

ARMY PROGRAMS

UH-60M Black Hawk

SUMMARY

- The UH-60M program intends to rebuild and modernize the Black Hawk fleet. Improvements include a digital cockpit, modernized engine and power train, and a semi-monocoque airframe with selected machined metal airframe components.
- In the past year, the program began developmental flight-testing of two prototype aircraft.
- Early developmental testing is producing encouraging results for aircraft performance and cockpit design. The aircraft's ability to attain reliability growth goals by Milestone C or the full-rate production decision is a concern.



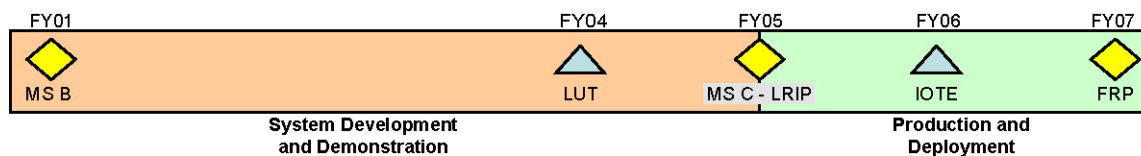
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SYSTEM DESCRIPTION AND MISSION

The UH-60 Black Hawk is a single rotor medium-lift helicopter. The aircraft provides utility and assault lift capability in support of air assault, general support, and aeromedical evacuation missions. The aircraft also has the capability to perform command and control, electronic warfare, and special operations missions when in the appropriate configuration. The prime contractor is Sikorsky Aircraft.

The Operational Requirements Document, approved in March 2001, establishes a blocked approach to development and modernization. The Army intends the near-term UH-60M Block 1 aircraft to provide a digital cockpit, extended service life, and performance and reliability levels equivalent to, or better than, the UH-60L. The UH-60M digital cockpit will feature a four Multi-Function Display (MFD) design by Rockwell Collins. Cockpit enhancements are to improve pilot situational awareness and enhance communications, navigation, and survivability. Block II capabilities will add performance improvements to lift and range capability beyond that of the UH-60L. The UH-60M is a covered program for live-fire test and evaluation (LFT&E). A waiver from full-up, system-level testing requires the program to execute an alternate plan to meet the LFT&E requirements.

TEST AND EVALUATION ACTIVITY



In the past year, the program began developmental flight-testing of two prototype aircraft at the Sikorsky flight test facility. Since first flight on September 17, 2003, the two aircraft have accumulated over 360 test flight hours. Flight-testing is focusing on performance and flight-envelope expansion, fuel consumption, vibrations, loads, handling qualities, and reliability. The Army plans for software development to occur in Builds for increased capabilities. The current software configuration in the aircraft is Build B. Build B provides sufficient functionality for flight-testing, but does not include advanced avionics systems such as the digital moving map and digital messaging.

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Integration and testing of advanced avionics is taking place in the System Integration Laboratory in Huntsville, Alabama. The most significant test of software Build C, incorporating the advanced avionics systems, took place during a Limited User Test (LUT) in August 2004. Using a UH-60M non-motion cockpit simulator, experienced Army pilots conducted six utility helicopter mission scenarios. Primary areas of evaluation were pilot-vehicle interface, workload, and situational awareness. This event also provides an opportunity to evaluate the maturity of procedures for employment of aviation platforms in a digital battlespace.

The Army and the Navy are conducting a coordinated LFT&E effort. This effort includes testing for the UH-60M and the Navy's MH-60S and MH-60R programs. This combined test effort intends to reduce costs and compress schedules. The integrated LFT plan takes into account vulnerability reduction features incorporated on the aircraft since its initial fielding in 1978. This plan also uses recent combat damage experience and subsystem qualification efforts. Complete ballistic testing includes static and dynamic testing. Testing will focus on the main and tail rotor blades, the engines, the vertical tail pylon, several flight critical rotor drive and flight control components, and the entire fuel system. Several tests are pending for the Improved Crashworthy External Fuel System, the Medical Evacuation OnBoard Oxygen Generating System, the fire detection/suppression system, the improved durability gearbox, and the new Wide Chord Main Rotor Blades. An operational, but not flight-worthy, YCH-60 prototype is serving as the primary production representative full-up system ground test vehicle. Army updates of earlier vulnerability assessments are more representative of the latest design configuration.

TEST AND EVALUATION ASSESSMENT

Early developmental testing is producing encouraging results for aircraft performance and cockpit design. However, the aircraft's ability to attain reliability growth goals at either Milestone C or the full-rate production decision is a concern. Technical risks for the UH-60M program remain for the structural design of the airframe and system integration. The approved UH-60M test program will provide the opportunity to evaluate these technical issues and determine the effectiveness and suitability of the helicopter.

Based on performance testing and analysis, the UH-60M appears poised to meet or exceed requirements for payload and range. Test pilot feedback is favorable for the improved handling qualities in comparison to UH-60A/L aircraft. The UH-60M provides the capability to maintain a constant heading, altitude, and speed without pilot inputs to the controls. This "autopilot" feature reduces pilot fatigue and workload, as reported following an 8-hour ferry flight from Colorado to Alabama. A "go around" flight control feature to address recent brown out conditions experienced by pilots in Iraq and Afghanistan will also increase safety and mission accomplishment.

Initial loads and vibration testing of the UH-60M confirms that there is a structural weakness in one of the newly-design cabin frames. This problem is consistent with a fatigue problem discovered on the Navy's SH-60R aircraft structure that was the baseline for design of the UH-60M. Until corrected, the stresses in the frame under heavy loads and/or aggressive maneuvers will, over time, lead to cracking in the aircraft frame.

A LUT during August 2004 in the System Integration Laboratory concluded that the digital map and navigation aids in the UH-60M cockpit enhance pilot situational awareness and mission flexibility. UH-60M pilots demonstrated the ability to fly the designated routes, avoid ground threat systems, and respond with confidence to unexpected mission changes while in flight. Digital messaging capabilities enabled coordination of detailed mission plans that are difficult to coordinate by voice radio. The LUT also uncovered a few situations in which the design of the software and controls can lead to pilot error or confusion when the pilot interface for the Joint Variable Message Format messaging and the Flight Management System do not compare notification information properly.

LFT&E to date includes both component static testing, and full-up system-level dynamic testing of the main and tail rotor blades, the engines, fuel system, tail structure, and several rotor drive and flight controls components. Test results for the improved components tested to date are showing increased survivability.