

Future Combat Systems: Non-Line-of-Sight Launch System (FCS: NLOS-LS)

Executive Summary

- The Non-Line-of-Sight Launch System (NLOS-LS) participated in the Future Combat Systems (FCS) Preliminary Limited User Test (P-LUT) in July 2008 with the Army Evaluation Task Force. The P-LUT provided an early look at how NLOS-LS will support the redefined Infantry Brigade Combat Team Spin Out.
- The program is making progress, but is schedule-driven leading up to the NLOS-LS Flight Limited User Test (LUT) in 3QFY09. The current schedule has little time to analyze failures should they occur or develop fixes and apply them to the missiles.
- The NLOS-LS unitary warhead is meeting expected performance levels for fragmentation and armor penetration.

System

- The XM501 NLOS-LS is a core FCS program the Army will field to Infantry Brigade Combat Teams.
- The NLOS-LS consists of a Container Launch Unit (CLU) with self-contained electronics and software for remote and unmanned operations. The CLU can be fired from the ground or from a variety of vehicles.
- Each CLU contains a computer, communications system, and 15 Precision Attack Missiles (PAM).
- The PAM is a modular guided missile that receives target information prior to launch and can respond to target location updates during flight.
- PAMs are designed to defeat high-payoff light and heavy armored targets, either moving or stationary at ranges up to 40 km.
- The PAM supports four targeting modes:
 - Laser-designation: the PAM follows the laser beam from the forward observer to the target
 - Laser-anointed: the PAM is initially guided by the laser then uses its infrared seeker and algorithms to select the aimpoint to the target
 - Autonomous operation mode: the PAM finds targets autonomously using its infrared seeker and computer algorithms
 - GPS mode: the PAM flies to a specific aimpoint using GPS and inertial guidance



- In the Infantry Brigade Combat Team Spin Out, Soldiers communicate with the missile, through the CLU, using the Advanced Field Artillery Tactical Data System. When the full FCS network is complete, Soldiers will communicate directly with the missile from a variety of nodes.

Mission

The Infantry Brigade Combat Teams will use NLOS-LS sections, composed of six CLUs, transported on three Family of Medium Tactical Vehicles, and a Control Cell located within the NLOS-Cannon battalions, to provide a precision-guided munitions launch capability to attack moving and stationary point targets such as tanks, armored troop carriers, and artillery.

Prime Contractors

- Lockheed Martin
- Raytheon

Activity

- Soldiers from the Army Evaluation Task Force tested the NLOS-LS during the Spin Out Tactical Field Test (TFT) in March 2008 and the Force Developmental Test and Evaluation

(FDT&E) in May 2008. Tests were conducted at White Sands Missile Range, New Mexico, and Fort Bliss, Texas, respectively. CLU reliability and the tactics, techniques, and

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procedures for employing NLOS-LS were the focus of these tests.

- NLOS-LS participated in the P-LUT in July 2008 with the Army Evaluation Task Force. The P-LUT provided an early look at how NLOS-LS will support the redefined IBCT Spin Out.
- The program manager has conducted seven early developmental PAM flight tests at White Sand Missile Range, New Mexico, between April 2007 and July 2008. Four tests were successful, demonstrating the PAM's ability to launch, fly a pre-designated route, and impact near an intended aimpoint. The test missiles did not have warheads or seekers, and used only inertial navigation. The program manager intends to test tactical missiles with seekers in 1QFY09.
- During FY08, the program completed developmental and live fire qualification warhead testing against static and dynamic range targets, fragmentation arena tests, and armor penetration tests considering adverse environments using production-representative warheads.

Assessment

- The program is making progress, but is schedule-driven leading up to the NLOS-LS Flight LUT in 3QFY09.
- Early flight tests in 2007 experienced failures at launch and initial flight resulting in test delays. The recent successes indicate the program manager appears to have fixed the problems, but more complicated flight tests with sensors remain. The schedule-driven flight tests leave little chance for reliability growth should the program experience failures. Additional time may be needed if the upcoming tests reveal further problems.
- Six NLOS-LS CLUs participated in the TFT and FDT&E. The program did not meet CLU reliability requirements during

the TFT. The CLU's did meet reliability requirements during the FDT&E where there were fewer operating hours. The program manager is planning additional developmental testing for 2009.

- The NLOS-LS unitary warhead is meeting expected performance levels for fragmentation and armor penetration. The missile must target and hit precisely those areas that are vulnerable to the warhead in order to achieve expected lethality levels against heavy armor.
- The Army is involving Soldiers early in the design process for the NLOS-LS interface to develop systems that Soldiers can easily use in a combat environment.
- The change to an Infantry Brigade Combat Team Spin Out focus may change the employment tactics, techniques, and procedures and target set of NLOS-LS. The Army continues to evaluate these potential changes.

Recommendations

- Status of Previous Recommendations. The Army continues to address the two FY06 and FY07 recommendations.
- FY08 Recommendations. The Army should:
 1. Expand the Developmental Flight Test window to allow time to analyze failures, develop fixes, and apply them to the missiles should they occur.
 2. Increase countermeasure testing in the technical flight tests. Previous efforts to field projectiles with discriminating or smart warheads have been successful against benign targets, but have been less successful against targets that employ passive countermeasures.
 3. Reexamine the current target set for the NLOS-LS and consider soft-skinned targets (trucks, civilian, or military non-combat vehicles) as potential targets in the flight LUT.