

## AH-64E Apache

### Executive Summary

- The Army conducted 30 mm gun accuracy testing to characterize performance and isolate root causes of inaccuracy reported by units fielded with AH-64E aircraft.
- The Army conducted developmental flight testing of upgraded subsystems to the Version 6 AH-64E aircraft in preparation for FOT&E II in 2019.
- In March 2018, the Army informed Boeing that it would suspend acceptance of all AH-64E aircraft due to the unacceptable safety risks and increased Army burden (inspections, time, funding) the strap pack retention nut failure presents. Boeing met the conditions for production restart in August 2018 and the Army has begun accepting production AH-64E aircraft.
- The Army is continuing with live fire testing to assess the vulnerability of the aircraft to combat induced fires.

### System

- The AH-64E is a modernized version of the AH-64D Attack Helicopter. The Army intends to sustain the Apache fleet through the year 2040. The Army uses the AH-64E in Attack/Reconnaissance Battalions assigned to Combat Aviation Brigades. Each battalion has 24 aircraft.
- The AH-64E advanced sensors, improved flight performance, and ability to integrate off-board sensor information provide increased standoff and situational awareness in support of the joint force.
- The Army fielded the AH-64E in two versions (1 and 4). Version 1 following IOT&E in 2012 and Version 4 following FOT&E I in 2014. Operational testing of Version 6 is planned for 2019.
- The major Version 1 AH-64E capability improvements included:
  - The ability of the aircrew to control the flight path and the payload of an Unmanned Aircraft System
  - Improved aircraft performance with 701D engines, composite main rotor blades, and an improved rotor drive system
  - Enhanced avionics, which includes satellite communication and an integrated navigation suite to meet global air traffic management requirements
- The Version 4 AH-64E retained Version 1 capabilities and added hardware and software to operate in the Link 16 network.
- The Army has developed AH-64E Version 4.5 with a pilot vehicle interface that enables employment of all Joint Air-to-Ground Missile (JAGM) modes to support JAGM flight testing.
- The Army will conduct FOT&E II with Version 6 AH-64E in 2019. The Army plans to add multiple enhancements in Version 6 to include:



- Radar Frequency Interferometer (RFI) passive ranging
- Fire Control Radar range extension and maritime targeting mode
- Cognitive Decision Aiding System
- Modernized Day Sensor Assembly with color and high definition displays
- The Army procurement objective is to procure 791 AH-64E aircraft. The Army's long term plan is to convert all AH-64E to Version 6. In the interim, the Army will convert fielded Version 1 aircraft to JAGM-capable Version 4.5. In time, all Version 4 AH-64E aircraft will be converted to Version 6.

### Mission

The Joint Force Commander and Ground Maneuver Commander employ AH-64E-equipped units to shape the area of operations and defeat the enemy at a specified place and time. The Attack/Reconnaissance Battalions assigned to the Combat Aviation Brigade employ the AH-64E to conduct the following types of missions:

- Attack
- Movement to contact
- Reconnaissance
- Security

### Major Contractors

- Aircraft: The Boeing Company Integrated Defense Systems – Mesa, Arizona
- Targeting Sensors and Unmanned Aircraft System datalink:
  - Longbow Limited Liability Company – Orlando, Florida, and Baltimore, Maryland
  - Lockheed Martin Corporation – Orlando, Florida, and Owego, New York
- L3 Communications Systems – Salt Lake City, Utah

# FY18 ARMY PROGRAMS

## Activity

- In December 2016, the failure of a Main Rotor Strap Pack resulted in the loss of an AH-64D and two crew members. The outboard retention nut failure was attributed to stress corrosion cracking. Boeing designed a larger strap pack retention nut that incorporates a stronger material with anti-corrosive properties. The Army has increased strap pack inspections and is retrofitting all AH-64 aircraft with the enhanced strap pack with priority going to coastal units that operate in more corrosive environments. The Apache Program Manager completed retrofit of coastal units in September 2018 and expects retrofit completion of U.S. and Foreign Military Sales aircraft by December 2019.
- Citing unacceptable safety risks and increased Army burden (inspections, time, funding) related to the strap pack nut failure, the Army informed Boeing in March 2018 that it would halt acceptance of all AH-64E aircraft. Boeing met the conditions for production restart in August 2018, and the Army has begun accepting production AH-64Es.
- Operational units have reported that the 30 mm gun is less accurate on the AH-64E than on the legacy AH-64D. The Apache Program Manager performed root cause analysis and identified three issues: early round inaccuracy (early round off target), dispersion (rounds not consistently on target), and changing bias (over time, shot group drifts from target). The Apache Program Manager and Boeing have systematically tested multiple subsystems and developed software fixes to be verified in October 2018 testing. The Program Manager expects to field solutions starting in early 2019.
- The Army conducted developmental flight testing of upgraded Version 6 AH-64E subsystems to include RFI passive ranging, the Fire Control Radar range extension and maritime targeting, the Cognitive Decision Aiding System, and the Modernized Day Sensor Assembly with color and high-definition displays.
- Apache aircraft supported integrated testing of 49 JAGM shots in FY17 and FY18.
- The Army selected AH-64E to be one of the five systems to complete an evaluation of cyber vulnerabilities to comply with section 1647 of the National Defense Authorization Act for FY16. The Army conducted a Cooperative Vulnerability and Penetration Assessment in September 2017 and plans to conduct an Adversarial Assessment of the Version 6 AH-64E in June 2019.
- In October 2017, the Army Research, Development, and Engineering Command (RDECOM)/Survivability/Lethality

Directorate (SLAD) completed live fire testing of the fire detection and expansion system.

- In November 2017, RDECOM/SLAD conducted testing to determine the effectiveness of a new fire barrier and intumescent paint added to production AH-64s to minimize the effect of fires in the tail boom aft transition. In August 2018, these tests were followed by additional tests, funded by the Joint Live Fire program, to assess the fire-induced damage effects under flight loading.
- Testing of the onboard halon fire suppression system is currently expected to begin in 1QFY19.
- The Army completed all testing in accordance with a DOT&E-approved Test and Evaluation Master Plan and Live Fire Strategy.

## Assessment

- Developmental testing of Version 6 AH-64E software and major subsystems in 2018 revealed multiple performance deficiencies. One or more deficiencies affected the Multi-Core Mission Processor, Modernized Radar Interferometer, the Fire Control Radar, the Target Acquisition Designation Sight, and Manned – Unmanned Teaming. The Program Office has since identified fixes for most of the problems. Regression testing on Apache subsystems has begun and early indications are that some of the problems have been resolved.
- The Fire detection and expansion system is largely effective in detecting tail boom fires providing aircrew with the awareness of the fire event before the condition becomes critical. Analysis of the fire barrier and intumescent paint testing is ongoing.

## Recommendations

1. The Army should continue to investigate sources of AH-64E 30 mm gun error, implement fixes as appropriate, and demonstrate in side-by-side testing that the AH-64E gun is as accurate as the gun on legacy aircraft.
2. The Apache Program Office should verify in regression testing of Version 6 AH-64E subsystems that Boeing has corrected the previous deficiencies. Following verification of fixes, the Army should conduct FOT&E II to demonstrate Version 6 Apache capabilities.
3. The Army should continue to retrofit all U.S. Government and Foreign Military Sales aircraft with the enhanced strap pack.