

Spider Increment 1A M7E1 Network Command Munition

Executive Summary

- The Program Executive Officer approved Spider Increment 1A's entry into low-rate initial production in June 2017.
- Spider Increment 1A is not meeting the reliability requirement for the Remote Control Station (RCS) to operate a Spider munition field for a 72-hour mission with a 96 percent chance of not having an Essential Function Failure (EFF).
- Software version 1.8.3 is not mature. The program has no plans to change or update software version 1.8.3 prior to the IOT&E planned for 4QFY18.
- During the August 2017 Cooperative Vulnerability and Penetration Assessment (CVPA), the Army demonstrated that it had mitigated most of the cyber vulnerabilities reported in DOT&E's January 2017 Operational Assessment. Some vulnerabilities still exist. Analysis of the data continues.



System

- The Army uses Spider as a landmine alternative to satisfy the requirements outlined in the 2004 National Landmine Policy that directed the DOD to:
 - End use of persistent landmines after 2010
 - Incorporate self-destructing and self-deactivating technologies in alternatives to current persistent landmines
- A Spider munition field includes:
 - Up to 63 Munition Control Units (MCUs), each housing up to 6 miniature grenade launchers or munition adapter modules (the modules provide remote electrical firing capabilities)
 - An RCS consists of a Remote Control Unit (RCU) and RCU Transceiver (RCUT). An operator uses the RCS to maintain "man-in-the-loop" control of all munitions in a field. The RCU is the component upgraded in Spider Increment 1A.
 - A repeater or communications relay device for use in difficult terrain or at extended ranges
- Spider incorporates self-destructing and self-deactivating technologies to reduce residual risks to non-combatants and has the capability to use non-lethal munitions such as the Modular Crowd Control Munition that fires rubber sting balls.

- The Army fielded Spider Increment 1 systems in FY09 under an Urgent Materiel Release. The system reached Initial Operational Capability in FY11 and obtained its Full Materiel Release in FY13.

Mission

Brigade Combat Team commanders employ engineer units equipped with Spider to provide force protection and counter-mobility obstacles using lethal and non-lethal munitions. Spider functions as a stand-alone system or in combination with other obstacles to accomplish the following:

- Provide early warning
- Protect the force
- Delay and attrit enemy forces
- Shape the battlefield

Major Contractor

Command and Control hardware and software: Northrop Grumman Information Systems Sector, Defense Systems Division – Redondo Beach, California

Activity

- DOT&E published an Operational Assessment report in January 2017 based on results from the 2016 Spider Increment 1A Limited User Test (LUT).
- The Army approved a change in the Spider Increment 1A Capabilities Production Document in January 2017. The document establishes the requirement to send digital obstacle reports from Spider Increment 1A to the classified

- mission command system. The Army downgraded this Key Performance Parameter from a threshold to an objective requirement.
- The Army continued its contract with Northrop Grumman to refine Spider Increment 1A software during FY17. Northrop Grumman conducted a number of reliability tests to assess

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software changes designed to address reliability problems found in the 2016 LUT.

- The Army conducted a Formal Qualification Test in April 2017 and a Record Reliability Test in May 2017.
- DOT&E approved the Spider Increment 1A Milestone C Test and Evaluation Master Plan (TEMP) in June 2017. The Army conducted all 2017 testing in accordance with an approved TEMP.
- The Army conducted the System Verification Test in June 2017 to demonstrate Spider Increment 1A reliability. Portions of the test included soldiers per DOT&E request.
- The Program Executive Officer approved Spider Increment 1A to enter low-rate initial production in June 2017 and awarded the contract in October 2017.
- The Army conducted the CVPA to assess cyber vulnerabilities in August 2017.

Assessment

- The DOT&E operational assessment of the 2016 LUT found that a unit could use Spider Increment 1A as a component of protection and counter-mobility missions. Poor reliability slowed emplacement times and forced commanders to extend planning times during mission preparations. Spider Increment 1A did not meet its reliability requirement during the LUT using software release 1.3. DOT&E found that Spider was not survivable in cyber and electronic warfare contested environments.
- Spider Increment 1A is not meeting the reliability requirement for the RCS to operate a Spider munition field for a 72-hour mission with a 96 percent chance of not having an EFF.
 - An EFF causes the system to lose control of the munition field for more than 20 minutes.
 - Thirteen of 18 missions (72 percent) in the Formal Qualification Test, Record Reliability Test, and System Verification Test did not have an EFF.
 - Most test missions were less than 72 hours.
 - These tests used experienced civilian operators.
- Software version 1.8.3 is not mature. DOT&E attributed 37 of the 101 failures during testing to the RCU with version 1.8.3

software. At this time, the Army has no plans to change or update the Spider software version 1.8.3 prior to the IOT&E planned for 4QFY18.

- The CVPA found the updated software addressed many of the vulnerabilities identified in the DOT&E FY17 Operational Assessment. Some vulnerabilities still exist. Analysis of the results is ongoing.
- Spider Increment 1A is no longer required to send digital obstacle reports to the classified mission command system. At this time, there is no approved cross-domain solution allowing the unclassified Spider to pass digital information to the classified mission command system. This makes it more difficult for units to update the mission command system, which adversely affects the ability of units to know in real time where Spider fields are located on the battlefield.

Recommendations

- Status of Previous Recommendations. The Army addressed previous recommendations with the exception of the following:
 1. The Army has not resolved the problem between Spider Increment 1A and the mission command system preventing Spider Increment 1A from sending digital obstacle reports to the classified mission command systems. The Army has downgraded this Key Performance Parameter to an objective requirement.
 2. The Army developed a reliability growth program, but reliability problems to the RCU and RCUT caused critical failures during reliability testing. Additionally, MCU reliability problems seen at the 2016 LUT continue to occur. The Army does not plan to address reliability problems found during recent reliability testing until after the IOT&E.
- FY17 Recommendation.
 1. The Army should update the current Increment 1A software to address known reliability problems and demonstrate improved MCU reliability prior to the 4QFY18 IOT&E.