

## AH-64E Apache

### Executive Summary

- The Army conducted 30 mm gun accuracy testing to verify accuracy performance of a redesigned AH-64E Apache gun mount. The redesigned mount corrected a portion of the accuracy problem that had been reported by units with fielded 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 of the Version 6 aircraft in 2018.
- Targeting systems on the Apache aircraft generated large target location and target velocity errors that will reduce Joint Air-to-Ground Missile (JAGM) performance. These errors should be corrected to support integrated testing of JAGM and future use in combat.

### 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's 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, after successful IOT&E in 2012, and Version 4, after successful FOT&E I in 2014, with operational testing of Version 6 planned in 2018.
- 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 communication capability, which includes satellite communication and an integrated communication suite to meet global air traffic management requirements
- The Version 4 AH-64E retained Version 1 capabilities and added hardware and software for Link 16 network participation.
- The Army will conduct FOT&E II with Version 6 AH-64E in May 2018. Version 6 will add multiple enhancements 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
- Interoperability with Soldier Radio Waveform networks
- The Army acquisition objective is to procure 767 AH-64E aircraft. Conversion of fielded Version 1 AH-64E aircraft to Version 4 has begun. Once Version 6 begins fielding, all fielded 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

# FY17 ARMY PROGRAMS

## Activity

- Following reports of poor accuracy of the 30 mm gun from units with fielded AH-64E aircraft, the Program Office investigated the original AH-64E design and found the gun mount came loose after sustained firing and reported erroneous azimuth and elevation positions of the gun.
- The Army redesigned the mounting hardware and conducted 30 mm gun accuracy testing of AH-64E aircraft in flight.
- 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.
- The Army completed all testing in accordance with a DOT&E-approved test plan.
- In FY16, the Army developed an Operational Test Agency Test Plan for LFT&E of Apache Version 6 system modifications. The plan includes test and evaluation of: 1) the Fire Detection and Expansion System (FDES) sensors, which are intended to mitigate fire-induced aircraft losses in the tail boom; 2) the Fire Detection and Suppression System (FDSS) upgrades, which are intended to mitigate engines fires; and 3) an evaluation of the Aircraft Survivability Product Improvement (ASPI) equipment for effects on aircraft system vulnerability. Testing of the FDES sensor began in September 2017.
- Apache aircraft supported 18 integrated test JAGM shots in FY17.
- The Army has selected AH-64E to be one of the five systems to complete an evaluation of cyber vulnerabilities to comply with the directive in section 1647 of the National Defense Authorization Act for FY16. The Army conducted a Cooperative Vulnerability and Penetration Assessment (CVPA) in September 2017 and will conduct an Adversarial Assessment (AA) of the Version 6 AH-64E in May 2018 as part of FOT&E II.

## Assessment

- In recent 30 mm gun accuracy testing, the Army did not observe any failures of the redesigned gun mount after more

- than 15,000 rounds of gun testing. The AH-64E 30 mm gun demonstrated improved accuracy with the redesigned gun mount. The Army identified contributing sources of gun accuracy errors and is continuing to investigate the other sources of error. The Army is retrofitting fielded AH-64E aircraft and will incorporate the redesigned mounting hardware into new AH-64E aircraft as they are fielded.
- The Apache Modernized Target Acquisition Designation Sight and Fire Control Radar on occasion generated erroneous target velocities that were passed to the JAGM without cueing the gunner. These errors should be corrected to support JAGM integration.
- Live fire planning and testing is ongoing in accordance with DOT&E guidance.

## Recommendations

- Status of Previous Recommendations. The Army has begun to address recommendations from the FY14 annual report. Actions include:
  1. Improve infrared countermeasures performance, upgrade radar- and laser-warning systems, and improve integration of aircraft survivability equipment on the Version 4 AH-64E. The Army integrated the APR-39D(V)2 Radar Warning Receiver onto the Version 4 AH-64E and conducted operational testing against expected threats. See the AN/APR-39 Radar Warning Receiver Annual Report on page 147.
  2. Plan and conduct exploitation of any potential vulnerabilities discovered during CVPA and AA.
  3. Conduct adequate cybersecurity testing in conjunction with the Version 6 FOT&E II in 2018.
- FY17 Recommendations.
  1. The Army should continue to investigate sources of 30 mm gun error and implement fixes as appropriate.
  2. The Apache Program Office should work with the JAGM Program Office to identify the source of spurious sensor targeting data and eliminate or mitigate targeting errors.