

Abrams M1A2 System Enhancement Program (SEP) Main Battle Tank (MBT)

Executive Summary

- In December 2015, the Army conducted a live fire user test event with the Common Remotely Operated Weapon System – Low Profile (CROWS-LP). CROWS-LP demonstrated no degradation to performance over the CROWS II in powered mode. Crews were also able to engage targets effectively in manual mode, an improvement to CROWS II where the height of the weapon hindered accuracy.
- In June 2016, the Army conducted a User Beta Test for Version 4.6 of the Abrams software. There were unexplained accuracy problems with the M829A4 service rounds during the test. The Program Office initiated the investigation of vehicle software, ammunition type, and gun tube wear as potential causes.
- DOT&E approved the Operational Test Agency test plan for the LFT&E of the M1A2 System Enhancement Program Version 3 (SEPV3) Engineering Change Proposal (ECP) la Turret Half-Bustle Ammunition Vulnerability Test Phase I in June 2016. The test is scheduled to start January 2017.
- The Army continued developmental and verification testing to characterize the performance of the M1A2 SEPV3 Next Evolutionary Armor (NEA) against multiple, operationally realistic threats. DOT&E is working with the Army to utilize data from ongoing test phases to support its final assessment of M1A2 SEPV3 survivability against existing and emerging threats in FY20.

System

- The M1A2 SEP Version 2 (v2) and M1A2 SEP Version 3 (v3) are tracked, land combat, assault weapon systems designed to possess significant survivability, shoot-on-the-move firepower, joint interoperability (for the exchange of tactical and support information), and a high degree of maneuverability and tactical agility. The Army intends the M1A2 SEPV2 and M1A2 SEPV3 to enable the crew to engage the full spectrum of enemy ground targets with a variety of point- and area-fire weapons in urban and open terrain.
- The M1A2 SEPV2 is currently fielded. It upgrades the M1A2 SEP by providing increased memory and processor speeds, full color tactical display, digital map capability, compatibility with the Army Technical Architecture, improved target detection, recognition, and identification through incorporation of second generation Forward Looking Infrared technology and electronics and crew compartment cooling through the addition of a thermal management system.
- The Abrams M1A2 SEPV3 fielding is planned for FY20. The M1A2 SEPV3 is an upgrade to the M1A2 SEPV2. The upgrades include the following:

Common Remotely Operated Weapon Station-Low Profile (CROWS-LP)



M1A2 SEP

- Power generation and distribution to support power demands of future technologies.
- Network compatibility.
- Survivability against multiple threats by incorporating NEA, a new underbody IED kit, and other vulnerability reduction measures to reduce the tank's vulnerability to IEDs. These measures include redesigned crew seating, additional floor stiffeners, hardware to provide lower limb protection, and changes in the material and dimensions of internal structural supports.
- Lethality by providing the ability for the fire control system to digitally communicate with the new large caliber ammunition through use of an Ammo Data Link.
- Energy efficiency (sustainment) due to the incorporation of an auxiliary power unit.
- The M153A1E1 CROWS-LP is an ECP integration onto the M1A2 SEPV2. The system addresses visibility concerns associated with the existing M153 CROWS II by relocating the sights and laser range finder to the side of the weapon and ammunition box rather than under the weapon, reducing the system height by 10 inches. The ECP includes upgraded software.
- The M1A2 SEP MBT utilizes 120 mm main gun rounds to defeat enemy targets.
 - The XM1147 Advanced Multipurpose (AMP) Round, which is currently in development, is a 120 mm

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munition fired utilizing an ammunition datalink-equipped Abrams MBT. The round is optimized for use in urban environments in direct support of assaulting infantry.

The Army intends the round to have three defeat modes including Point Detonate (PD), Point Detonate Delay (PDD), and airburst. It will be used to defeat a combination of targets including anti-tank guided missile teams, dismounted infantry, double reinforced concrete wall, light armor, bunkers, obstacles, and armor.

- The M829A4, which was fielded in 2014, is an Armor-Piercing, Fin-Stabilized, Discarding Sabot, 120 mm line-of-sight kinetic energy cartridge. It is the materiel solution for the Abrams' lethality capability gap against threat vehicles equipped with third-generation explosive reactive armor.

Mission

- Units equipped with the M1A2 SEP MBT enable Army combined arms teams to close with and destroy the enemy by fire and maneuver across the full range of military operations.
- The Army intends the M1A2 SEP MBT to defeat and/or suppress enemy tanks, reconnaissance vehicles, infantry fighting vehicles, armored personnel carriers, anti-tank guns, guided missile launchers (ground and vehicle mounted), bunkers, dismounted infantry, and helicopters.

Major Contractor

General Dynamics Land Systems – Sterling Heights, Michigan

Activity

- All testing was conducted in accordance with a DOT&E-approved test plan.
- In December 2015, the Army conducted a live fire user test event with the CROWS-LP. Four tank commanders fired 80 different scenarios and approximately 18,000 rounds during the event at Aberdeen Proving Ground, Maryland.
- In June 2016, the Army conducted a User Beta Test for Version 4.6 of the Abrams software. This software version provides full functionality for the CROWS-LP, the Ammunition Data Link required to support the M829A4 kinetic energy round, and integration for the Joint Chemical Agent Detector.
- In June 2016, DOT&E approved the Operational Test Agency test plan for the LFT&E of the M1A2 SEPv3 ECP 1a Turret Half-Bustle Ammunition Vulnerability Test Phase I.
- In FY16, the Army continued testing to characterize M1A2 SEPv3 armor performance against multiple threat types under the auspices of NEA, a separate materiel development verification and production effort. DOT&E is following the NEA development and verification program to leverage all relevant data to support the M1A2 SEPv3 survivability assessment. The Army plans to continue testing to characterize NEA and explosive reactive armor performance, vulnerabilities associated with stowed ammunition, and underbody IED protection in FY17.

Assessment

- During the live fire test event, CROWS-LP demonstrated no degradation to performance over the CROWS II in powered mode. Crews were also able to engage targets effectively in

manual mode, an improvement to CROWS II where the height of the weapon hindered accuracy.

- There were unexplained accuracy problems with the M829A4 service rounds during the User Beta Test for Version 4.6 of the Abrams software. Crews reported an increase in firing system faults compared to home station vehicles operating on the current software version. The Army is currently conducting a test-based, root cause analysis of the accuracy issue. DOT&E is overseeing these diagnostic tests and analyses and will amend the DOT&E M829A4 report if the test series reveals deviations in originally reported ammunition effectiveness/lethality.
- DOT&E continues to assess data resulting from the Army's ongoing efforts to characterize the protection provided by NEA against expected, operationally-realistic threats. DOT&E will leverage all relevant vulnerability test data from the armor characterization and underbody IED test phases and evaluate all modeling and simulation tools available to support an FY20 final assessment of the tank's survivability to current and expected threats.

Recommendations

- Status of Previous Recommendations. There are no previous recommendations.
- FY16 Recommendations. None.