degree of technological success. Its first free-flight test on 21 January 1984 was successful, although its second test on 2 November 1984 was not.⁵⁴ Finally, on 13 September 1985, the ASAT successfully carried out its only flight test against an orbiting satellite,⁵⁵ which it destroyed by impact. Despite some further successful testing, the Air-launched ASAT program was terminated by the Air Force on 14 March 1988 because of Congressional restrictions against testing and budgetary constraints.



Left: The Air-launched Antisatellite missile is released from its F-15 launching aircraft and its motor is ignited. At a certain point in its trajectory, the missile released a miniature homing vehicle which destroyed the satellite by impact. Below: A cutaway view of the ASAT's miniature homing vehicle. The rockets were mounted in an outer ring around the vehicle, and the infrared seeker assembly was in the center.



⁵³ The program was authorized by President Gerald Ford's National Security Decision Directive 333. See David N. Spires, Beyond Horizons, Air Force Space Command and Air University Press, revised edition, 1998, p. 188.

⁵⁴ The first free-flight test did not include a miniature homing vehicle. The second test used a star as a target for the homing vehicle's sensor.

⁵⁵ The satellite used as a target was P78-1, an experimental satellite launched in 1979 by SAMSO's Space Test Program.