Javelin Antitank Missile System – Medium

The Javelin system is undergoing two independent, but complementary upgrades, referred to as the G-model missile and Light Weight Command Launch Unit (LW CLU). The Army Test and Evaluation Command (ATEC) conducted a Limited User Test (LUT) on the LW CLU in March 2023 and an FOT&E in August 2023. While analysis is ongoing and DOT&E expects to release a report in 2QFY24, early results from the LUT and FOT&E indicate that the LW CLU achieved its performance requirements and soldiers equipped with the LW CLU performed as well as, or better than, soldiers equipped with the current Block 1 CLU when engaging targets. The LW CLU did not meet its reliability requirement during FOT&E due to a new failure that resulted in multiple system aborts. The G-model missile experienced developmental delays due to a flight test failure in FY22 and will restart government-led flight and lethality testing in FY24.

SYSTEM DESCRIPTION

The Javelin Antitank Missile System – Medium is a man-portable, shoulder-launched, fire-and-forget weapon system used to defeat threat armored vehicles out to 2,500 meters. The Javelin system consists of a missile in a disposable launch tube assembly (LTA) and a reusable CLU. The CLU mechanically engages the LTA for shoulder firing, has day and night sights for surveillance and target acquisition, and electronically interfaces with the missile for target lock-on and missile launch.

The Javelin system is undergoing two independent, but complementary upgrades intended to control unit cost, reduce size and weight, and address component obsolescence while meeting or exceeding the current F-model missile and Block 1 CLU performance. These system improvements are referred to as the G-model missile and LW CLU. The G-model missile effort is developing a new LTA, electronic battery unit, guidance electronics unit, and missile seeker. Production missiles will be designated FGM-148G. The LW CLU effort incorporates modern daylight and infrared camera technology in a smaller and lighter form factor. The LW CLU will be backward compatible with prior missile models and the G-model missile will be backward compatible with the current Block 1 CLU.

The Army is developing a new Basic Skills Trainer (BST) and the Javelin Outdoor Trainer (JOT) to be compatible with the upgraded Javelin system as well as the Block 1 CLU.

MISSION

Commanders use Army and Marine Corps ground maneuver units equipped with the Javelin to destroy, capture, or repel enemy assault through maneuver and firepower. Soldiers and marines use the Javelin to destroy threat armor targets and light-skinned vehicles, and to incapacitate or kill threat personnel within fortified positions or in the open.

PROGRAM

Javelin is an Acquisition Category IC program. The Army is upgrading the Javelin weapon system and associated training equipment through multiple engineering change proposals occurring in separate LW CLU and G-model missile development efforts.

Results from the Javelin LW CLU FOT&E will inform the LW CLU full-rate production (FRP) decision planned in 2QFY24. The G-model missile will continue development and testing over the next four years and begin production upon the completion of a successful government-led qualification flight test series. DOT&E approved an updated Test and Evaluation Master Plan (TEMP) for the Javelin program in April 2020 and a LW CLU-specific TEMP addendum in February 2023.

» MAJOR CONTRACTORS

- Raytheon, a subsidiary of RTX (formerly Raytheon Technologies) – Tucson, Arizona
- Lockheed Martin Corporation – Orlando, Florida

TEST ADEQUACY

In FY23, ATEC conducted two operational tests of the Javelin system comparing the LW CLU against the Block 1 CLU, both paired with current inventory missiles. A LUT was conducted at the Cold Regions Test Center, Fort Greely, Alaska in March 2023 and an FOT&E at Yuma Proving Ground, Arizona in August 2023. Both tests were observed by DOT&E and conducted in accordance with the DOT&E-approved TEMP and respective test plans. Together, these tests were adequate to determine the operational effectiveness and suitability of the Javelin LW CLU as well as the system performance in the arctic and desert environments. Analysis of the results are ongoing. DOT&E will publish a classified FOT&E report in 2QFY24 supporting the FRP decision later that quarter.

The G-model missile was not included in the LUT or FOT&E. The Javelin TEMP is being updated to reflect the new G-model development timeline. The updated TEMP should also include a T&E concept for combined LW CLU and G-model missile testing as well as demonstrating the maximum effective range of the upgraded

Javelin as was recommended in the 2022 DOT&E Annual Report.

The LW CLU cyber survivability adversarial assessment (AA), planned for August 2023, was delayed to coincide with a logistics demonstration to better evaluate supply chain risks. An adversarial cybersecurity developmental test (ACDT) was completed in August 2023 to ensure any cyber survivability findings would be corrected in the planned LW CLU software update 4.1. Previous testing included a cooperative vulnerability and penetration assessment (CVPA) of Javelin in FY22. Future cyber survivability testing includes a Javelin AA in 3QFY24, and JOT ACDT in late FY24.

PERFORMANCE

» EFFECTIVENESS

Early results indicate soldiers equipped with the LW CLU performed as well or better than soldiers equipped with the Block 1 CLU at engaging targets day or night, and across the arctic, temperate, and hot desert climates. Infantry units equipped with the LW CLU were operationally effective at conducting their tactical missions. DOT&E will publish an FOT&E report on the system's operational effectiveness in 2QFY24.

» LETHALITY

The G-model missile experienced developmental delays due to a flight test failure in FY22. The program was re-baselined in FY23 and government-led flight and lethality testing in expected to resume in FY24.

» SUITABILITY

Early results indicate that the LW CLU met its reliability requirement at the LUT, but not during the FOT&E due to a new software fault that resulted in multiple system aborts. The program office opened a failure review board, identified a probable cause of the fault, and is planning to implement corrective actions in LW CLU software update 4.1. The corrective action for the new failure mode identified during FOT&E should be demonstrated prior to the FRP decision in 2QFY24 and the LW CLU software update 4.1 should undergo integrated testing prior to equipping the first unit. Representatives from ATEC and DOT&E should witness the demonstration and integrated testing.

Soldier feedback on the LW CLU was positive, with gunners preferring the improved camera resolution and the smaller, lighter form factor as compared to the Block 1 CLU. Soldiers expressed concerns about the LW CLU battery being too exposed to the elements. The LW CLU and Block 1 CLUs both use the same battery, though the Block 1 CLU uses a full battery enclosure and the LW CLU uses a bungee cap to hold the battery in place. Battery performance for both the LW CLU and Block 1 CLU was significantly degraded in the cold temperatures experienced during the LUT. The Army should investigate a long-term replacement strategy for the existing battery to improve cold weather performance.

Soldiers found the new BST to be intuitive, easy to use, and believed that the BST provided the training needed to prepare Javelin gunners to engage targets with the tactical system. The JOT design was not fully mature, and its reliability was poor during the LUT. The JOT performance and reliability improved during the FOT&E. Soldier feedback indicated that the JOT replicates the target engagement process and supports realistic training. Additional development and testing are required to further improve reliability and ensure the JOT can replicate the future G-model missile. DOT&E will publish an FOT&E report on its suitability findings in 2QFY24.

» SURVIVABILITY

Previous testing included a CVPA of Javelin between August and September 2021, and four cyber survivability findings were identified. An ACDT was conducted in August 2023 and the findings will be corrected in LW CLU software update 4.1. Fixes will be verified prior to the AA planned for 3QFY24. A JOT Cyber Vulnerability Identification and ACDT are planned for late FY24. DOT&E will include an update on the system's cyber survivability in 4QFY24 as an addendum to the FOT&E report.

RECOMMENDATIONS

The Army should:

1. Demonstrate the effectiveness of corrective actions for the

new failure mode identified during FOT&E prior to the FRP decision and conduct integrated testing of LW CLU software update 4.1 prior to equipping the first unit. Representatives from ATEC and DOT&E should witness the demonstration and integrated testing.

2. Continue development and testing of the JOT to improve reliability and accurately replicate the G-Model missile.
3. Address the ACDT findings through LW CLU software update 4.1 and conduct fix verification testing prior to conducting the AA in 3QFY24.
4. Update the Javelin TEMP to reflect delays in the G-model missile development and plan for combined G-model missile and LW CLU testing, as well as demonstrating the maximum effective range of the upgraded Javelin system.
5. Investigate a long-term replacement strategy for the existing LW CLU battery to improve cold weather performance.