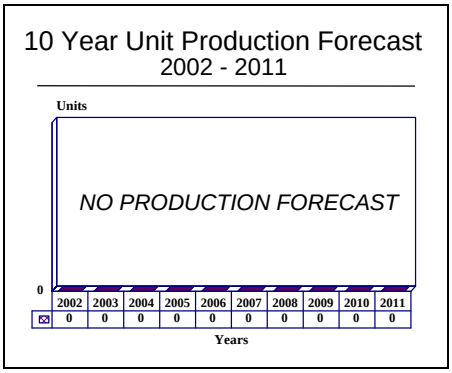
ASAT - Archived 4/2003

Outlook

- Research work continuing
- KE ASAT has managed to survive despite numerous attempts to have the program canceled
- Three prototype kill vehicles could be completed in FY2002
- There is a slim chance that 10 KE ASAT user-operational evaluation systems could be deployed by the United States
- Laser could also be used by the US to disable or destroy satellites



Orientation

Description. Land-based tactical surface-to-air anti-satellite missile system.

Sponsor. The United States Department of Defense through the Kinetic Energy ASAT Joint Program Office.

Contractors. Rockwell International Corporation, Rocketdyne Division, Seal Beach, California, USA. Rockwell was acquired by Boeing in 1996. Work is the responsibility of Boeing's Electronic Systems & Missile Defense, Anaheim, California (CA).

Status. The KE ASAT was marked for termination, but US congressional supporters have provided sufficient funding to keep it active. The US Congress is pushing for the military to deploy 10 user operational evaluation systems before the end of the decade.

Total Produced. No serial production has taken place. The US is planning to complete the fabrication of three prototype kill vehicles this year (2002).

Application. The KE ASAT is designed to launch a small, lightweight, non-explosive vehicle that detects, identifies, and negates specified hostile satellites.

Price Range. No specific price was attached to the Rockwell KE ASAT system. The research and development costs for the original LTV Aerospace ASAT system was put at $2 billion by the General Accounting Office. Various Fiscal 1987 supporting documents and testimony list a unit price of $40 million based on the procurement of 35 missiles. Total program cost, again based on 35 missiles, was put at $3.8 billion in Fiscal 1986 dollars.

Technical Data

Design Features. Little technical data was produced on the KE ASAT prior to its termination. Since the system was to have been ground-based, it was expected to be somewhat larger than the original LTV ASAT, although certain features of the older system could have been incorporated. Sources had indicated that the ASAT was to have been approximately 26.72 meters (30 ft) in length and 68.18 kilograms (150 lb).

Propulsion. Either a liquid or solid-rocket motor was to have been used with the new ASAT system.

Control & Guidance. Possibly similar to that used with the original US ASAT system, although certain improvements were probably to have been incorporated, possibly including a ground control data link.

Launcher Mode. Ground-launched from a fixed site. Sites mentioned for the ASAT launcher have included

Fort Stuart, Georgia, and Hawaii. But some sources said that in order to be treaty compliant, the US could use Grand Forks, North Dakota, which was designed as an Anti-Ballistic Missile (ABM) site allowed in the 1972 Soviet-American ABM agreement. The system could also have been configured so that it may be launched from a mobile platform or even a naval vessel.

Warhead. Kinetic energy penetrator was to have been used with this new ASAT system.

Variants/Upgrades

No specific variants were produced before this program was terminated.

Program Review

Background. In the mid-seventies, the United States became increasingly interested in obtaining a weapon system that could destroy orbiting satellites. The loss of military satellites would be devastating in time of war. The United States uses these vehicles for real-time imagery and electronic intelligence of the then-USSR and other hot spots around the world. In addition, the US has placed communications and position determining satellites in geosynchronous orbits 35,888.79 km (22,300 statute miles) above the earth. At this altitude, a satellite orbits at the same speed as the earth below, so that it remains stationary above a fixed point on the earth's surface. These satellites are an integral part of the United States' worldwide command, control and communications network, which would be vital in time of war.

First US ASAT. The first US anti-satellite weapon system to come close to being available for actual production was developed by LTV Aerospace. This was an air-launched system, which used a modified F-15 Eagle as its initial firing platform. The system consisted of a booster combination, with Boeing Aerospace's AGM-69 Short-Range Attack Missile (SRAM) as the first stage and a Thiokol Altair III research rocket, the fourth stage propulsion unit of the LTV-built Scout space launch vehicle, as the second stage.

After launch, the ASAT booster was guided by a Sperry inertial guidance unit to a specific, pre-computed point in space during powered flight. The navigation unit was located in the second stage. At the predesignated point in space, the infrared sensors on the miniature homing vehicle were activated for search. Following booster burn-out, the miniature homing vehicle was spun up to 20 rpm by the spin table, as the sensors acquired the target through eight small telescopes. Once the target was acquired, the vehicle accelerated to its maximum forward speed of 13,716 m/s (45,000 fps); the booster separated automatically. Lateral movements were then paramount since the vehicle could no longer be accelerated in the forward plane. The Hughes long wavelength infrared sensors, located at the end of the telescope tubes, refined and retained lock-on since the spin rate stabilized the vehicle and enhanced viewing. The sensor signals were sent to a central processor which correlated this information with data received from Honeywell's laser gyro reference system. The processor actuated the correct rocket motor (56 circumferentially mounted propulsion tubes) for firing. Each rocket was a single-shot device, so the vehicle was commanded to spin past already expended tubes each time it fired, to achieve or halt lateral motion. Once a collision course to the target was precisely maintained, a direct kinetic energy kill resulted upon impact.

In December 1987, the US Air Force made a preliminary decision to abandon the aircraft-launched ASAT program as a cost cutting measure. All funding for FY89 was deleted.

However, the cancellation of the program involved only the Miniature Homing Vehicle (MHV) for the F-15, and not the basic technology. Then-LTV Missiles & Electronics Group received a stop work order from the US Air Force on March 11, 1988, making the cancellation of the program official.

KE ASAT. The Kinetic Energy ASAT program was an effort to develop a near-term surface-launched weapon system capable of non-nuclear neutralization of hostile military satellites. The program was part of an overall US Department of Defense effort to develop a national ASAT capability to include an improved space surveillance capability, Battle Management/Command, Control and Communications elements, and both kinetic and directed energy weapons.

The KE ASAT was to be a land-based, direct ascent, rapid response weapon (attacking a target within possibly 30 minutes). Using information from the existing Space Surveillance Network, the US would launch ASAT missiles against military satellites in near or low Earth orbit (170 kilometers and up). An onboard computer would have provided initial flight guidance until the system's seeker was able to acquire and track

the satellite target. The ASAT missiles would have utilized end game maneuvering to achieve a miss distance small enough to permit non-nuclear destruction of the military satellite. This program was expected to benefit from experiences gained through the US Army ZEUS and Air Force THOR ASAT system programs which were operational from 1963-1975, the LTV Aerospace F-15 air-launched Miniature Homing Vehicle-ASAT, and then ongoing technology programs of the Strategic Defense Initiative (SDI).

On July 13, 1990, the US Army selected Rockwell International (now part of Boeing) for final negotiations leading to a definitive contract to design and produce a KE ASAT system. The US Army informed Congress on July 18, 1990, that it was altering its acquisition strategy for the ASAT. The Army had originally planned to carry two competing contractors through demonstration and validation and then down-select to a winner who would proceed into the full-scale development phase. The US Army notification indicated that the service had decided to down-select early and have only one contractor continue with the 24-month demonstration/validation phase. The US Army estimated that this action would result in fiscal year savings of $49 million, and a total FY91-92 savings of $10 million.

The demonstration/validation contract, which included tactical design, was awarded to Rockwell in August 1990. The Defense Acquisition Board (DAB) met on February 15, 1990, and approved the program to proceed into Phase I. This phase (Milestone I) of the program did not involve the testing of the system against an object in space. Full-scale development, Milestone II, was to have been achieved by the second quarter of 1994, with initial low-rate production, Milestone IIIA, following in 1997, if sufficient funding were allocated.

Budget cuts and cost increases soon made the KE ASAT effort unaffordable. In its FY94 budget deliberations, the KE ASAT program was thought to have been terminated. However, US congressional supporters have managed to provide sufficient unrequested funding each year to keep the program alive under the Tactical ASAT Technologies effort.

In 1999, the United States Army announced it had found funding to perform additional ASAT tests. A modification contract worth $18 million was awarded to Boeing to perform ground tests of the Kinetic Energy ASAT.

The money is part of $37.5 million eliminated by President Clinton's line item veto in 1998. The funding was restored after the US Supreme Court found that the line item veto was unconstitutional. The Clinton administration had long opposed the development of the KE ASAT and provided no funding in FY99 or FY00 defense budget requests. Still, supporters of the program have managed to insert funding for KE ASAT in each year's defense budget.

The Pentagon plans to complete the fabrication of three kill vehicles in FY2002. These three kill vehicles will be put on the shelf for future use if directed, according to US military officials. There are no current plans to carry production beyond this point.

Funding

Although the KE ASAT demonstration/validation effort was terminated, a low level of funding has continued to be provided to study tactical satellite-killer technology efforts. The US FY01 defense budget includes funding for the further development of an anti-satellite weapon system. The KE ASAT received $20 million in FY01.

Previously, the US Army had twice tried to zero its allocations for ASAT, but the Office of the Secretary of Defense intervened on both occasions to support this program's continuation. KE ASAT supporters believe that a window of opportunity exists to move ahead with this program at a reasonable cost.

In 1994, the Tactical Anti-Satellite Technology Program was established to take responsibility for the previous ASAT development project. The US Army's ASAT program was originally funded under PE#0603392A Anti-Satellite Weapons (ASAT) and by the US Navy under PE#0603392N. Later funding was transferred to PE#0603892D Tactical Anti-Satellite Program Development.

Recent Contracts

Boeing North American Incorporated, Rocketdyne Division, Canoga Park, California, received a $35 million increment as part of a $43.9 million cost plus incentive fee completion letter contract for its ASAT program. Contract Number DASG60-97-C-0039

Rockwell International Corporation, Seal Beach, California, was awarded a $7.5 million increment as part of a $90 million contract for near-term Kinetic Energy ASAT. The work was to be completed in February 1993. The US Army Strategic Defense Command, Huntsville, Alabama, was awarded the contract.

Timetable

Month	Year	Major Development
	1967-79	Tests and deployment of Soviet ASAT system
Early	1970s	Development of US ASAT system begun
	1981	Initial contracts awarded for a definitive US ASAT system
Jan	1984	First test of US LTV-ASAT missile
	1986	Development continued on LTV-ASAT
	1988	Stop work order issued on LTV-ASAT
	1989	Interest in ASAT weapons continued
Dec	1989	DAB selected land-based ASAT over other options
Feb	1990	Defense Acquisition Board approved KE ASAT program
Jul	1990	Rockwell International selected to study KE ASAT
Aug	1990	Demonstration/validation phase contract awarded
	1993-94	KE ASAT program nearly terminated
	1993-1997	US congressional ASAT supporters put funds in KE ASAT program
	1998	KE ASAT funding received line-item veto
	1998	Line-item veto struck down, KE ASAT funding once again available
	2000s[(a)]	Research continuing

[(a)] Estimate

Worldwide Distribution

No export of any potential ASAT weapon systems is expected.

User Country(s). None

Forecast Rationale

An anti-satellite weapon is not presently a top priority for the United States. Funding is currently being prioritized for systems that can be used in the ongoing US campaign against global terrorism networks. Still, supporters believe that anti-satellite weapons are needed, despite changes in the global political situation, and continue to push for their development.

The de facto leader of KE ASAT supports in the US Congress is Senator Bob Smith (R-New Hampshire). Senator Smith has helped to keep the program alive despite repeated efforts by the Pentagon to have it terminated. Instead of developing weapons to destroy satellites, the Pentagon prefers to jam them or their ground communications sites. If physical attacks are to be made, the Pentagon would rather strike a satellite system's ground-based infrastructure. This has resulted in Pentagon foot-dragging when it comes to spending the unrequested KE ASAT money added to its budget each year.

US congressional supporters of KE ASAT want to see continued funding for the program's technology development phase, with the eventual aim of purchasing 10 user operational evaluation systems (UOES) for deployment in the future. While further tests may be conducted, the deployment of even an experimental ASAT system seems unlikely.

The US Army believes that KE ASAT program should be a much lower priority than other space control efforts. At the most, the military services may accept the KE ASAT user operational evaluation systems as an interim capability but would be unlikely to throw much support behind any major congressionally sponsored development and production effort. Instead, the US military seems to be more interested in pursuing the development of ground-based, high-energy lasers rather than missile systems.

A major problem for advocates of anti-satellite weapons like the KE ASAT, and military planners alike, is the

expanding network of commercially operated satellite systems. Although not as sophisticated as those run by the Pentagon and other armed forces, commercial satellites can perform many of the duties of military satellites. This leaves military commanders with a dilemma: either potentially allow an enemy to have access to a neutral's worldwide satellite surveillance systems, or advocate a strategy that includes the destruction of all space-based surveillance assets, combat and non-combatant alike. Faced with this situation, the world's major powers may simply decide to live with the fact that they cannot stop all observation of its military forces and instead develop technology that can temporarily blind these assets during certain critical hours of an ongoing operation.

Eventually, the US may begin production of an anti-satellite system. Whether its the KE ASAT or some other systems remains to be seen, but production definitely will not occur during this decade and possibly not in the next, either.

Ten-Year Outlook

ESTIMATED CALENDAR YEAR PRODUCTION

			High Confidence Level				Good Confidence Level				Speculative			
Missile	**(Engine)**	**thru 01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**Total 02-11**
BOEING													
KE ASAT	UNSPECIFIED	0	0	0	0	0	0	0	0	0	0	0	0
Total Production		0	0	0	0	0	0	0	0	0	0	0	0