

## CV-22 Osprey

### Executive Summary

- Air Force Special Operations Command (AFSOC) conducted recent operational testing of upgrades to the Directional Infrared Countermeasure (DIRCM) and Suite of Integrated Radio Frequency Countermeasures (SIRFC) systems that demonstrated improvements in countermeasure effectiveness.
- AFSOC completed operational assessments of ramp-mounted machine guns and flight control software in FY12.
- AFSOC plans to evaluate improvements to the icing protection and communications systems in FY13.

### System

- There are two variants of the V-22: the Marine Corps MV-22 and the Air Force/U.S. Special Operations Command (USSOCOM) 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.
- Its speed and range enable the ability to support Special Operations mission demands that were not possible with legacy rotary- or fixed-wing aircraft.
- The CV-22 can carry 18 combat-ready Special Operators 538 nautical miles (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.

### 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 deficiencies with electronic defense systems discovered during the 2008 CV-22 IOT&E, AFSOC tested upgraded hardware and software of the DIRCM (April through June 2010) and SIRFC (April through July 2012).
- The CV-22 program relocated communication antennas to address limited operating range and inadequate reliability with the CV-22 radios demonstrated during the 2008 IOT&E.
- AFSOC conducted operational assessments of the GAU-18 and GAU-21 .50 caliber Upgraded Ramp-Mounted Weapon System in March through June 2012. AFSOC had modified these machine guns to improve weapons reliability following brownout landings.
- AFSOC evaluated the Tactical Software Suite 10.3.01 in March through April 2012. The major feature of this software

version was the addition of the capability to perform coupled or uncoupled tactical approaches (during a coupled approach, flight crew utilize autopilot to fly the aircraft; during an uncoupled approach, the flight crew fly the aircraft manually).

### Assessment

- DOT&E evaluated the DIRCM system during the CV-22 IOT&E in 2009 and reported significant reliability and performance shortfalls. Since IOT&E, AFSOC upgraded the CV-22 DIRCM with a new system processor, updated software, and Guardian Laser Transmitter Assembly designed to reduce system weight and to improve system reliability. AFSOC tested the hardware and software upgrades to the CV-22 DIRCM and the upgrades meet performance

requirements. IOT&E reliability failures have not resurfaced during testing or fielding.

- DOT&E evaluated the SIRFC system during the IOT&E and reported substantial significant shortfalls in providing threat situational awareness and limited countermeasure effectiveness. DOT&E also reported a high rate of reliability failures during IOT&E. Since IOT&E, AFSOC upgraded the CV-22 SIRFC with new high-power transmitters, cabling, radio-frequency switches, antennas, and Block 7 Operational Flight Software with over 140 changes to correct system deficiencies; nonetheless, some deficiencies remain outstanding. Analysis of the SIRFC test data from FY12 testing is ongoing and will be reported in 2013.
- The GAU-18 .50 caliber Upgraded Ramp-Mounted Weapon System is not effective or suitable for fielding. Dust covers proposed for the GAU-18 did not protect the weapon from dust intrusion and resulted in numerous broken extractor pins.
- In testing, the GAU-21 demonstrated potential for reliable performance following exposure to brownout conditions. Repeated brownout landings did not adversely affect the rate of fire.
- The Tactical Software Suite 10.3.01 enabled pilots to conduct coupled and uncoupled tactical approaches. This enhancement reduces pilot workload when coupled approaches are feasible.
- While the program has made progress in improving CV-22 radio effectiveness and reliability, further testing and

assessment is needed. Additionally, deficiencies with the Icing Protection System remain. Improvement and further testing is needed in both areas.

- No development or testing has been accomplished to address aerial refueling from strategic tankers.
- No additional flight testing or engineering analysis have been performed, indicating a change would be appropriate to DOT&E's September 2005 assessment that the V-22 cannot perform autorotation to a survivable landing.

## Recommendations

- Status of Previous Recommendations. The program addressed all but one of the previous recommendations. The recommendation regarding development of battle damage repair procedures and fire suppression systems for the aircraft dry bays remains valid.
- FY12 Recommendations.
  1. The program should address deficiencies with the multi-mission advanced tactical terminal and the strategic refueling capability as documented in IOT&E and then operationally test the fixes.
  2. AFSOC should proceed with plans to evaluate communications effectiveness and reliability in FY13.
  3. AFSOC should proceed with plans to evaluate reliability fixes to the Icing Protection System under operationally representative icing conditions in FY13.