CMV-22B Joint Services Advanced Vertical Lift Aircraft – Osprey – Carrier Onboard Delivery

The Navy completed a second FOT&E (FOT&E II) in February 2024 focused on the CMV-22B's Communications Upgrade (CU) system. In July 2024, DOT&E published a classified combined FOT&E and LFT&E report that determined the system's operational effectiveness, suitability, and survivability. The CU system is operationally effective using the Iridium SatPhone. Operational suitability for overall aircraft systems is unchanged from previous reporting. Analysis of the CMV-22B survivability to operationally relevant kinetic threats indicated that the aircraft has similar survivability as the legacy platforms and discovered no new nor unexpected vulnerabilities.

SYSTEM DESCRIPTION

The CMV-22B Osprey is a tiltrotor vertical/short takeoff and landing aircraft that can take off and land as a helicopter, and transit as a turboprop aircraft. The CMV-22B is the replacement of the in-service C-2A Greyhound carrier onboard delivery fixed-wing aircraft. The CMV-22B is based on the MV-22B design, with several changes integrated to support the carrier onboard delivery mission: increased fuel capacity to extend the range, fuel jettison system, public address system for making announcements in the cabin area, high-frequency (HF) radio for over-the-horizon communications, and lighting to assist with cargo loading in the cabin and cargo areas.

To meet the required 1,150 nautical mile mission profile, the CMV-22B has increased the fuel capacity by 524 gallons through the expansion of the two forward external sponson tanks, and the addition of two internal inboard wing auxiliary tanks (WATs) located over the aircraft cabin.

The Navy began installing the CU system into the baseline CMV-22B in FY21. The CU is designed to provide operators with communications and situational awareness enhancements when conducting logistics, search and rescue, and mobility missions. The CU system includes Link 16 tactical data link, Iridium satellite phone (Satphone), and TacView smart tablets. Link 16 provides secure communications and a common operational picture for Link 16 network participants by sharing location information. The Iridium Satphone enables over-the-horizon communications and acts as a backup for beyond line-of-sight communications provided by the HF radio. The TacViews are used to visualize the common operating picture and improve situational awareness via a moving map.

MISSION

The Navy will employ units equipped with CMV-22B aircraft to perform the primary mission of transporting personnel, mail, and cargo from forward logistics sites to aircraft carriers at sea. A detachment of three aircraft will support a carrier strike group. The CMV-22B must be capable of conducting operations in all weather conditions, day and night, in a permissive threat environment. Secondary missions include vertical onboard delivery, vertical replenishment, medical evacuation, Naval special warfare support, missions of state, search and rescue support, and self-deployment into the theater of operations.

PROGRAM

The CMV-22B is an Acquisition Category IC program. The Navy has procured all 48 aircraft under the program. DOT&E approved the CMV-22B TEMP and the Alternative LFT&E Plan in March 2020. The Navy declared initial operational capability in 1QFY22 after FOT&E I completed in 4QFY21. DOT&E published a combined FOT&E and LFT&E report with a classified annex in June 2022, detailing CMV-22B performance demonstrated during FOT&E I. DOT&E approved another FOT&E test plan in November 2022 and a cyber survivability test plan in March 2023, to support FOT&E II. DOT&E published a classified

CMV-22B Osprey Flight Operations from USS Carl Vinson *(CVN 70), August 2023*

combined FOT&E and LFT&E report in July 2024 detailing CMV-22B performance demonstrated. The Navy plans to declare full operational capability in FY25.

» MAJOR CONTRACTOR

- Bell-Boeing Joint Project Office – Amarillo, Texas

TEST ADEQUACY

The Navy completed FOT&E II in 2QFY24. DOT&E observed testing. Testing deviated from the DOT&E-approved test plan but provided sufficient data to assess the operational effectiveness and survivability of the CU system and to reevaluate the operational suitability of the aircraft systems assessed during FOT&E I. The Navy did not conduct the HF radio calls using the CU system, as stipulated in the test plan. Instead, HF call performance data was gathered on non-CU-equipped aircraft as a verification of correction of deficiencies from FOT&E I. The Navy did not complete the maintenance demonstrations for the Link 16 components of the CU system installed on the operational test aircraft because the time to remove and reinstall these components would have negatively impacted the fleet squadron's real-world mission taskings.

A DOT&E-approved known test limitation precluded the evaluation of the CU system suitability. The Navy updated the Link 16 software in the middle of FOT&E II but did not complete in-flight verification testing.

FOT&E II included a verification of correction of deficiencies for a fix to the HF radio, which is on both CU-equipped and non-CU-equipped aircraft.

The Navy conducted a cooperative vulnerability and penetration assessment, and an adversarial assessment of the CU system in 2QFY23 at Naval Air Station Patuxent River, Maryland. Testing was observed by DOT&E and conducted in accordance with the DOT&E-approved test plan and was adequate to assess the survivability of the CU system in a cyber-contested environment.

The Navy previously performed a series of live fire ballistic tests on a full-scale, production representative CMV-22B test article, to evaluate the damage tolerance of the expanded fuel sponson and WATs when impacted by threat projectiles at the Naval Air Warfare Center – Weapons Division China Lake, California, in FY19. During FY24, the Navy completed the system-level vulnerability and personnel protection assessments, and structural analyses to determine the post-damage residual capability of the aircraft in accordance with the DOT&E-approved test plan.

PERFORMANCE

» EFFECTIVENESS

FOT&E II proved units equipped with the CU-installed CMV-22B aircraft are operationally effective using the Iridium Satphone, which demonstrated a high success rate of two-way communications and high voice quality during calls. The Navy implemented Link 16 software corrections during FOT&E II; verification of the software update will be required in a future FOT&E period. HF radio performance on CU-equipped aircraft cannot be assessed with statistical confidence due to the limited number of test points executed. On non-CU-equipped aircraft, HF radios were effective for unencrypted calls, but significantly lower performance was observed for encrypted calls.

Additional details on the operational effectiveness are included in the classified July 2024 report.

» SUITABILITY

The overall aircraft operational suitability assessed during FOT&E II is consistent with the previous assessment from DOT&E's June 2022 report on FOT&E I and discussed in the FY23 Annual Report. Not all metrics could be assessed due to the limited number of test hours executed in FOT&E II.

Assessment of the CMV-22B containerized flight training device and virtual maintenance trainer was deferred from FOT&E I to FOT&E II. The containerized flight training device was usable, but future versions require the incorporation of CU capability and the associated collection of operational test data. The virtual maintenance trainer was

usable. Additional operational test data is required, however, to assess the incorporation of new maintenance steps that were implemented after FOT&E II ended.

Additional details on the operational suitability are included in the classified July 2024 report.

» SURVIVABILITY

FOT&E II demonstrated structural damage to the expanded fuel sponson and self-sealing of the WAT fuel bladders is similar to that of the legacy MV/CV-22 variants. Navy testing did not uncover any new failure mechanisms. System-level survivability and personnel protection analyses were also similar to the MV/CV-22. Due to material obsolescence issues, the Navy is working to qualify a new material supplier for V-22 fuel bladders. When that effort is completed, additional ballistic testing will be necessary to ensure continued survivability.

Additional details on system survivability, including cyber survivability of the CU system are included in the classified July 2024 report.

RECOMMENDATIONS

The Navy should:

1. Conduct additional CU testing on operational networks in a future FOT&E period to verify deficiencies are corrected.
2. Conduct additional HF radio testing on CU-equipped CMV-22B aircraft in a future FOT&E period.
3. Include CU capability in the future versions of the training systems and collect suitability data in a future FOT&E period.
4. Continue to implement recommendations in the combined FOT&E and LFT&E report from June 2022, as recommended in the FY23 Annual Report, and implement recommendations from the July 2024 report.