

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

Executive Summary

- The Navy is testing in accordance with the DOT&E-approved Test and Evaluation Master Plan (TEMP) and Alternative LFT&E plan dated March 20, 2020.
- Changes to the baseline MV-22B design include increased fuel capacity, incorporation of CV-22B fuel jettison, integrated public address (PA) system, high-frequency (HF) radio, cabin and cargo lighting, and a Navy paint scheme.
- Fleet Logistics Squadron VRM 30/40 detachments equipped with CMV-22B will perform the primary mission of Airborne Resupply/Logistics for Seabasing (AR/LSB).
- Operational Test and Evaluation Squadron VX-1, supported by aircraft and personnel from VRM-30, will conduct Operational Test period OT-D1, which is scheduled to begin in January 2021.
- In order to evaluate the effects of the CMV-22B survivability and force protection against operationally relevant kinetic threats, the LFT&E Strategy heavily leveraged previous MV-22B data. LFT&E testing is focused on the evaluation of the effects of changes to the fuel system design on survivability.

System

- The CMV-22B Osprey is a tiltrotor Vertical/Short Takeoff and Landing (V/STOL) aircraft. The design of the CMV-22B is based on the MV-22B.
- Changes to the baseline MV-22B design include increased fuel capacity, incorporation of CV-22B fuel jettison, integrated PA system, HF radio, cabin and cargo lighting, and a Navy paint scheme.
- Increased fuel capacity design changes include an enlarged aft sponson and new wing fuel tanks.
- The fuel jettison system will exit at the left-hand lower tail section and will ensure no fuel impingement while in airplane mode.
- The PA system will provide a handheld microphone to make audio broadcasts in the aircraft cabin.
- The HF Radio will utilize the same antenna and antenna tuning unit as the CV-22B.
- The aft cabin and cargo lighting solution will be compatible with Night Vision Imaging System (NVIS) white lighting and



green lighting configurations and will include a cabin control panel.

Mission

- Fleet Logistics Squadron VRM 30/40 detachments equipped with CMV-22B will perform the primary mission of Airborne Resupply/Logistics for Seabasing (AR/LSB).
- The CMV-22B fills the Joint Force Maritime Component Commander time-critical logistics air connector requirements by transporting personnel, mail, and priority cargo from advance bases to the Seabase.
- Additional secondary missions include: Vertical Onboard Delivery; Vertical Replenishment (VERTREP); Medical Evacuation (MEDEVAC); Naval Special Warfare (NSW) Support; Missions of State; and Search and Rescue (SAR) Support.

Major Contractors

Bell-Boeing Joint Venture:

- Bell Helicopter – Amarillo, Texas
- The Boeing Company – Ridley Township, Pennsylvania

Activity

- The Navy has been conducting integrated developmental and operational, cybersecurity, and live fire testing in accordance with the DOT&E-approved TEMP and Alternative LFT&E Strategy dated March 20, 2020.
- CMV-22B developmental test aircraft N-1 is part of the V-22 Multi-Year 3 production contract, and has been

augmented with temporary instrumentation to support developmental test. N-1 supported Bell-Boeing acceptance and developmental tests to validate the initial flight clearance from December 2019 to January 2020. N-1 ferried to Developmental Test and Evaluation Squadron HX-21 at

FY20 NAVY PROGRAMS

the Naval Air Station (NAS) Patuxent River, Maryland, on February 2, 2020.

- CMV-22B developmental test aircraft N-2 is part of the V-22 Multi-Year 3 production contract. It has permanent instrumentation installed to support flight envelope developmental test. N-2 ferried to HX-21 at NAS Patuxent River, Maryland, on May 21, 2020.
- As of September 30, 2020, Bell-Boeing has delivered 4 of 44 planned fleet aircraft to Fleet Logistics Squadron VRM-30 at NAS North Island, California.
- HX-21 implemented two shift maintenance teams in the spring of 2020 to mitigate the coronavirus (COVID-19) pandemic exposure risks. The Program Office prioritized test efforts for other aircraft supporting test events, which slowed progress on N-2's acceptance at the squadron. The test team conducted CMV-22B test flights while supporting two high priority MV-22B shipboard test periods. Both test periods required 40 members of the test team to conduct a 2-week Restriction of Movement (ROM) period due to COVID-19 protocols, which reduced manpower availability and affected flight test productivity. The test program is approximately 6 weeks behind schedule, but has improved test productivity since the shipboard test periods. The Integrated Test Team (ITT) projects it will be on schedule by November 2020.
- N-1 and N-2 have flown 111.8 hours as of September 30, 2020. CMV-22B ITT has conducted test events to collect data on the fuel system, aircraft flying qualities and structural loads, and to measure the effects of operating in an electromagnetic environment
- VX-1, supported by aircraft and personnel from VRM-30, will conduct OT-D1, which is scheduled to begin in January 2021. OT-D1 will include test periods at sea aboard an aircraft carrier and at ashore fleet logistics locations during a carrier strike group Composite Training Unit Exercise (COMPTUEX).
- Bell-Boeing has begun a redesign effort for CMV-22B fuel bladders 4 and 5, the bladders located in the wings closest to the aircraft fuselage. The original design used 4-ply materials that were found to be difficult to manufacture, install, and service. The new design will use 2-ply materials, but the new design will not be installed in the OT-D1 aircraft. The time to develop and qualify the new design will delay live-fire testing of the wing tanks until 3QFY21.
- The Program Office is adding a commercial off-the-shelf (COTS) interim solution for Required Navigation Performance/Area Navigation (RNP/RNAV) to support CMV-22B's first deployment. RNP/RNAV provides onboard navigation performance monitoring and alerting capability to ensure that the aircraft stays within a specific containment area, and is a requirement for aircraft operations in certain areas around the world. The Program Office will implement a final, integrated RNP/RNAV system in 2QFY24.
- The ITT conducted a Cyber Table Top (CTT) exercise on January 14, 2020. Cyber test planning is in work. Developmental cyber testing is planned to begin in

October 2020. A cooperative vulnerability and penetration assessment (CVPA) is planned for January 11 – 15, 2021, and the adversarial assessment (AA) is planned for January 18 – 22, 2021. The CVPA and AA test plans will incorporate the results from the CTT into the test design.

- In June 2019, the contractor performed Phase II qualification testing of the enlarged forward fuel sponson at China Lake, California. LFT&E of the 4-ply Wing Auxiliary Tanks No. 4 and No. 5 is planned for October 2020. LFT&E of the 2-ply Wing Auxiliary Tanks is planned for April 2021.

Assessment

- Developmental test events found the flying characteristics of the CMV-22B are very similar to the Marine MV-22B.
- Operational Test Squadron VX-1 has participated in Integrated Test (IT) efforts at HX-21. HX-21 and VX-1 have completed IT events for the PA system and cabin lighting system. Several deficiencies have been discovered, including PA system feedback and lighting panel control switch designs, which may result in additional changes to the PA and lighting systems.
- The CMV-22B will have maneuvering restrictions in effect until the ITT completes developmental flight envelope testing. The full maneuvering envelope will not be available for first deployment in 4QFY21. VX-1 will assess the maneuvering restrictions as part of OT-D1.
- Without RNP/RNAV, there will be arrival and departure limitations under instrument meteorological conditions at certain airfields and routing challenges due to elimination of ground-based navigation aids and V-22 navigation database limitations. These limitations will increase transit times due to suboptimal routing and prohibit entry into some airfields. The intent of the interim COTS GPS solution is to bridge the navigation capability gap between initially fielded aircraft and the Boeing/Raytheon integrated solution on the CMV-22B aircraft.
- Conducting OT-D1 during COMPTUEX with a full carrier air wing embarked aboard the aircraft carrier is operationally representative of how CMV-22B will integrate into the carrier strike group.
- Comparison of the qualification test data of the enlarged fuel sponson with legacy MV-22 data indicated that the vulnerability of this component is equivalent to that of the MV-22.
- Redesign of the wing fuel cells will delay the final survivability assessment to after Initial Operational Capability (IOC). The first 16 aircraft will be deployed with the original fuel cell design. The final survivability assessment will encompass both designs.

Recommendation

1. The Navy should ensure adequate resources for follow-on testing for the Boeing/Raytheon RNP/RNAV, and any other future capability improvements after IOC.