

Amphibious Combat Vehicle (ACV) Family of Vehicles

Executive Summary

- From November 2018 to March 2019, the Program Manager, Advanced Amphibious Assault (PM AAA) and the Marine Corps Operational Test and Evaluation Activity (MCOTEA) conducted cold weather developmental and operational testing at the Cold Regions Test Center (CRTC) at Fort Greeley, Alaska, and cold weather amphibious developmental testing at Coast Guard Station Cape May, New Jersey.
- The infantry rifle squad equipped with the Amphibious Combat Vehicle (ACV) was able to complete assigned missions while carrying additional cold weather clothing and equipment. Vision blocks and Remote Weapons System (RWS) optics were prone to icing and/or fogging, and could lead to performance or reliability problems. During amphibious operations, the exposed ammunition in the RWS was also subject to sea spray and potential ice buildup.
- ACV reliability is below the expected reliability growth estimate. Based on Reliability Growth Testing during the Engineering and Manufacturing Development (EMD) phase, ACV demonstrated reliability was 27 percent of its planned growth estimate. The program intends to implement several engineering change proposals into the low rate initial production to improve reliability.
- During FY19, the Aberdeen Test Center began the ACV full-up system-level (FUSL) live fire test series. The test series includes 26 events using 4 low-rate initial production (LRIP) and 3 EMD ACVs to support the survivability evaluation of the ACV and its crew in projected combat scenarios. ACV live fire testing will be complete in May 2020.

System

- The Marine Corps intends to field a vehicle capable of providing expeditionary protected mobility and general support lift to the Marine Infantry Battalion as part of a Ground Combat Element-based maneuver task force. The ACV is a family of vehicles that includes a personnel variant, command and control variant, recovery variant, and 30-mm gun variant. The ACV Program Office is focusing current procurement efforts on the personnel variant.
- The ACV is a modern generation, eight-wheeled, armored personnel carrier with a combat-loaded gross vehicle weight of 70,000 pounds. The primary weapon on the ACV is a single mount RWS equipped with an Mk-19 automatic grenade launcher or M2 heavy machine gun.
- The Marine Corps intends the ACV to operate with Marine Air Ground Task Force maneuver formations, and achieve up to 6 knots while operating at sea. The ACV will carry a crew of 3 operators and 13 embarked infantry marines with 2 days of supplies and combat essential equipment.



- The Marines desire the ACV to provide effective land and tactical water mobility (ship-to-shore and shore-to-shore), precise supporting fires, and high levels of force protection. This protection is intended to provide survivability against blasts, fragmentation, and kinetic energy threats while supporting combat-loaded marines as they close with and destroy the enemy, respond to crises, and conduct stability operations.
- The planned acquisition objective of 1,122 ACVs will replace the legacy Amphibious Assault Vehicles (AAVs) fielded to the Assault Amphibian battalion within the Marine Division.

Mission

- Commanders will employ ACV-equipped units to land the surface assault elements of the landing force in order to seize inland objectives and conduct mechanized operations in subsequent actions ashore.
- Assault Amphibian Battalions equipped with the ACV will provide task organized units to transport personnel, equipment, and supplies ashore from amphibious shipping; execute ship-to-shore and riverine operations; support breaching of barriers and obstacles; and provide embarked infantry with armor protected firepower, extended communications capabilities, and mobility on land and sea.

FY19 NAVY PROGRAMS

- ACV-equipped units will provide protected mobility to embarked infantry and deliver precision support-by-fire effects in support of dismounted infantry maneuver. ACV-equipped units will operate with M1 series main battle tanks and conduct mounted security operations in urban or restrictive

terrain alongside other wheeled vehicles within the Marine Air Ground Task Force or Marine Division.

Major Contractor

BAE Systems – York, Pennsylvania

Activity

- In June 2018, the Marine Corps awarded the ACV Family of Vehicles LRIP contract to BAE Systems. The performance of the ACV1.1 program during its developmental testing and operational assessment led to the consolidation of the ACV 1.1 and ACV1.2 programs in January 2019.
- OSD approved the ACV Milestone C Test and Evaluation Master Plan update in February 2019 for the production and deployment phase of the program.
- The PM AAA and MCOTEA conducted cold weather developmental/operational testing at the CRTCC in Fort Greeley, Alaska, in accordance with the DOT&E-approved test plan. The test consisted of a Marine Rifle Squad embarked on an ACV conducting operationally representative missions based on the system's Operational Mode Summary/Mission Profile.
- PM AAA conducted, and MCOTEA observed, cold weather amphibious developmental testing in February 2019 at the U.S. Coast Guard Training Center in Cape May, New Jersey, to characterize the ACV mobility in extreme cold water temperature.
- The program conducted Reliability Growth Testing at CRTCC in January and February 2019 using two EMD prototypes.
- In December 2018, the Marine Corps began the execution of the ACV FUSL live fire test series at the Army's Aberdeen Test Center in Maryland. The test series includes 26 events using 4 LRIP and 3 EMD ACVs to support the evaluation of the survivability of the ACV and its crew in projected combat scenarios. As of November 2019, the Aberdeen Test Center has completed 11 test events in accordance with DOT&E-approved test plans. The FUSL test series is on track to conclude in May 2020.
- PM AAA will conduct a Cooperative Vulnerability Identification (CVI) and MCOTEA will conduct a Cooperative Vulnerability and Penetration Assessment (CVPA) in 2QFY20, followed by an Adversarial Assessment planned for 4QFY20 in conjunction with IOT&E.

Assessment

- The infantry rifle squad equipped with the ACV was able to complete assigned missions while carrying additional cold

weather clothing and equipment. Optimized load planning will be required to ensure equipment does not hinder ingress and egress, and mission essential items will fit inside the vehicle during cold weather ship-to-shore operations. For extended cold weather operations, a unit equipped with the ACV may require more frequent sustainment due to limited interior and storage space.

- The ACV crew employed the RWS during developmental testing at CRTCC and Cape May. Vision blocks and RWS optics were prone to icing on land and fogging on water, affecting gunner visibility and could lead to performance or reliability problems if water freezes on the RWS sights and cameras.
- During land operations in restricted terrain, ACV crews operated with hatches open making them susceptible to extreme cold.
- ACV reliability is below the expected reliability growth estimate. Based on Reliability Growth Testing, ACV demonstrated reliability was 27 percent of its planned growth estimate. The program intends to implement several engineering change proposals throughout the EMD phase to improve reliability. The suspension and steering subsystems remain the primary drivers of reduced reliability.
- The survivability evaluation of the production-representative ACV against representative threat scenarios is ongoing. DOT&E will report on the final ACV survivability assessment after completion of the LFT&E program expected in June 2020. This will support the Full-Rate Production decision expected in 3QFY20.

Recommendations

The Marine Corps and the PM AAA should:

1. Improve ACV reliability by implementing corrective actions on LRIP vehicles to reduce the failure rate and maintenance demand.
2. Resolve vision block and RWS sight freezing and fogging issues in extreme cold weather environments.
3. Investigate the development of a cold weather special mission kit to keep Marine crews warm when operating with hatches open in extreme cold.