

## UH-60M Black Hawk Utility Helicopter

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The UH-60M Black Hawk utility helicopter is operationally effective, suitable, and survivable. The Initial Operational Test and Evaluation (IOT&E) and live fire testing were adequate and executed in accordance with the Director, Operational Test and Evaluation (DOT&E)-approved test plan.

The UH-60M is operationally effective. The UH-60M successfully accomplished 41 of 45 (91 percent) of assigned combat support missions. Internal and external lift missions were successfully executed day and night in simulated stressful combat environments. The aircraft exceeds performance requirements for internal lift, external lift, and self deployment. The digital moving map and other cockpit displays reduce pilot workload and improve crew situational awareness, although some improvements in subsystem integration are necessary.

The UH-60M is operationally suitable. In operational testing, the UH-60M was reliable and required infrequent repairs. The UH-60M is more reliable than the current UH-60L, which is the basis for requirement thresholds. In the 261.6-hour IOT&E, in which six mission aborts would have been acceptable, the UH-60M had three mission aborts. When the aircraft did fail, it was repaired quickly by unit maintainers. Aircraft were available for mission execution over 95 percent of the time.

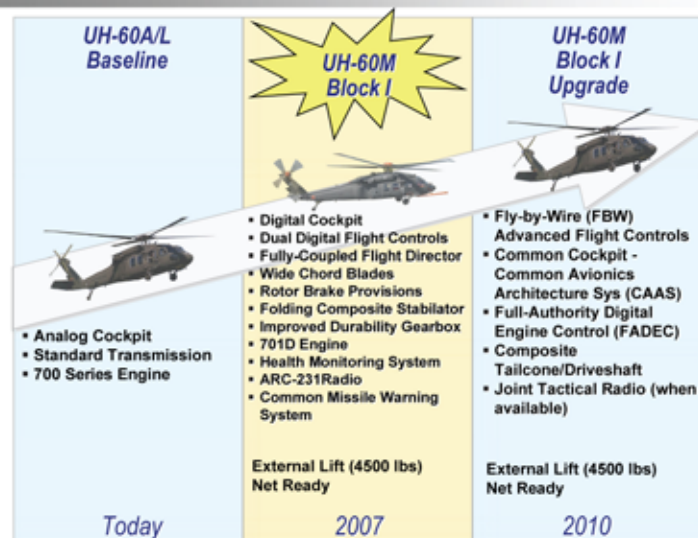
Operational and live fire testing demonstrated that the UH-60M is survivable in expected threat environments and that the overall susceptibility to surface-to-air threats is lower when compared to the legacy UH-60A/L aircraft. Susceptibility improvements are largely the result of the integration of the Common Missile Warning System (CMWS) on the UH-60M. During integration testing on the UH-60M, the CMWS demonstrated timely detection, declaration, and flare dispenses in response to simulated infrared threat signatures. Testing and analyses showed that the UH-60M is no more vulnerable to projected ballistic threats than the UH-60L. Combat data indicate that the UH-60 can survive some hits from rocket propelled grenades (RPGs), and improvements in the UH-60M safety and crashworthiness features enhance crew survivability in the event of a threat encounter or crash.

### System Overview

The UH-60M Black Hawk is a single rotor, medium-lift helicopter that provides utility and assault lift capability in support of combat and peacetime missions. The Black Hawk is the primary helicopter for air assault, air mobility, logistics support, and aero medical evacuation. The Black Hawk can be configured to perform command and control or mine-laying missions. Army aviation lift units will have ten UH-60M Black Hawks per company with three companies in various multi-function aviation battalions. The UH-60M crew includes two pilots who are assisted by two crew chiefs in the rear cabin. Aircraft and their crews are employed individually, in multi-ship formations, or by company as required by each mission.

The UH-60M will replace the aging UH-60A/L Black Hawks. The Army's strategy is a blocked approach, as depicted below, to develop and modernize the UH-60 fleet. This report covers the UH-60M Block I version of this aircraft.

## UH-60M Acquisition Strategy



### UH-60M Developmental Block Approach

#### Test Adequacy

The Army conducted the initial operational test in accordance with the approved DOT&E test plan. The test was adequate to support an assessment of operational effectiveness and suitability. The capstone event was a six-week, 261.6-hour Initial Operational Test (IOT) conducted by Stetson Troop, 4th Squadron, 3rd Armored Cavalry Regiment with five production UH-60M aircraft. This event took place at Fort Hood, Texas, from October 11, 2006, to November 20, 2006. Operational testing included night operations under austere field conditions with dynamic mission planning and threat interaction. The Army conducted operational testing of the MEDEVAC missions at Fort Rucker, Alabama, from January 24 - 26, 2007. UH-60M crews successfully completed four minefield emplacements on February 15, 2007, at Redstone Arsenal, Alabama. Additionally, the Army completed integration testing of the CMWS and the AN/ARC 231 radios onto the UH-60M. These systems were operationally tested at Fort Rucker, Alabama, on March 23 and 24, 2007, to demonstrate that these systems were effective.

Live fire test and evaluation was adequate to assess vulnerability to a variety of expected ballistic threats. This phase of testing included threats at and above the user's requirements in the Operational Requirements Document. Ballistic damage results from previous combined Army and Navy H-60 series aircraft testing and combat data supported the vulnerability assessment. Smaller developmental and operational test events provided additional data to complete the assessment.

#### Operational Effectiveness

The UH-60M is operationally effective. The UH-60M successfully accomplished 41 of 45 (91 percent) of assigned combat support missions. Internal and external lift missions were successfully executed day and night in simulated stressful combat environments. The aircraft exceeds performance requirements for internal lift, external lift, and self deployment. The digital moving map and other cockpit displays reduce pilot workload and improve crew situational awareness, some improvements in subsystem integration are necessary. Subsystem integration with digital messaging systems, communications systems, flight management systems, or aircraft survivability equipment caused some level of degradation in 71 percent of aircraft sorties. In spite of the degraded subsystems, UH-60M crews successfully completed assigned missions.

#### Operational Suitability

The UH-60M is operationally suitable. In operational testing, the UH-60M was reliable and required infrequent repairs. The UH-60M is more reliable than the current UH-60L, which is the basis for requirement thresholds. Mission aborts and other reliability failures occurred less often than expected. In the 261.6-hour IOT&E, in which six mission aborts would have been acceptable, the UH-60M had three mission aborts. When the aircraft did fail, it was repaired quickly by unit maintainer. Aircraft were available for mission execution over 95 percent of the time.

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The UH-60M provides an expanded shipboard operating environment and is more compatible with the shipboard environment than UH-60A/L aircraft. Operators found aircraft systems to be intuitive, well-integrated, and compatible for human use. Some subsystems warrant redesign or improved training to make them more usable by operational crews.

### **Operational Survivability**

Operational and live fire testing demonstrated that the UH-60M is survivable in expected threat environments and that the overall susceptibility to surface-to-air threats is lower when compared to the legacy UH-60A/L aircraft. Susceptibility improvements are largely the result of the integration of CMWS on the UH-60M. During integration testing on the UH-60M, the CMWS demonstrated timely detection, declaration, and flare dispenses in response to simulated infrared threat signatures.

In other testing, the performance of the APR-39 radar receiver on the UH-60M was poor and no better than legacy aircraft. The radar warning receiver demonstrated a high false alarm rate that eventually resulted in aircrews disregarding correctly reported radar threat warnings.

Testing and analyses showed that the UH-60M is no more vulnerable to projected ballistic threats than the UH-60L. Combat data indicate that the UH-60 can survive some hits from rocket propelled grenades (RPGs), but will not survive most hits by man portable air defense systems (MANPADS). Improvements in the UH-60M safety and crashworthiness features enhance crew survivability in the event of a threat encounter or crash.

### **Recommendations**

The UH-60M Black Hawk utility helicopter is operationally effective, suitable, and survivable. The UH-60M program executed the Initial Operational Test and Evaluation and live fire testing in accordance with the DOT&E-approved test plans. I recommend the Army address the following issues:

#### *Operational Effectiveness*

- Improve network connectivity for secure communications and digital messaging systems. Reduce latency of position reports.
- Complete integration and testing of the AN/ARC-231 radio.
- Develop an individual subsystem reset capability after system startup.
- Complete integration of Aviation Mission Planning System with the UH-60M to include loading and displaying tactical overlays.
- Examine weight, functionality, and endurance for an Army airborne command and control system for use during command and control missions.
- Develop and document procedures for identifying where, when, and how to use digital messaging in an aviation environment.

#### *Operational Suitability*

- Improve performance and reliability of the flight management system.
- Replace the crew chief seat to make more comfortable. Simplify the restraining harness for easier ingress and egress of the crew chief station.
- Continuing development of, and improving training on subsystems for:
  - Communications suite (loading frequencies and digital messaging systems).
  - Flight Management System and moving map display.
  - Secure communications.
  - Aircraft survivability equipment.

#### *Survivability*

- Improve radar warning receiver performance to increase threat reporting accuracy for the aircrew.
- Reduce the potential for gearbox chip detector screen blockage resulting from drive ballistic hits to the main transmission assembly.
- Install an additional fire detector and fire suppression agent dispenser nozzle to the engine nacelle compartment.
- Reinforce or redesign some of the engine nacelle structural components.
- Add fire detection and extinguishment to the fuel plumbing enclosure and transition section of the aircraft.
- Complete the survivability evaluation of the monolithic high speed machined frames, the ballistic testing of the Main Rotor Mast, and the modular ballistic armor protection system.
- Revise Battle Damage Assessment and Repair doctrine and manuals to allow more expedient field repairs.

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