NAVY PROGRAMS

USMC H1 Upgrades

SYSTEM DESCRIPTION AND MISSION
This program combines upgrades of two USMC H-1 aircraft: the AH-1W Cobra attack helicopter and the UH-1N light utility helicopter. The common elements of the two will be identical twin engines, drive trains, a new four-bladed rotor, tail sections, and integrated digital cockpits. In addition, the AH-1Z attack helicopter will feature an upgraded targeting system while the UH-1Y will double the payload and range of legacy utility aircraft.

In the past year, the H-1 Upgrades System Development and Demonstration aircraft have matured markedly, thanks to the program’s approach of keeping System Development and Demonstration test aircraft configuration identical to the

TEST AND EVALUATION ACTIVITY
The approved Test and Evaluation Master Plan calls for the test and evaluation program to be conducted in two phases: integrated contractor/government developmental testing and operational testing. Both the AH-1Z and UH-1Y will participate in Operational Test and Evaluation (OT&E) and Live Fire Test and Evaluation (LFT&E).

In the past year, the second of two planned operational assessments, OT-IIB, was conducted at Naval Air Station Patuxent River, Maryland, in April and May 2004. Operational test pilots completed 120.3 flight hours and 44 operational missions while fleet Marines performed operational-level maintenance on two H-1 Upgrades aircraft. The Navy will consider results from OT-IIB in making a second low-rate initial production decision to produce three AH-1Z and six UH-1Y aircraft.

Following OT-IIB, more developmental testing of the UH-1Y was conducted at Camp A.P. Hill, Virginia, and the AH-1Z at Yuma, Arizona. Marine maintainers continued to assist with aircraft maintenance and validation of maintenance documents and procedures. At year’s end, the aircraft received planned modifications to software and hardware that address many of the previously discovered deficiencies and provide all remaining production functionality for the operational evaluation aircraft. Operational evaluation will support the full-rate production decision in FY06.

Live Fire testing continued in accordance with the approved LFT&E strategy. The Live Fire program has completed sixteen of twenty-one planned tests, including a dynamic test of the main rotor gearbox, rotating with partial load. These tests require operating targets to demonstrate platform survivability based on performance of vulnerability reduction features.

TEST AND EVALUATION ASSESSMENT
In the past year, the H-1 Upgrades System Development and Demonstration aircraft have matured markedly, thanks to the program’s approach of keeping System Development and Demonstration test aircraft configuration identical to the
production design. Solutions to problems discovered in earlier testing have been implemented to strengthen the tail boom, eliminate tail boom overheating, improve targeting performance of the AH-1Z, and achieve required UH-1Y mission range. Aircraft performance, reliability, and maintainability results were positive, but not conclusive given the limited scope of OT-IIB. Risk areas remain for software integration of mission equipment, reduction of false alarm rates for maintenance diagnostic tools, and accessibility of components behind the rear seat of the AH-1Z.

Throughout OT-IIB, the UH-1Y and AH-1Z demonstrated remarkable performance compatibility that enhanced mission planning and execution. Similarities in aircraft communications, speed, maneuverability, range, and endurance enabled both aircraft to provide complementary and mutual support during in-flight and objective area portions of all joint missions. H-1 Upgrade aircraft were used nearly interchangeably on several missions enhancing mission flexibility. In the objective area, the maneuverability, speed, and agility of both aircraft were much improved over legacy aircraft performance.

Both aircraft demonstrated in OT-IIB that they have the potential to perform a variety of key mission requirements in daylight and favorable weather conditions. Several concerns remain. Pilots reported unreliable communications on some radio nets and did not use secure, anti-jam, or satellite communications during the test. Pilots wore the Helmet Mounted Sight and Display system during daylight missions and reported that the display was occasionally unreadable, the helmet was uncomfortable, and it restricted visibility in aft sectors. The AH-1Z targeting system provides high fidelity infrared images, but needs additional refinements to automatic and manual target tracking software. In 2.75-inch rocket firing testing after OT-IIB, AH-1Z engines suffered damage from ingestion of rocket plume exhaust. New restrictions on the employment of multiple simultaneous rockets may be required to accommodate the new aerodynamic environment of the four-bladed aircraft. In the report of test results from OT-IIF, the Commander, Operational Test and Evaluation Force rated the risk red in the critical operational issues of weapons employment, targeting, mission planning, and tactics. In addition, they rated suitability critical operational issues red in maintainability, human factors, and documentation.

During OT-IIB, both aircraft were generally reliable and available to conduct missions when required. Both aircraft supported an aggressive flight schedule and rarely required unscheduled maintenance. While maintainability statistics were generally good, the placement of radio components behind the rear seat of the AH-1Z makes component replacement a time-consuming and tedious task. Diagnostic tools, still under development, were useful but still have a high rate of false alarms.

Both aircraft should be more survivable and crashworthy than their predecessors. However, testing in FY04 showed the main rotor gearbox was vulnerable to ballistic threats that impact high-pressure oil passages. The ballistic damage resulted in severe cracking, followed by a rapid loss of lubrication. Testing demonstrated that gears catastrophically failed after running 17 minutes under load with no lubrication. (The specification requires 30 minutes runtime without lubrication.) Otherwise, testing has demonstrated that the components of the AH-1Z and UH-1Y will retain or exceed the degree of damage tolerance found in their predecessors. The full-up system level ballistic tests of the AH-1Z is scheduled for FY05. A battle damage repair team plans to participate in the component-level tests and full-up, system-level live fire testing to update the aircraft system maintenance procedures based on the battle damage caused by realistic threats.