CV-22 Osprey

Executive Summary

- Air Force Special Operations Command (AFSOC) tested the upgraded Suite of Integrated Radio Frequency Countermeasures (SIRFC) hardware and software version 7.0 from January through July 2012 and conducted an operational test of the GAU-21 .50 caliber Ramp-Mounted Weapon System (RMWS) in February through May 2013. They also evaluated the reliability of the upgraded Icing Protection System (IPS) during flights into actual icing conditions during January 2013. AFSOC evaluated relocated communications antennas from October through December 2012.
- In spite of shortcomings, operational testing indicates that current SIRFC performance, combined with appropriate tactics, techniques, and procedures, results in CV-22 survivability against most expected radar threat systems.
- The GAU-21 .50 caliber RMWS is more reliable than the previously fielded GAU-18 RMWS.
- The CV-22 IPS has improved since the 2008 IOT&E.
- During the 2012 radio antenna relocation testing, the CV-22 communicated with ground troops at distances from 0.5 to 25 nautical miles (nm) and with another aircraft at distances from 0.5 to 120 nm.

System

- There are two variants of the V-22: the Marine Corps MV-22 and the Air Force/U.S. Special Operations Command CV-22. The air vehicles for Air Force and Marine Corps missions are nearly identical, with common subsystems and military components sustainable by each Service's logistics system.
- The CV-22 is the replacement for aging Special Forces MH-53 helicopters. It is a tilt-rotor aircraft capable of conventional fixed-wing flight and vertical take-off and landing over the range of Special Operations missions.
- The speed and range of the CV-22 enable support for Special Operations missions that were not possible with legacy rotary-or fixed-wing aircraft.
- The CV-22 can carry 18 combat-ready Special Operators 538 nm and return. It can self-deploy up to 2,100 nm with one aerial refueling.

- The CV-22 will augment Air Force Special Operations MC-130 aircraft. It has terrain-following/terrain-avoidance radar, an advanced multi-frequency communication suite, and a more robust electronic defense suite.
- Future capabilities will include engine sub-assembly upgrades, strategic refueling capability, and various fixes to deficiencies identified during IOT&E.
- As of August 13, 2013, 34 of 50 CV-22 aircraft have been fielded.

Mission

Air Force squadrons equipped with the CV-22 will provide high- speed, long-range insertion and extraction of Special Operations Forces to and from high-threat objectives.

Major Contractors

Bell-Boeing Joint Venture:

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

Activity

- To address 2008 CV-22 IOT&E deficiencies with SIRFC, AFSOC tested upgraded SIRFC hardware and software version 7.0 from January from July 2012.
- AFSOC evaluated the relocation of CV-22 communication antennas from October through December 2012. The antennas were relocated to address limited operating range and inadequate reliability with the CV-22 radios used during the 2008 IOT&E.
- AFSOC evaluated the reliability of the upgraded IPS. CV-22 pilots flew 21 sorties totaling 73 flight hours searching for icing conditions, with approximately 26 hours in light-icing conditions from January 10 – 29, 2013.

- AFSOC conducted an operational test (in accordance with an informal oversight arrangement with DOT&E) of the GAU-21 .50 caliber RMWS from February through May 2013. The GAU-21 was fired from the ramp following dust-out landings at test ranges and from aircraft deployed to Afghanistan.

Assessment

- Block 5 SIRFC shortfalls during the 2008 CV-22 IOT&E included inaccurate and late threat situational awareness, limited countermeasure effectiveness against some threat systems, and a high rate of reliability failures. Since IOT&E, the Air Force upgraded CV-22 SIRFC with new, higher-power transmitters, cabling, radio-frequency switches, antennas, and Block 7 operational flight software. The DOT&E FY12 CV-22 Annual Report included partial analysis of FY12 testing. Completed analysis shows:
  - Block 7 SIRFC exhibited significant improvement in threat situational awareness displayed and some improvement in reliability. The countermeasure dispenser does not function properly in automatic mode, requiring manual dispense of countermeasures.
  - The Block 7 electronic countermeasures performed no better than the Block 5 electronic countermeasures. The system is still subject to software failures requiring reboots, during which the aircraft may be more vulnerable to threat systems. In spite of these shortcomings, operational testing indicates that current SIRFC performance combined with appropriate tactics, techniques, and procedures results in CV-22 survivability against most expected radar threat systems.
- CV-22 radio communications with ground forces during the 2008 IOT&E were not effective beyond approximately 5 nm and frequently failed to establish radio contact with the ground troops within 0.5 nm. During the 1QFY13 radio antenna relocation testing, the CV-22 communicated with ground troops at distances from 0.5 to 25 nm and with another aircraft at distances from 0.5 to 120 nm. The test was limited to a small subset of operational and atmospheric conditions.
- The CV-22 IPS has improved since the 2008 IOT&E. During the IOT&E, the IPS frequently failed the ground built-in test checks and two failure modes led to damage to the aircraft. This damage resulted in restrictions on V-22 flight in icing conditions. Testing in 2013 demonstrated that the probability that the upgraded IPS can operate for 45 minutes in light icing conditions without a failure is 87 percent (80 percent confidence interval: 77 to 92 percent). This improvement expands the operational envelope for the CV-22 to include deliberate operations in light icing, if required.
- The GAU-21 .50 caliber RMWS is more reliable than the previously fielded GAU-18 RMWS. During testing in a dust-out landing, the GAU-18 was able to fire only 16 rounds, jamming 3 times before the gun stopped firing. The overall stoppage rate of the GAU-21 is approximately 2,000 rounds between stoppages, whether in dust-out or dust-free landings. The aircrew noted that during testing, none of the GAU-21 stoppages appeared to have been caused by the accumulation of dust and debris.

Recommendations

- Status of Previous Recommendations. The program has addressed previous recommendations with the exception of battle damage repair and strategic refueling capability.
- FY13 Recommendations.
  1. The Services should address SIRFC deficiencies and demonstrate improved performance and reliability in future operational testing. Meanwhile, crews should combine the enhanced situational awareness provided by Block 7 SIRFC with appropriate tactics, techniques, and procedures to defeat threat systems.
  2. AFSOC should conduct future radio communications testing in the context of end-to-end operational missions in a variety of operational and atmospheric conditions.