

## H-1 Upgrades – U.S. Marine Corps Upgrade to AH-1Z Attack Helicopter and UH-1Y Utility Helicopter

### Executive Summary

- The Navy conducted an FOT&E from October 2012 to January 2013 to evaluate the aircraft System Configuration Set 6.0 (SCS 6.0) software, which was designed to enhance capabilities and correct previously identified problems.
- The H-1 Upgrades aircraft with SCS 6.0 remain operationally effective and survivable. The test unit successfully completed 19 of 23 missions. Operational test aircraft met reliability and maintainability requirements but did not meet the availability requirement of an 85-percent mission-capable rate.
- Effectiveness, suitability, and survivability of H-1 Upgrades aircraft with SCS 6.0 are degraded by occasional software blanking of the electronic warfare display.
- An FOT&E of SCS 7.0, scheduled for 4QFY14, will evaluate corrections to the blanking of the electronic warfare display, other corrections to SCS 6.0, and any new features. The VX-9 test squadron tested this correction in September 2013 at China Lake and the Verification of Correction of Deficiencies report is in staffing.

### System

- This program upgrades two Marine Corps H-1 aircraft:
  - The AH-1W attack helicopter becomes the AH-1Z
  - The UH-1N utility helicopter becomes the UH-1Y
- The aircraft have identical twin engines, drive trains, four-bladed rotors, tail sections, digital cockpits, and helmet-mounted sight displays. By parts count, the aircraft are 84-percent common.
- The UH-1Y has twice the payload and range of legacy UH-1N aircraft and can deliver eight combat-ready Marines 118 nautical miles and return without refueling. The AH-1Z has a high-fidelity targeting sensor for delivery of air-to-ground and air-to-air missiles, rockets, and guns.

### Activity

- The Navy conducted operational testing (OT-IIIIB) of the AH-1Z and UH-1Y aircraft from October 2012 from January 2013 at Yuma Proving Ground, Arizona; Marine Corps Base Twenty-nine Palms, Camp Pendleton; and Naval Air Weapons Station China Lake, California.
  - Commander, Operational Test and Evaluation Force executed OT-IIIIB in accordance with a test plan that DOT&E approved on October 12, 2011.
  - An exception was made to cancel the planned shipboard phase of testing as no ship was available.



- As of July 2013, Bell Helicopter has delivered 79 of the planned 160 UH-1Y aircraft and 32 of the planned 189 AH-1Z aircraft.

### Mission

- Marine light/attack helicopter squadron detachments are typically deployed with a mix of UH-1Y and AH-1Z helicopters.
- Detachments equipped with the AH-1Z attack helicopter conduct rotary-wing close air support, anti-armor, armed escort, armed and visual reconnaissance, and fire support coordination missions.
- Detachments equipped with the UH-1Y utility helicopter conduct command, control, assault support, escort, air reconnaissance, and aeromedical evacuation missions.

### Major Contractor

Bell Helicopter – Amarillo, Texas

- Four aircraft, two AH-1Zs and two UH-1Ys, completed a total of 163.8 flight hours in pre-test training and 62.3 flight hours during FOT&E. Crews completed 19 operational missions during FOT&E in an operationally realistic desert environment including real-world scenarios against simulated threats.
- The primary focus of OT-IIIIB was to evaluate the newly-installed SCS 6.0 software, which added or enhanced several capabilities and corrected some previously identified deficiencies.

## Assessment

- The H-1 Upgrades aircraft with SCS 6.0 remain operationally effective.
  - The OT-IIIIB unit successfully completed 19 of 23 missions. This 83-percent mission success rate is consistent with demonstrated mission success rates in previous H-1 Upgrades operational test events.
  - Two of the four mission failures were caused by blanking of the electronic warfare display. SCS 6.0 blanks the electronic warfare display if any failure is detected in the aircraft survivability equipment before or during mission execution.
  - Aside from the electronic warfare software blanking, SCS 6.0 software enhances pilot situational awareness with pilot-to-pilot cueing, improved cockpit lighting, more editable waypoints, more efficient zoom control of the AH-1Z sensor, and increased awareness of hostile fire.
- OT-IIIIB aircraft met reliability and maintainability requirements, but did not meet availability requirements. As observed in the non-deployed AH-1Z/UH-1Y fleet, the OT-IIIIB unit did not meet mission-capable rates because of long downtimes while awaiting repair parts, particularly those associated with the tail and main rotor systems. Deployed H-1 aircraft in combat in Afghanistan and with Marine Expeditionary Units afloat have higher priority for repair parts, shorter parts delays, and higher mission-capable rates.
- H-1 Upgrades units remain survivable against small arms and automatic weapons fire (up to 12.7 mm) and legacy Man-Portable Air Defense Systems. With SCS 6.0, pilots have increased awareness of hostile fire from small arms and rocket-propelled grenades, as long as all electronic warfare components are operating properly.
- Effectiveness, suitability, and survivability of H-1 Upgrades aircraft with SCS 6.0 are degraded by occasional software blanking of the electronic warfare display.
  - This means that if any failure (actual or false) is detected in the suite of aircraft survivability equipment (APR-39 and AAR-47, both missile approach and ballistic warning functions), SCS 6.0 causes the electronic warfare display to go blank.
  - SCS 6.0 detection of a single, failed electronic warfare component results in total loss of visual threat displays for all threat detection systems. When this loss of situational awareness occurs mid-mission, pilots have the option to abort the mission or continue the mission by relying on countermeasures afforded by still-functioning aircraft survivability components and cues from the wingman to detect and counter threat activity. The VX-9 test squadron tested this correction in September 2013 at China Lake and the Verification of Correction of Deficiencies report is in staffing.
  - This software blanking of the electronic warfare display caused two of the four mission failures.

## Recommendations

- Status of Previous Recommendations. The Program Office is satisfactorily addressing previous recommendations.
- FY13 Recommendations. The Navy should consider the following recommendations and verify the corrections to deficiencies during the next FOT&E period:
  1. Eliminate software blanking of the electronic warfare display.
  2. Continue efforts to increase the availability of spare parts, especially of critical rotor system components.
  3. Continue to resolve H-1 survivability concerns identified during live fire testing. Redesign the main rotor transmission and combine gearbox housings to increase run-dry capabilities following loss of lubricant, and improve the self-sealing capability of fuel bladders.