

Armored Multi-Purpose Vehicle (AMPV)

Executive Summary

- The Armored Multi-Purpose Vehicle (AMPV) program conducted a Limited User Test (LUT) in September 2018. Preliminary analysis indicates the AMPV meets or exceeds its goal of replacing the M113 Armored Brigade Combat Team (ABCT) Family of Vehicles (FoV) with a more capable platform.
- In FY17, the Army completed component (armor) live fire testing, and in FY18, the Army completed ballistic hull live fire testing of the AMPV General Purpose (GP) and Mortar Carrier (MC) variants to assess survivability and force protection specification requirements.
- Preliminary assessment identified minor vehicle design vulnerabilities that the program would have to mitigate to meet the survivability and force protection requirements.
- In FY18, the AMPV program started system-level live fire testing on GP and MC prototype vehicles. Testing will continue for all AMPV variants to assess survivability and force protection against underbody mines, and direct and indirect threats in support of the program of record Milestone C decision scheduled for 1QFY19, and the FY20 European Deterrence Initiative (EDI) fielding decision.



**Mission Command
(Mcmd)**



**Mortar Carrier
(MC)**



**General Purpose
(GP)**



**Medical Evacuation
(ME)**



**Medical
Treatment (MT)**

System

- The AMPV will replace the ABCT M113 FoV program that the Army terminated in 2007. The AMPV is required to operate alongside the M1 Abrams Main Battle Tank and the M2 Bradley Infantry Fighting Vehicle.
- The Army intends for the AMPV variants to address the M113 shortcomings in survivability and force protection; size, weight, power, and cooling; and the ability to incorporate future technologies such as the Army Network.
- The Army is carrying over the Mission Equipment Packages from the existing M113 FoV into the AMPV variants.
- The AMPV has five variants:

- GP vehicle from which the unit First Sergeant will conduct combat resupply escort, emergency resupply, and casualty evacuation; and provides security for medical evacuation.
- Mission Command (Mcmd) vehicle intended to integrate the communications equipment in accordance with the Network Systems Architecture.
- Medical Treatment (MT) vehicle to provide an armored and mobile protected environment for the unit surgeon and medical staff to provide immediate medical care of casualties or life stabilization triage for casualties prior to their evacuation to more capable facilities.
- Medical Evacuation (ME) (Ambulance) vehicle supports the ABCT integration of medical support providing

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protected ambulance evacuation and immediate medical care to the mechanized and armored cavalry units.

- MC vehicle provides immediate, responsive, heavy mortar fire support to the ABCT in the conduct of fast-paced offensive operations by utilizing the M121 Mortar System and the M95 Mortar Fire Control System.

Mission

Commanders employ units equipped with the AMPV to provide a more survivable and highly mobile platform to accomplish

required operational support missions across the range of military operations. ABCT units use AMPVs to conduct logistical resupply; casualty evacuation and treatment; command post operations; and heavy mortar fire support.

Major Contractor

BAE Systems – York, Pennsylvania

Activity

- The Army approved an Operational Needs Statement in FY17 directing the program manager to begin fielding two brigade sets of AMPV no later than December 2020.
- USD(AT&L) approved the EDI Acceleration acquisition strategy and funding in January 2016. Two hundred and fifty-eight vehicles are to be procured and fielded beginning in FY20.
- DOT&E approved the test plan and the Cooperative Vulnerability and Penetration Assessment (CVPA) in March 2018.
- The Army moved the Milestone C decision from 2QFY19 to 1QFY19 in order to align with the EDI production decision.
- The vendor experienced production challenges that delayed the delivery of vehicles to the Army Test and Evaluation Command (ATEC), which delayed the start of the Production Prove-Out Test (PPT) by 60 days. The first AMPV vehicle was delivered and started testing in June 2017; ATEC began PPT in September 2017 on all five variants.
- The Army conducted a LUT from September 6 – 24, 2018, at Fort Hood, Texas, in accordance with the DOT&E-approved test plan. The test unit was the 4-9 Cavalry Squadron out of the second Brigade First Cavalry Division. The opposing force was the 1-5 Mechanized Infantry Battalion out of the second Brigade First Cavalry Division.
- The Army completed armor coupon testing in November 2017 to evaluate armor performance and to assess any secondary damage effects of the armor debris.
- In June 2018, the Army completed ballistic hull testing of the AMPV GP and MC variants to evaluate vehicle survivability against underbody mines and direct and indirect threats.
- In September 2018, the Army started system-level live fire tests on prototype AMPV vehicles configured with operational systems and equipment to evaluate system and crew vulnerability to direct fire kinetic energy munitions, shape charged jet threats, artillery, explosively formed penetrators, and side and underbody mines.
- AMPV full-up system-level (FUSL) live fire test planning is ongoing. FUSL testing is scheduled to start in FY20 and is intended to support a survivability and crew casualty assessment of the production-representative AMPV variants against expected operational threats. DOT&E is working with the live fire integrated product team to incorporate the latest

underbody LFT&E methods to increase test repeatability and crew surrogate biofidelity.

- The Army conducted Cooperative Vulnerability Identification (CVI) in FY16 and a CVI Verification of Fixes in FY17.
- The Army conducted a CVPA in April 2018 and an Adversarial Assessment in conjunction with the LUT at Fort Hood in September 2018.
- The program manager has updated the Milestone C Test and Evaluation Master Plan; it is currently being staffed through the Army.

Assessment

- During PPT testing, several deficiencies reduced the Mean Miles Between System Aborts (MMBSA).
 - The demonstrated MMBSA of 445 was below the expected entrance criteria of 850 MMBSA.
 - Several unintended Automatic Fire Extinguishing System (AFES) engine discharges occurred. Following each AFES discharge, the Program Office thoroughly investigated the vehicle to rule out a possible thermal incident.
 - There were several instances of the elevating support of the mortar carrier bipod becoming unlatched after firing, allowing the mortar to lift and/or fall.
- The vendor conducted corrective actions during PPT and reliability, availability, and maintainability testing to address the critical deficiencies identified prior to the LUT.
- Preliminary observations of the LUT indicate the AMPV meets or exceeds its goal of replacing the M113 FoV with a more capable platform.
 - The AMPV demonstrated superior power and mobility than the M113 FoV.
 - The AMPV was able to maintain its position in the formation.
 - The AMPV operational mission availability and reliability were far superior to the M113 FoV.
 - The AMPV demonstrated a point estimate of 665 MMBSA.
 - The platform provides potential for growth for power demand.
 - Having common parts amongst all the variants should improve overall availability.
 - The MCcmd variant facilitates digital mission command.

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- The MT and ME variants provide improved patient care and treatment capability with a new capability of conducting treatment on the move.
- The following deficiencies, if uncorrected, could adversely affect IOT&E:
 - The driver's and vehicle commander's displays would frequently lock up and the reboots each took 10 minutes.
 - Due to the physical size and location, the commander's weapons station degraded situational awareness of the vehicle commander.
 - The Joint Battle Command – Platform and radios in the MCcmd vehicle cannot be removed from their docking stations within the vehicle. This limits the ability of the command group to share a common operational picture when operating as a Tactical Operations Center.
 - The capability to support analog operations is degraded without the stowage for mapboards and plotting boards.
 - The ME vehicle seat stowage and litter lift are difficult to use. The program manager has identified a design change to correct this deficiency.
 - The MC ammunition storage is not optimized to support the mortar system.
 - There is water leakage from the hatch and the roof leaks affecting the electronics in all variants and patient care in the medical variants.

- Preliminary survivability assessment identified minor vehicle design vulnerabilities that the Program Office is addressing with the vendor in order to meet survivability and force protection requirements.
- Preliminary analysis of armor coupon testing demonstrated expected armor protection capabilities.
- DOT&E will summarize AMPV survivability findings in a classified LFT&E report to support the Full-Rate Production decision.
- The Adversarial Assessment built upon vulnerabilities identified during the CVPA and attempted to exploit those vulnerabilities using insider and near-sider attacks. The Army was not able to conduct outsider attacks during the LUT.

Recommendations

The Army should:

1. Mitigate the vulnerabilities identified in sub-system level testing to meet the survivability and force protection requirements.
2. Ensure AMPV FUSL testing is executed in accordance with the latest LFT&E guidance to include those related to employing buried underbody blast threats.
3. Correct critical deficiencies identified during the LUT prior to fielding the AMPV in support of EDI.

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