

UH-60V BLACK HAWK

Executive Summary

- The UH-60V BLACK HAWK modernization of the UH-60L is intended to emulate the capabilities of the UH-60M. Enhancements increase pilot situational awareness, improved navigational functionality, and extend the service life of UH-60L airframes.
- The UH-60V is based on a UH-60L that has completed depot-level recapitalization at Corpus Christi Army Depot (CCAD) and modernized to a UH-60L, Lot 30 airframe, which is the final production version of the UH-60L.
- The UH-60L recapitalization results in a 10-year service life extension for the airframe while also updating the electrical system capacity to support future modifications.
- The Army completed an IOT&E in September 2019. The processing of data and analysis is in progress and is expected to be complete in 2QFY20.

System

- The Army recapitalized UH-60L to serve as the backbone of the UH-60V. Older UH-60L will be first baselined to the Lot 30 configuration, which is the final production version of the UH-60L. The Army will then apply modification kits to finalize the UH-60V production.
- The UH-60V program is a low cost modernization of the UH-60L that the Army intends to produce similar qualities to the UH-60M, such as modernizing the existing UH-60L analog cockpit to a digital cockpit enabling a Pilot-Vehicle Interface (PVI) similar to the UH-60M.
- The program reduces avionics obsolescence and upgrades navigation systems to meet future Global Air Traffic Management (GATM) instrument flight rule requirements.
- The UH-60V employs an open systems architecture with Army-owned technical data.
- The basic mission configuration includes a crew of four (pilot, copilot, crew chief, and gunner), integral (internal) mission fuel, avionics, aircraft survivability equipment, armor



protection, two M240 machine guns and ammunition, and other mission-related equipment.

Mission

Commanders will use units equipped with the UH-60V BLACK HAWK to conduct movement and maneuver, sustainment, and mission command flight operations.

Major Contractors

- Development and Engineering: Redstone Defense Systems – Huntsville, Alabama
- Avionics Enhancements: Northrup Grumman – Woodland Hills, California

Activity

- The Army conducted all testing in accordance with a DOT&E-approved Test and Evaluation Master Plan and test plan. The aircraft used during IOT&E had not completed the CCAD recapitalization program. The FY21 FOT&E will be the first operational evaluation of a CCAD recapitalization aircraft.
- The Army conducted airworthiness and flight characteristics testing at Redstone Arsenal, Alabama, with software build 2.0/2.1 from September 28, 2018, through March 29, 2019. Flight testing of the UH-60V was conducted during day

- and night (aided) visual meteorological conditions for a total of 187.5 hours of ground test and 85 total flight-hours.
- The Army conducted a 133-hour IOT&E in September 2019, with operational pilots and aircrews from the 16th Combat Aviation Brigade and three Engineering Design Model (EDM) UH-60V aircraft. The Army executed 27 air assault, air movement, causality evacuation, and external load missions; during day, night, and night vision goggle flight modes, in moderate temperatures, near Tacoma, Washington. Aircrews flew aircraft in contour and nap-of-the-earth mission

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profiles over Joint Base Lewis-McChord and Yakima Training Center. The Army simulated missile, laser, and radar threat engagements during some of the missions.

- The Army conducted a cybersecurity Adversarial Assessment (AA) in July 2019 using one UH-60V aircraft in a hangar and in the Army-accredited UH-60V System Integration Lab to identify potential cyber-attack vectors. While portraying insider and nearsider threat postures, the threat team attempted to identify and exploit cybersecurity vulnerabilities. Aircrews were confronted with a number of hypothetical cybersecurity scenarios, and asked to take appropriate actions.

Assessment

- Aircrews successfully completed 38 of 42 mission flights during the IOT&E. One mission failure resulted from pilot error; three mission flights had reliability aborts.
- The Army identified 8 deficiencies and 44 shortcomings at the completion of developmental testing of software version 2.0/2.1. The Army airworthiness authority approved the use of the UH-60V EDM aircraft in IOT&E with warnings of these deficiencies in the operators manual. Flights were restricted to Day/Night Visual Meteorological Conditions under Visual Flight Rules.
- The UH-60V aircraft that participated in IOT&E had not undergone the CCAD recapitalization program. Two of the test aircraft retained the modified old UH-60L wiring harness, which did show signs of chaffing. These older systems may have contributed to reliability testing results. Reliability findings will be released in 2QFY20 once analysis is complete.
- The UH-60V provided more situational awareness than the UH-60L and near-equal situational awareness to the UH-60M.
- The UH-60V provided tactical flight navigation capabilities not in the UH-60M.

- The UH-60V retains crewmember seats from the UH-60L. These seats are not as ergonomically designed as the UH-60M and may increase fatigue on long missions or on flight crews with high operational tempo.
- The UH-60V encountered numerous software and communications problems throughout the IOT&E that degraded suitability.
- The UH-60V is not yet certified for flight into Instrument Meteorological Conditions (IMC) and was limited to simulated-IMC conditions during IOT&E.
- The 4QFY19 AA identified a number of critical cyber-attack vectors. The AA confirmed that some of those vectors could be exploited and, to a limited extent, explored the likely mission effects of successful exploitation.

Recommendations

The Army should:

1. Conduct FOT&E and additional cybersecurity testing with a trained unit equipped with production aircraft to properly reassess UH-60V operational effectiveness, suitability, and survivability.
2. Continue to develop UH-60V to address software problems discovered during IOT&E. All software updates should be complete prior to FOT&E in order to properly evaluate a production-representative aircraft.
3. Complete development and testing required to secure instrument flight certification to allow unrestricted instrument flight during FOT&E.
4. Conduct aeromedical testing to determine if UH-60V seats increase acute and/or chronic fatigue presenting a mitigatable flight safety risk
5. Eliminate or mitigate the cybersecurity vulnerabilities identified during the AA.