

## **MH-60R MULTI-MISSION HELICOPTER UPGRADE**



The MH-60R Multi-Mission Helicopter Upgrade originally consisted of a Service Life Extension Program (SLEP) for existing SH-60B, SH-60F, and some HH-60H aircraft. Aircraft remanufacture, avionics improvement, and new or improved mission sensors constituted the program path until cost reconsideration in FY01 resulted in redefinition of the program to include new production aircraft as opposed to remanufactured aircraft. The program develops the AN/AQS-22 Airborne Low Frequency Sonar (ALFS) and increases sonobuoy acoustic signal processing capability. The acoustic suite is designed to improve undersea warfare mission effectiveness against the quiet submarine threat in both deep and shallow water environments. The program also develops the AN/APS-147 Multi-Mode Radar (MMR) that includes Inverse Synthetic Aperture Radar imaging and periscope detection modes of operation. Other improvements include the AN/ALQ-210 electronic support measures (ESM), a fully Integrated Self-Defense (ISD) system, the AN/AAS-44 Forward-Looking Infrared sensor with laser designator, and armament capability to launch Hellfire missiles. The MH-60R and MH-60S helicopters will incorporate the Common Cockpit, which consists of multi-functional displays, keysets, and a complex client-server based tactical data processing system. The program represents a significant avionics modification to the SH-60 series of aircraft by enhancing undersea and surface warfare, surveillance and ID, and power projection.

### **BACKGROUND INFORMATION**

The MH-60R Multi-Mission Helicopter entered EMD in FY93 and combined the missions of the predecessor SH-60B and SH-60F baseline aircraft. A recent program restructure includes new production aircraft instead of remanufactured airframes and was in response to escalating remanufacture costs and the over 12 week late delivery/poor quality of the first four fully remanufactured test articles.

In 1999, a developmental test and an operational assessment were conducted on the AN/AQS-22 ALFS installed in a SH-60B. The tests were primarily focused on the mechanical performance of the system, not the tactical performance. The OA assessed the system to be both potentially operationally effective and suitable. The system exhibited an excessive Built-In-Test (BIT) false alarm rate, an inadequate BIT error reporting format, a below threshold Mean Time Between Mission Critical Failure rate, numerous human factors engineering problems, and insufficient factory training to address the complexity of the system.

In January 1998, DOT&E designated the SH-60R (now redesignated the MH-60R) aircraft a covered system for LFT&E. The waiver granted for the SH-60B/HH-60H Munitions Upgrade Program by the ASN(RDA) Memo of July 1996 has been extended to cover the MH-60R. The DOT&E report to Congress on the Hellfire Missile Integration Program Upgrade to the SH-60B and HH-60H aircraft identified a number of data voids in the original H-60 Live fire data. These voids preclude an adequate evaluation of the MH-60R vulnerability for LFT&E. DOT&E recognized that the data voids were common to all H-60 aircraft variants within the Navy and Army and proposed that the two Services coordinate their efforts and thus minimize cost. In response, a Joint Army/Navy LFT&E Test Program was established to address the data needs of the MH-60R, the MH-60S, and the UH-60M programs. The program takes advantage of the high degree of similarity between components and structure of Navy and Army variants of the H-60. Utilizing the resources and talents of both Services' vulnerability testing establishments, a number of usable H-60 components and structures have been collected, including an operable YCH-60. Testing in this joint program has just begun.

### **TEST & EVALUATION ACTIVITY**

Contractor proof of compliance testing and DT on two YMH-60R prototype aircraft began in January 2000 and continues to the present. The first increment of DT was completed in April 2001 and focused on the performance of the Common Cockpit and on two operating modes of the MMR. The current DT increment additionally focuses on the ESM system, additional operator modes of the MMR, and on the ALFS systems. All testing to date has been performed on the two prototype YMH-60R aircraft due to the late delivery of the first four fully remanufactured test articles.

A four-week DT Assist conducted in February 2001 provided the Operational Test and Evaluation Squadron (VX-1) the opportunity to assess the Common Cockpit and two modes of the MMR. Although a DT Assist, by definition, does not provide sufficient operational test opportunity to resolve Critical Operational Issues, it did provide operational exposure to the system and early operational feedback to the Program Manager, especially in the area of man-machine interface issues.

The program has incurred several breaches of the Acquisition Program Baseline schedule and cost, reflected by subsequent instances of program restructure. The January 1994 Test and Evaluation Master Plan (TEMP) and the March 1992 Operational Requirements Document (ORD) are being updated to reflect the latest program restructure. The ORD revision is undergoing Joint review. The TEMP revision will reflect the updated ORD.

The first tests under the Joint Army/Navy LFT&E test program included static flight control shots executed by the Army at Aberdeen Proving Ground in June 2001. These tests provided order of magnitude threat effect data to allow threat selection for dynamic flight controls tests to be accomplished at the Naval Air Warfare Center – Weapons Division, China Lake in September 2001. This program differs from the extensive prior testing of the H-60 in that a large number of the tests will be conducted under dynamic conditions while the aircraft is in a 1G-hover condition. There is some risk under these conditions, that the single operable test aircraft will be destroyed prematurely.

### **TEST & EVALUATION ASSESSMENT**

The Common Cockpit and the MMR demonstrated low levels of hardware and software maturity throughout FY00 contractor proof of compliance testing and DT. A major restructure of the Lockheed

Martin team in 2001 and the new Navy Program Manager's insistence that the Common Cockpit system be baseline tested and that configuration control discipline be imposed have proven successful. The system is now beginning to exhibit stable, more mature performance.

The paucity of spare component parts has adversely impacted the program. Design problems in the MMR traveling wave tube amplifier (TWTA) have limited Telephonics and the Navy to two workable systems for contractor proof of compliance testing and DT while Telephonics seeks a second TWTA source. Numerous failures of the Common Cockpit multi-functional displays adversely impacted testing of both the MH-60R and MH-60S aircraft.

Test data acquired from the Joint Live Fire test program funded by DOT&E have contributed to assessing the vulnerability of the aircraft. Though off to a good start with the static flight control tests at Aberdeen, program success depends greatly on a single operable YCH-60 ground test vehicle. If any of the tests destroy the vehicle prematurely this program could be faced with either funding a new test article or terminating with insufficient data.

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