

Suite of Integrated Radio Frequency Countermeasures (SIRFC) (AN/ALQ-211)

Executive Summary

- Suite of Integrated Radio Frequency Countermeasures (SIRFC), as installed on the MH-47 helicopter, will undergo IOT&E during FY06. Prior to operational testing, improvements to Electronic Countermeasures (ECM) software and built-in test (BIT) functionality are required.
- Both the helicopter and CV-22 applications of SIRFC have demonstrated that the Radar Warning Receivers (RWR) are effective, but the ECM jamming has limited potential as the sole source of protection.
- The three Services, and U.S. Special Operations Command, should continue to improve joint involvement in development and test planning for SIRFC.

System

- SIRFC is a Radio Frequency (RF) self-protection system designed for installation on aircraft.
- Major SIRFC subsystems are:
 - Advanced threat RWR
 - Advanced threat radar jammer/ECM
- SIRFC is planned to support future integration of an infrared self-protection suite.
- SIRFC is being integrated on the Army's MH-47 and MH-60 helicopters. These are both special operations platforms.
- The Joint Navy and Air Force V-22 Tilt Rotor Aircraft program is integrating SIRFC on the CV-22. This is an Air Force special operations aircraft currently in development.

Mission

- U.S. Special Operations Command will use SIRFC to enhance the survivability of aircraft on missions that penetrate hostile areas.



- The U.S. Army Special Operations Command is developing and testing SIRFC as an advanced RF self-protection system for Special Operations Forces helicopters.
- SIRFC is designed to provide self-protection against threat radar-guided weapons systems by:
 - Improving aircrew situational awareness and threat warning
 - Employment of active electronic jamming countermeasures
 - Expending countermeasures (i.e. chaff)

Activity

U.S. Army Special Operations Command (USASOC)

- USASOC conducted an operational assessment of SIRFC as installed in the MH-47 and MH-60 helicopters to assess the effectiveness and suitability to support the Milestone C/Low-Rate Initial Production (LRIP) decision in June 2005.
- The operational assessment included 85 flight hours of development testing at the Naval Air Weapons Station, China Lake, California, Electronic Combat Range, and Nevada Test and Training Range.
- The Army also supported the June 2005 LRIP decision with more than 450 total hours of reliability growth testing on two complete SIRFC systems in a laboratory environment.

- A Test and Evaluation Master Plan (TEMP) was prepared with planned DOT&E approval signature in early FY06.
- The TEMP focused on the overall program test flow, but is focused on the SIRFC/MH-47 IOT&E. This IOT&E supports a SIRFC/MH-47 full-rate production decision planned for 4QFY06.

U. S. Air Force and U. S. Navy Test Activity Supporting CV-22 Development

- The V-22 program is post-Milestone III and entered full-rate production late in 2005. Three CV-22 LRIP special operations

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variants are currently in development testing in preparation for an operational utility evaluation in FY06.

- Ongoing CV-22 developmental testing by the Navy using a modified MV-22 included assessment of the SIRFC RWR/ECM effectiveness and system interoperability with the onboard navigation and weather radar in 2005. This test was conducted with the Air Force Operational Test and Evaluation Center and the Navy's Operational Test and Evaluation Force's involvement.

Assessment

U.S. Army Special Operations Command

- Testing on the MH-47 and MH-60 was adequate to support a Milestone C/LRIP decision and acquisition of 17 LRIP systems. Testing was conducted in accordance with DOT&E-approved test plans.
- The SIRFC RWR demonstrated good effectiveness in many scenarios, including multi-threat scenarios. This is a significant improvement over the 2001 performance results from AH-64 Apache helicopter tests. After limited testing, the SIRFC RWR has demonstrated significant improvement over the legacy APR-39 RWR. The demonstrated stand alone (no ECM) performance of the RWR shows improved crew situational awareness and potentially enhances survivability.
- The SIRFC RWR has experienced false alarms caused by ambiguities between threat and non-threat signals that could be mitigated by creation of theater specific libraries.
- The expected effectiveness of the SIRFC ECM jammer as the primary source of protection is limited in its current configuration. Demonstrated survivability improved when combined with tactics and use of expendables. DOT&E does not expect resolution of ECM effectiveness concerns prior to IOT&E.
- SIRFC will be ready for the Army IOT&E in FY06 after the following issues are resolved:
 - Correction of software deficiencies identified during the developmental test flight tests.
 - The maturity of the SIRFC BIT is reassessed in the planned FY06 BIT demonstration.
- IOT&E of SIRFC as installed in a production-configured MH-47G, scheduled for 2006, will be required to support a full-rate production decision.

U. S. Air Force and U. S. Marine Corps CV-22 Development

- In the CV-22 developmental test, the SIRFC interoperability with the onboard navigation and weather radar was good and RWR/ECM performance testing was adequate.

- Demonstrated performance of the CV-22 SIRFC integration and interoperability was similar to the Army's results with good RWR effectiveness and limited capability for effective ECM jamming.
- The Navy and Air Force will conduct an Integrated Systems Evaluation development test in 1QFY06 to ensure all avionics systems are interoperable. This will include ECM effectiveness testing at the Electronic Combat Range. Successful Integrated Systems Evaluation is necessary for the system to be ready for the FY06 Air Force operational utility evaluation. The FY06 operational utility evaluation includes an assessment of SIRFC as installed in the CV-22, but also full multi-spectral countermeasures defensive suite effectiveness by integrating SIRFC with the Directed Infrared Countermeasures system.
- The Army Special Operations Command TEMP preparations are adequate to support SIRFC IOT&E. Coordination has been conducted between the Army's Special Operations Command, the U.S. Special Operations Command Staff, and DOT&E. The Air Force CV-22 and the Army Special Operations Command Helicopter test planning have had some Joint interaction, with more expected. Adequate test planning coordination for FY06 IOT&E has not been conducted.
- The non-availability on U.S. open air ranges of required surface-to-air missile fly out models and short-range radar threat systems will challenge the adequacy of the Army's IOT&E in FY06.

Recommendations

1. The Army Special Operations Command should ensure adequate SIRFC system maturity, with an emphasis on improving ECM performance and formally assessing BIT maturity, prior to IOT&E.
2. The Air Force and Navy should report on the FY06 assessment of SIRFC as installed on the CV-22. Additionally, the Air Force should report on the assessment of integration of the multi-spectral defensive system.
3. The Army, Navy/Marine Corps, Air Force, and U.S. Special Operations Command should continue to improve the level of Joint involvement in SIRFC development and test planning.
4. The Army should consider creating theater specific threat libraries to reduce SIRFC RWR susceptibility to false alarms.
5. The Services should provide more realistic short-range radar-guided missile threats. This will support adequate testing of self-protection systems against radio frequency-guided threats.