

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

Executive Summary

- In January 2017, the Army continued root cause analysis of Abrams M1A2 System Enhancement Program (SEP) main gun accuracy problems noted during the Software 4.6 user Beta Test in June 2016. The Army has excluded crew error and software as possible factors leading to inaccuracy and will focus future efforts on gun tube wear.
- The Army initiated testing in February 2017 to determine how round count and tube wear affect main gun accuracy. Testing was completed in October 2017. The Army will provide updated gun tube condemnation criteria to fielded units, which includes new equivalent full charge counts for service ammunition and revised tube inspection criteria.
- As of October 2017, the M1A2 SEPv3 has completed 80 percent of planned reliability testing. The system is exceeding the operational requirement for combat mission failures, but is below the requirement for system failures. Current M1A2 SEPv3 reliability exceeds that demonstrated by the M1A2 SEPv2.
- The Army conducted ballistic testing of the Abrams Reactive Armor Tiles (ARAT) I and II in FY17. The Army continued to characterize the performance of the M1A2 SEPv3 Next Evolutionary Armor (NEA) and is scheduled to begin full-up system-level (FUSL) live fire testing for the M1A2 SEPv3 in 2QFY18.

System

- The Abrams M1A2 Main Battle Tank (MBT) is a tracked, land combat, assault weapon system 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 SEP 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 Army integrated M153A1E1 Common Remotely Operated Weapon Station (CROWS)-Low Profile (LP) into the M1A2 SEPv2. The CROWS-LP incorporates upgraded software and addresses visibility concerns associated with the M153 CROWS II by relocating the sights and laser range

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



M1A2 SEP

- finder to the side of the weapon and ammunition box rather than under the weapon. This reduces the system height by 10 inches.
- M1A2 SEPv3 fielding is planned for FY20. The M1A2 SEPv3 is an upgrade to the M1A2 SEPv2. The upgrades include the following:
 - Power generation and distribution to support the 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 ammunition datalink.
 - Energy efficiency (sustainment) due to the incorporation of an auxiliary power unit.
- The M1A2 SEP MBT utilizes 120 mm main gun rounds to defeat enemy targets.
 - The XM1147 Advanced Multi-purpose (AMP) Round, currently in development, is a 120 mm munition fired utilizing an ammunition datalink-equipped Abrams MBT.

FY17 ARMY PROGRAMS

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 in order to defeat a combination of targets including anti-tank guided missile teams, dismounted infantry, double reinforced concrete walls, light armor, bunkers, obstacles, and armor.

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

Mission

- Commanders employ units equipped with the M1A2 SEP MBT 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

- The Army conducted all testing in accordance with a DOT&E-approved test plan.
- In January 2017, the Army continued root cause analysis of the main gun accuracy problems noted in June 2016 when Abrams crews fired service M829A4 kinetic energy (KE) ammunition during the Software 4.6 user Beta Test.
- The Army initiated testing in February 2017 to determine how round count and tube wear affect main gun accuracy.
- The Army conducted ballistic testing of the ARAT I and II in FY17. The ARAT I and II characterization included 54 total shots along with behind-armor debris testing. DOT&E analysis is ongoing.
- The Army continued developmental and verification testing to characterize the performance of the M1A2 SEPv3 NEA against multiple operationally realistic threats. DOT&E is working with the Army to utilize data from ongoing test phases to support its FY20 final assessment of M1A2 SEPv3 survivability against existing and emerging threats.
- FUSL live fire testing for the M1A2 SEPv3 is scheduled to begin in 2QFY18.

Assessment

- The Army excluded crew error and software as sources of the failure during its root cause analysis. The Army narrowed further testing to focus on how gun tube wear affects main gun accuracy. The Army identified that similar inaccuracy phenomena occurred during testing of the M829A3 KE round.

- After isolating the inaccuracy variables to gun tube wear, the Army acquired field-representative tubes for use during testing. Testing was completed in October 2017. The Army will provide updated gun tube condemnation criteria to fielded units, which includes new equivalent full charge counts for service ammunition and revised tube inspection criteria.
- As of October 2017, the M1A2 SEPv3 has completed 80 percent of planned reliability testing. The system is exceeding the operational requirement for combat mission failures, but is below the requirement for system failures. Current M1A2 SEPv3 reliability exceeds that demonstrated by the M1A2 SEPv2.
- 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.
- FY17 Recommendations. None.