

LINE-OF-SIGHT ANTI-TANK MISSILE (LOSAT)



Army ACAT II Program

Total Number of Systems:	172 FU; 1,560 missiles
Total Program Cost (TY\$):	\$1,171M
Average Unit Procurement Cost (TY\$):	Fire Units: \$3.6M Missiles: \$238K
Full-rate production	1QFY06

Prime Contractor

Lockheed Martin Missile and Fire Control, Dallas, TX

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Line-Of-Sight Anti-Tank (LOSAT) Missile is an anti-tank weapon system designed to provide lethal fire, defeating any known or projected armor systems at ranges greater than 4,000 meters. It uses kinetic energy as its kill mechanism and is the first of the Army's Kinetic Energy Missile programs. LOSAT, which will be mounted on a U.S. Army High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) chassis, is being developed as a supplemental anti-armor capability for fielding in five light divisions currently equipped with TOW and Javelin anti-tank systems. The basic organizational unit for LOSAT will be a five-man squad equipped with two HMMWVs and a high-mobility trailer. One HMMWV, called the Fire Unit, will be the LOSAT missile launch vehicle that can carry four ready-to-fire missiles. The fire unit can engage two targets sequentially. The other vehicle, the Re-supply HMMWV, will tow a Missile Re-supply Trailer carrying eight additional missiles. The system is to be deployable by strategic (e.g., C-5, C-17) and tactical airlift (C-130), and external air transport via UH-60L and CH-47 helicopters. The design of the Fire Unit is heavily constrained by a

Key Performance Parameter (KPP) that requires that it be sling-loadable from a UH-60L helicopter with a threshold requirement for two ready rounds and an objective requirement four rounds. Therefore, only minimal armor protection will be provided on the Fire Unit; the Re-supply vehicle will have no armoring. The trailer will have some form of armoring, such as Kevlar blankets or a form of metal protection. The Re-supply vehicle may, however, be equipped with the Shortstop Electronic Protection System to provide a defense against some types of indirect fires.

The LOSAT fire control system is based on the Improved Bradley Acquisition System, which features an acquisition system using a second-generation, Forward-Looking Infrared (FLIR) sensor and a daylight TV. LOSAT is capable of operating autonomously or with other systems using its digitized command and control/interoperability capability. The fire control system allows the gunner/commander to acquire and auto-track up to two targets simultaneously. Once the gunner initiates launch consent, the system automatically initializes and guides the missiles to the targets in a sequential manner: the missile accelerates to 5,000 feet per second and then flies to maximum range in approximately five seconds.

The current configuration of LOSAT is significantly different from the configuration and concept originally proposed in the 1980s. While the missile has remained essentially the same, the carrier has changed from the Bradley chassis to a HMMWV. Further, the new configuration has no turret. This means that its field of engagement is now 20-30 degrees of frontal area versus 360 degrees provided in the original configuration with a turret. Finally, its mission profile has changed from that supporting a mechanized infantry force in a Warsaw Pact scenario, to a light infantry role supporting early entry missions, such as securing an airfield.

Most of the technology in the current LOSAT system is well established, except for the missile guidance. The guidance for the high velocity missile, which follows a slightly curved path after launch, is a technical challenge for the development program. The LOSAT missile guides itself to the target utilizing "missile position relative to the target" updates received via laser pulses from the LOSAT Fire Unit.

LOSAT is intended to contribute to *Joint Vision 2020* as a *precision engagement* system enhancing the Army's *dominant maneuver* capabilities in the ground battle.

BACKGROUND INFORMATION

The LOSAT program began as an Acquisition Category (ACAT) I Army system with OSD T&E oversight. In 1992, in order to preserve the kinetic energy missile technology, the program was designated as an Advanced Technology Demonstration (ATD). Subsequently, the Joint Requirements Oversight Council upgraded the program to an Advanced Concept Technology Demonstration (ACTD) in 4QFY97. Formal testing of LOSAT was initiated, including the Early Soldier Involvement Plan, motor testing, attitude control motor testing, spin testing, and air drop rigging/static load testing although the funding for T&E had been reduced.

Although initially LOSAT was to be mounted on an extended length Bradley Fighting Vehicle chassis, during the ATD period the Army proposed mounting LOSAT on an Armored Gun System (AGS) chassis. When the AGS program was cancelled, LOSAT was reconfigured for a HMMWV chassis. The current ACTD design efforts further involve updating the missile electronics and integrating the fire unit electronics into the HMMWV.

In late December 1999, Program Budget Decision 745, supported by the Army Chief of Staff, provided additional non-ACTD developmental funding for FY01-03 and initial procurement funding in FY04-05. To reflect this plus-up, the program is currently being restructured to enter an EMD-like phase, referred to by the Program Manager as "ACTD Plus," to prepare for an LRIP decision in early FY04, rather than FY06 as previously planned. This LRIP decision in FY04 will be followed by IOT&E in FY05. Results of this testing will support a full-rate production decision in early FY06.

On July 11, 2000, the re-structured LOSAT program was designated an ACAT II program, with Milestone Decision Authority delegated to PEO, Tactical Missiles. OSD had designated LOSAT for DT&E, OT&E and LFT&E oversight. Furthermore, LOSAT will require LFT&E for both assessments for the vulnerability of the system (Fire Unit, Re-supply Vehicle, and Re-supply Trailer) and the lethality of the missile.

TEST & EVALUATION ACTIVITY

There was little T&E activity this year involving actual hardware. The primary test activities related to the planning required to develop the overall test program to support the PEO's MS II decision expected in November 2000. As part of the LOSAT test program, Dismounted Battlespace Battle lab Demonstrations will be conducted in the FY04 timeframe to examine: (1) deployability/mobility; and (2) survivability (Force-on-Force). A Limited Users' Test (LUT) will conduct Field Training Exercises and Live Fire Exercises. This will be a full-scale operational exercise to assess the effectiveness, suitability, and survivability of the LOSAT Weapon System, and to provide decision makers information as input to the LRIP decision. IOT&E is currently scheduled to be conducted in FY05, and will involve live firings and force-on-force exercises. Since the LOSAT is to provide a supplemental capability to an existing force, IOT&E must include a baseline comparison with the currently proposed light force anti-tank capability (e.g., ITAS TOW, Javelin). LOSAT's 'value added' and other KPPs must be demonstrated in representative terrains.

A combined vulnerability and lethality LFT&E strategy has also been developed and is included in the TEMP. The data for the survivability evaluation will be derived from a multi-phased test program that culminates in a full-up, system-level test that will subject all three vehicles of the LOSAT system (Fire Unit, Re-Supply Vehicle, and Trailer) to a variety of expected threats. Rather than conducting lethality testing dedicated solely to LFT&E, specific firings during planned Production Qualification Testing (PQT), LUT, and (if required) IOT&E missile flight tests have been identified. Relatively high-fidelity threat targets will be used to provide sufficient lethality data. Also, some lethality test data from prior testing has been assessed as being applicable to the current missile design.

TEST & EVALUATION ASSESSMENT

At this stage of the program's history, only limited operational assessments based on earlier developmental tests are possible. These tests included 27 prior missile launches to evaluate missile guidance and missile-tracking performance using the 2nd generation FLIR, as well as evaluations to measure lethality effectiveness. LOSAT demonstrated that it is capable of defeating any current or projected tank it hits. Furthermore, test results had revealed that launch effects from shock, g-load, flash, toxic gases, pressure, and sound (in and outside the vehicle) fall within the Army's acceptable ranges for human factors.

LOSAT has numerous operational performance questions to be addressed in future testing, either within the ACTD-Plus test program or in subsequent formal OT&Es. Some of the many issues to be resolved include:

- What are the LOSAT tactics, techniques, and procedures for light forces, and how do they interplay with TOW F&F?
- How will the LOSAT gunner identify friend-or-foe prior to an engagement?
- Can the LOSAT gunner auto-track multiple targets and engage sequentially?
- What are the impacts of countermeasure and thermal clutter effects on target acquisition, tracking, and command link?
- What are LOSAT's limitations in representative terrain where its range advantage may be nullified by line-of-sight restrictions?
- How effective are the training simulators/programs? Although there are no current plans for firing actual LOSAT missiles in a training environment, there will be live soldier firings during LUT and IOT&E as well as during PQT firings. The system must be man-rated sufficiently early in PQT to allow for soldiers to fire LOSAT during this phase.
- How survivable is the LOSAT crew on the modern battlefield?

From an LFT&E perspective, the kinetic energy missile is expected to be lethal given that it hits its intended targets. The missile firings against high-fidelity targets will be used to verify this expectation. The survivability of the system itself is more problematic. The Army has chosen to trade-off ballistic protection of the LOSAT vehicles and trailer for enhanced deployability as part of a light early entry force. As such, to ensure that the LOSAT system remains sling-loadable from a UH-60L helicopter, the system's armor protection levels were constrained. The LFT&E program will assess the degree to which the LOSAT system, including the missile, both HMMWV vehicles, and the loaded trailer is vulnerable to the expected threats.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

The LOSAT is being developed to support the light early entry forces at the same time that the TOW Fire & Forget is being developed for a similar mission. There is a need for each system to demonstrate its contributions to the effectiveness of light forces during their intended mission. As part of this effort, their functional dependencies and interrelationships need to be demonstrated. Additionally, high fidelity training equipment must be developed and tested prior to IOT&E to ensure that an adequate level of troop proficiency can be maintained in the absence of live missiles for training. Because of the size of the safety fan required during LOSAT launches, testing in some desired test conditions (e.g., representative terrain with limited LOS) may require non-tradition range locations.

By drawing lethality data from planned end-to-end missile firings against threat combat vehicle targets, the LOSAT LFT&E program continues the successful trend of other recent Live Fire programs.