VH-92A Presidential Helicopter Fleet Replacement Program

Executive Summary

- The Navy is testing in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP), dated July 24, 2005, IOT&E Test Plan, dated May 29, 2020, and Cyber Test Plan Annex, dated August 18, 2020.
- System Development Test Articles (SDTA) 1, 2, 3, and 4 are operating at Marine Helicopter Squadron HMX-1 at Marine Corps Air Facility (MCAF), Quantico, Virginia, and have flown 431.0 hours as of September 30, 2020.
- The Integrated Test Team (ITT) began testing the next version of Mission Communication System (MCS) 3.0 in January 2020. The MCS development effort has taken the deficiencies discovered in testing and made corrections.
- The Program Office realigned the start of IOT&E from June 2020 to January 2021 to provide a better progression of Marine Helicopter Squadron HMX-1 personnel training, aircraft modifications, and squadron transition from legacy aircraft to VH-92A operational missions.
- Cybersecurity test agencies were not able to send personnel to support testing in September 2020, due to travel restrictions associated with the coronavirus (COVID-19) pandemic. The cyber tests are rescheduled for March 2021.
- In August 2020, the Navy completed their consolidated report on the survivability of the VH-92A to meet the LFT&E requirements. DOT&E is currently reviewing these data as part of the final survivability assessment in support of Initial Operational Capability.

System

- The VH-92A is a dual-piloted, twin-engine helicopter based on the Sikorsky S-92. The program will maintain the Federal Aviation Administration (FAA) airworthiness certification throughout its lifecycle.
- The VH-92A aircraft will replace the current Marine Corps fleet of VH-3D and VH-60N helicopters flown by Marine Helicopter Squadron One (HMX-1) to perform the presidential airlift mission.
- The VH-92A will operate worldwide in day, night, or adverse weather conditions. The VH-92A will be air transportable to remote locations via a single Air Force C-17 cargo aircraft.

- The government-designed MCS will provide the capability to conduct simultaneous short- and long-range, secure and nonsecure, voice and data communications. The MCS will provide situational awareness by exchanging information with outside agencies, organizations, and supporting aircraft. Lockheed Martin in Owego, New York, installs the MCS hardware and baseline software and conducts systems checks as part of VH-92A production.
- Lockheed Martin will conduct final interior finishing and aircraft painting at Owego, New York, to complete the VH-92A for delivery.

Mission

- Marine Helicopter Squadron HMX-1 will use the VH-92A aircraft to provide safe and timely transport of the President of the United States and other parties as directed by the White House Military Office.
- HMX-1 will operate the VH-92A from the White House South Lawn, commercial airports, military airfields, Navy ships, and austere sites throughout the world.

Major Contractor

Sikorsky Aircraft Corporation, a Lockheed Martin Company – Stratford, Connecticut

Activity

- The Navy is testing in accordance with the DOT&E-approved IOT&E Test Plan, dated May 29, 2020, and Cyber Test Plan Annex, dated August 18, 2020.
- Engineering and Manufacturing Development (EDM)-1 and EDM-2 aircraft are at the Naval Air Station, Patuxent River, Maryland, supporting the ITT test program. As of

September 30, 2020, the two EDM aircraft have accumulated 161.2 flight hours. SDTAs 1, 2, 3, and 4 are operating at Marine Helicopter Squadron HMX-1 in Quantico, Virginia, and have flown 431.0 hours.
- Naval Air Systems Command (NAVAIR) at St. Inigoes, Maryland, is continuing the development of the MCS

software. Systems integration laboratories, which replicate the MCS for development, test, and training, are operational.

- The ITT implemented manpower schedule controls to mitigate COVID-19 exposure risks. Those controls had minimal effect to program execution.

- HMX-1 personnel conducted an air transportability integrated developmental/operational test in November 2019. Helicopter Developmental Test and Evaluation Squadron HX-21, HMX-1, and PMA-274 used revised procedures and redesigned ground support equipment to disassemble, reassemble, and load VH-92A aircraft on a C-17A. The event involved HMX-1 personnel conducting a test event under the supervision of the ITT with support from an Air Force C-17A crew and equipment.

- The ITT began testing the next version of MCS 3.0 in January 2020. MCS 3.0 testing incorporated recommendations from DOT&E's VH-92A Operational Assessment OT-B1 report, dated May 28, 2019, including the use of MCS test scripts that aided in the discovery of deficiencies during the assessment. The Program Office has been addressing MCS deficiencies, discovered in testing. The ITT has tested five iterative releases of MCS 3.1 software. The NAVAIR design team continues to make improvements. The ITT will begin testing on MCS 3.2 in January 2021.

- The Program Office obtained assistance from Johns Hopkins University Applied Physics Laboratory to analyze the causes and potential mitigations for landing zone damage. The damage was found to be primarily due to engine exhaust, auxiliary power unit exhaust, and discharge of aircraft fluids onto the grass.

- The Program Office realigned the start of IOT&E from June 2020 to January 2021. The realignment provided the program and HMX-1 a better progression of HMX-1 personnel training, aircraft modifications, and transition of squadron operations to permit VH-92A to perform Presidential Lift missions within the National Capital Region in July 2021.

- HMX-1 has conducted several Integrated Test (IT) events to collect data for inclusion in the IOT&E analysis and test report. HMX-1 deployed to Peterson AFB, Colorado, to simulate a long-distance mission to support the President. HMX-1 conducted a transportability load in Quantico, Virginia, on August 18, 2020, unloaded in Colorado, conducted mission events in Colorado on August 19, 2020, and returned to Quantico, Virginia, on August 21, 2020. Preliminary data analysis indicated HMX-1 met all mission requirements with the VH-92A.

- HMX-1 conducted multiple practice contingency operations at MCAF Quantico, Virginia, on September 9, 2020. The events simulated contingency operations that the current In-Service aircraft perform. Data from the event are being analyzed and will be included in the IOT&E test report.

- Commander, Operational Test and Evaluation Force (COTF) was scheduled to conduct a cybersecurity cooperative vulnerability and penetration assessment (CVPA) and an adversarial assessment (AA) in September 2020. The testing required assistance from cyber testing experts from multiple agencies. Those agencies were not able to send personnel to support testing in September 2020 due to travel restrictions associated with COVID-19. The cyber tests are rescheduled for March 2021.

- Sikorsky maintenance personnel discovered the presence of material blisters inside both fuel cells in all six delivered VH-92A. The blisters were first discovered on EDM 2 during a regularly scheduled 24-month inspection. The program initiated an inspection for the other five VH-92As once the blisters were discovered. After analysis by Sikorsky and the fuel cell vendor, the Program Office reported that all aircraft would return to service with an additional one-time visual check before first refueling, followed by an every-50-hour fuel filter check during continued operations. NAVAIR Safety has dispositioned the issue as "No Residual Risk" upon completion of repairs. Repair planning and scheduling is ongoing, as is further analysis for causal factors and corrections.

- The Navy completed their consolidated report on the survivability of the VH-92A in August 2020. DOT&E is currently reviewing these data as part of the final survivability assessment in support of Initial Operational Capability.

Assessment

- The transportability events conducted in November 2019 and August 2020 demonstrated how HMX-1 will execute long-range missions in the real world. The revised procedures and redesigned equipment allowed HMX-1 to perform the events within program timeline requirements, and were the result of data and lessons learned during the previous air transportability demonstration HMX-1 conducted in January 2019.

- Airframe software changes have improved the aircraft availability. Aircraft publications need additional guidance to the aircrew for aircraft malfunctions and their effect on mission availability. The Program Office will deliver updated publications prior to IOT&E in January 2021.

- MCS 3.0 hardware and software show performance improvement over the MCS 2.1.3 that was tested during the FY19 Operational Assessment. MCS reliability needs additional improvements to meet the demands for operational employment. Design changes in hardware are needed, particularly intercommunication system cords, to improve the usability of communications equipment at different passenger seats in the aircraft.

- The Program Office has made procedural changes to minimize the effects of engine and Auxiliary Power Unit (APU) exhaust on Landing Zone (LZ) grass. Design changes to the airframe will prevent aircraft fluids from exiting the aircraft, and redirect APU and engine exhaust away from the LZ. The ITT has collected data on the effectiveness of these procedural and airframe changes.

- Emerging cyber threats and adversaries will require COTF to perform cyber testing that it does not have the appropriate resources to conduct. COTF should expand its cyber testing capabilities for system vulnerabilities that real-world adversaries will seek to exploit.

- Realigning the start of IOT&E provides several benefits:
  1. The program has additional time to correct emerging deficiencies in both the airframe and the MCS. HMX-1 will participate in IT of the next MCS software drop, MCS 3.2, from November – December 2020. All aircraft will be retrofit with MCS 3.2 in the December 2020 timeframe.
  2. It permits the completion of additional aircraft modifications prior to IOT&E and transition to operational assignments.
  3. It permits a more realistic timeframe to conduct adequate aircrew and maintainer training to support both IOT&E and the transition to operational assignments.
  4. It allows HMX-1 to execute IOT&E without the competing priorities of the 2020 Presidential Campaign.

Recommendations

The Navy should:
  1. Ensure the cyber test teams receive resources required to conduct an adequate CVPA and AA.
  2. Continue to refine aircraft publications to provide aircrew go/no-go criteria for aircraft malfunctions.
  3. Ensure adequate resources to support integrated testing for future corrections of deficiencies and capability upgrades.