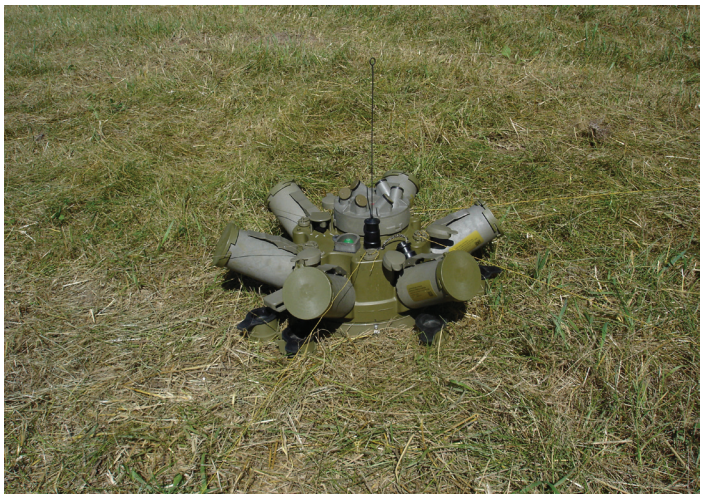
Spider XM7 Network Command Munition

Executive Summary
- Spider provides capabilities not available with previous anti-personnel land munition systems.
- Following the FOT&E conducted in March 2009, in accordance with DOT&E-approved test plans, the Army identified system shortcomings and took corrective actions to address the areas of employment concept, system complexity, and training shortfalls.
- The Army conducted a second "man-in-the-loop" FOT&E, in accordance with DOT&E-approved test plans, at Fort Leonard Wood, Missouri, in May 2010.
- DOT&E intends to publish its report on Spider XM7 early in calendar year 2011. Based on analysis conducted to date, Spider is operationally effective and lethal when operated with efficient operator-observer communications and clearly defined Rules of Engagement. Spider is not operationally suitable. The system remains difficult to sustain in an operational environment.
- The program will not achieve IOC with the fielding of 111 systems by the end of 2010 to support the 2004 National Landmine Policy that discontinues use of all persistent landmines by 2010. The Army plans to achieve IOC in April 2011.

System
- The Army intends Spider to be the landmine alternative to satisfy the anti-personnel munition requirements outlined in the 2004 National Landmine Policy, which directs DoD to:
  - End use of persistent landmines after 2010
  - Incorporate self-destructing and self-deactivating technologies in alternatives to current persistent landmines
- The Army intends to achieve an IOC with Spider in 2011.
- Spider no longer has the capability to engage targets autonomously. All engagements use "man-in-the-loop" control to engage targets.
- A Spider munition field includes:
  - Up to 63 Munition Control Units (MCU), each housing up to six miniature grenade launchers or munition adapter modules for remote electrical and non-electrical firing capabilities
  - A remote control station, used by the operator to maintain "man-in-the-loop" control of all munitions in a field
  - A communications relay device known as a "repeater" for use in difficult terrain or at extended ranges
- The Army intends to employ Spider in all environments and in all terrains.
- Spider incorporates self-destructing and self-deactivating technologies to reduce residual risks to non-combatants.



Mission

Maneuver or engineer units employ Spider as a contributor to a force protection obstacle or as a standalone force protection system to accomplish the following missions:
- Protect the Force
- Shape the Battlefield
- Provide Early Warning
- Delay and Attrite Enemy Forces

Major Contractors
- Command and Control hardware and software: Textron Defense Systems – Wilmington, Massachusetts
- Munition Control Unit and Miniature Grenade Launcher: Alliant-Techsystems Advanced Weapons Division – Plymouth, Minnesota

Activity
- Following the FOT&E conducted in March 2009, the Army took corrective actions to address the shortfalls in employment concept, system complexity, and training.
- DOT&E approved an updated Test and Evaluation Master Plan in April 2010. The update addressed integration of the Spider Standoff Capabilities Enhancement program initiated in FY08 to mitigate the loss of the autonomous operations mode, and follow-on testing to demonstrate corrective actions in an operationally realistic environment.

- The Army conducted a second "man-in-the-loop" FOT&E at Fort Leonard Wood, Missouri, in May 2010.
- The Army approved a funding plan in July 2010 to provide interim training support at Home Station, Combat Training Centers, and in theater for Spider training. The training plan goal is to prepare Soldiers scheduled for overseas deployment to employ Spider systems in combat by addressing system complexities from individual, collective, and combined arms perspectives.

Assessment

- DOT&E intends to publish its report on Spider XM7 early in calendar year 2011. The following assessment is based on analysis conducted to date.
- Spider provides enhanced capabilities not previously available with anti-personnel land munition systems:
  - "Man-in-the-Loop" positive control of both lethal and non-lethal munitions
  - Remote electrical and non-electrical firing capabilities for munitions and demolitions to a range of four kilometers
  - Capability to fire a single munition or multiple munitions at the same time
  - Capability to collect situational awareness information through tripline activation by threat personnel
- Spider is operationally effective and lethal.
  - Soldiers emplaced on time, maintained, and achieved lethal effects in 15 of 16 Spider munition field missions during the May 2010 FOT&E.
  - The level of Spider effectiveness is dependent on the efficiency of operator-observer communications, clearly defined Rules of Engagement, and training.
  - Changes in employment concepts and increased focus on non-Spider specific tasks such as establishing an observation post and maintaining tactical communications will enable units to effectively employ Spider as part of a protective obstacle.
  - Spider is lethal. The demonstrated effects of the Spider munitions in the May 2010 FOT&E against simulated threat personnel achieved Army lethality requirements.
- Spider is not operationally suitable. The system continues to be difficult to sustain in an operational environment:
  - The Army requires individual Spider MCUs to be reused up to seven times before repair. In the May 2010 FOT&E, only nine of 30 MCUs met this reuse requirement.
  - Spider MCUs will sterilize and no longer function when subjected to tampering. During the May 2010 FOT&E, 22 of 43 new MCUs were sterilized due to non-tampering actions caused by software and safety feature complexity.
  - The Army's maintenance and logistical systems require more assets to support Spider fielding due to high sterilizations and unmet reuse requirements.
- The Spider system requires three different types of rechargeable and non-rechargeable batteries when commercial or vehicle power is not available. Battery management increases a unit's logistical burden. During a 60-hour operation, a platoon size unit employing a 20 MCU Spider munition field with a repeater may use up to 86 non-rechargeable batteries, costing $2,400.
- Spider skills are perishable and require periodic sustainment training, thus increasing a unit's training burden.
- The program will not achieve IOC with the fielding of 111 systems by the end of 2010 to support the 2004 National Landmine Policy that discontinues use of all persistent landmines by 2010. The Army plans to achieve IOC in April 2011.

Recommendations

- Status of Previous Recommendations. The Army satisfactorily addressed all previous recommendations.
- FY10 Recommendations. The Army should:
  1. Develop, implement, and verify through testing, a plan to address MCU sterilization and reliability.
  2. Improve Spider reuse capability inclusive of Soldier actions in operating the system. Consider software changes that eliminate the possibility of sterilizations during unit emplacement and recovery operations.
  3. Continue to improve the suitability of Spider by reducing system complexity in the hands of Soldiers. Provide a more thorough and efficient sustainment training program.
  4. Review the Spider design with a goal of reducing the need for three different types of batteries.