

H-1 Upgrades – U.S. Marine Corps Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter

Executive Summary

- The program is nearing the end of the engineering and manufacturing development phase.
- Current performance of Helmet-mounted Sight Display systems (HMSD) is likely to impose operational restrictions for Operational Evaluation (OPEVAL) scheduled to begin in March 2006.
- The program office continues to develop solutions to meet integrated helmet sighting and display requirements.



System

- Upgrades two U.S. Marine Corps H-1 aircraft:
 - The AH-1W attack helicopter becomes the AH-1Z.
 - The UH-1N light utility helicopter becomes the UH-1Y.
- Identical twin engines, drive trains, a new four-bladed rotor, tail sections, digital cockpits, and HMSD.
- The AH-1Z has an improved targeting system for delivery of air-to-ground and air-to-air missiles, rockets, and bombs.
- The UH-1Y has twice the payload and range of legacy UH-1N aircraft; it can carry eight combat-ready Marines 110 nautical miles and return without refueling.

Mission

- Squadron detachments equipped with the AH-1Z attack helicopter conduct rotary-wing close air support, anti-armor, armed escort, armed/visual reconnaissance, and fire support coordination missions.
- Squadron detachments equipped with the UH-1Y light utility helicopter conduct command, control, assault support, escort, air reconnaissance, and aeromedical evacuation missions.

Activity

- Due to problems discovered in FY04 testing, the program was restructured by deferring the Milestone III decision for full-rate production to 4QFY06, adding a third low-rate initial production lot, and incorporating an option to build new UH-1Y instead of remanufacturing operational UH-1N aircraft needed in the fleet.
- Flight testing of three AH-1Z and two UH-1Y engineering, manufacturing, and development aircraft continues. As of October 2005, the development program has completed more than 3,200 flight hours of test.
- Test activity has been in accordance with the H-1 Upgrades Test and Evaluation Master Plan, last approved by DOT&E in 2003; a revision is in the final stages of an update now.
- The H-1 Upgrade is a covered program for purposes of LFT&E. The LFT&E strategy was approved by DOT&E, taking into account the commonality between the two platforms. Nineteen of 21 planned Live Fire tests have been completed. Activity in FY05 included testing of the AH-1Z weapons pylon and wing mounted munitions.
- Development activity in FY05 focused on mission computer stability, maturity of the Target Sight System (TSS), installation of turned exhausts, integration of weapons

systems, performance of the HMSD, and qualification for shipboard operations.

Assessment

- Developmental testing of the TSS, weapons integration, and shipboard operations were completed and initial results are encouraging. Detailed analysis of test results continues.
- HMSD performance remains marginal. Because of poor image quality and human factors effects, the HMSD is not qualified for night aided takeoffs and landings aboard ships. The program office is investigating two new HMSD configurations, as well as beginning to develop an alternate solution.
- The recent ballistic tests of the fuel system in the AH-1Z weapons pylon indicate good resistance to hydraulic ram and fuel ingestion in the engines, but a deficiency with the self-sealing tanks was noted. Other issues remain:
 - The UH-1Y floor fuel bays. Ballistic testing resulted in cracking of the load bearing fuselage skin under fuel containing, below floor bays.
 - The performance of the main transmission to both loss of lubrication and in ballistic tolerance. In non-ballistic loss of lubrication tests, the transmission failed at 17 minutes (30

minutes required). Against ballistic threats, results indicate the transmission is quite fragile, with severe case cracking and rapid loss of lubrication.

- The canopy mounted AH-1Z armor. The control stick on the AH-1Z was moved to a new side location, necessitating relocating cockpit armor to the canopy doors. Potential ballistic issues with canopy-mounted armor will remain unaddressed until full-up system-level testing in 2QFY06.
- OPEVAL is scheduled to begin in March 2006 with operational restrictions likely stemming from HMSD deficiencies. These

restrictions include low-light operations aided by night vision devices onboard L-class amphibious ships.

Recommendations

The program:

1. Should continue its vigorous pursuit to fix HMSD deficiencies.
2. Should continue its developmental testing of survivability through the additional testing of infrared signature, radar cross section, and aircraft survivability equipment.
3. Must have appropriate publications available for OPEVAL.