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

Executive Summary

- The Suite of Integrated Radio Frequency Countermeasures (SIRFC) system integration is approximately 90 percent common between the U.S. Army Special Operations Command (USASOC) and Air Force Special Operations Command (AFSOC) aircraft. However, some unique aircraft integration challenges have resulted in different system effectiveness and suitability results with each Service.

Army Special Operations Command

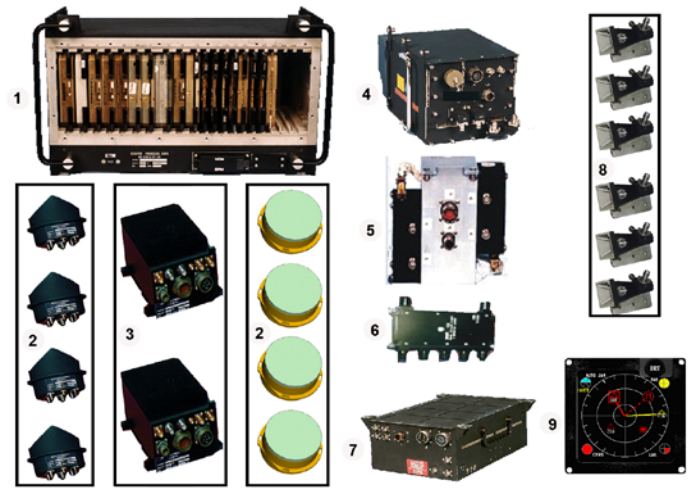
- USASOC continued reliability testing of the SIRFC radio frequency switch assembly in order to determine the root cause of hardware failures observed during 4QFY08 IOT&E and post IOT&E correction of deficiencies testing.
- As a result of analysis completed in 4QFY09, USASOC requested a complete switch redesign and additional qualification testing to be completed no later than November 2010.
- SIRFC jamming on CV-22 was less effective than that observed on the USASOC aircraft, but the system experienced no failures of the radio frequency switch. The less effective jamming and lack of radio frequency switch failures are likely related to the lower power transmitter installed on the CV-22. Operational flight testing with a new higher power transmitter will be required to confirm this assessment.

Air Force Special Operations Command and Navy

- The AFSOC, in coordination with the Navy V-22 Joint Program Office, completed operational testing of SIRFC on the CV-22 aircraft during the 3QFY08 IOT&E.
- DOT&E assessed the SIRFC integration on the CV-22 as not operationally effective due to limited threat efficacy and not operationally suitable due to reliability problems.

System

- SIRFC is an advanced radio frequency self-protection system designed for installation on aircraft.
- Major SIRFC subsystems are the following:
  - Advanced threat Radar Warning Receivers (Numbers 1, 2, 3, 6, and 9 in picture)
  - Advanced threat radar jammer/Electronic Countermeasures (Numbers 4, 5, 7, and 8 in picture)
- SIRFC is integrated onto USASOC MH-47 and MH-60 helicopters and AFSOC CV-22 tilt rotor aircraft. The AFSOC CV-22 aircraft is supported by the Navy V-22 Joint Program Office (PMA 275).
- The SIRFC system integration is 90 percent common between the Service platforms, though the Army MH-47 and MH-60 aircraft have a higher power transmitter installed. Early integration challenges on the AFSOC CV-22 aircraft dictated the installation of a lower power transmitter. Future CV-22 block upgrades are scheduled to incorporate the higher power transmitter.



1 - LRU (Line Replaceable Unit) Receive Processor
2 - Receive Antenna
3 - Amplifier
4 - LRU Advanced Countermeasure
5 - Radio Frequency Switch Assembly
6 - Electrical Assembly
7 - LRU High Power Receive Transmit
8 - Transmit Antenna
9 - Cockpit Display

Mission

Special Operations Forces will use SIRFC to enhance the survivability of aircraft on missions that penetrate hostile areas. SIRFC-equipped units should be able 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)

Prime Contractor

- ITT Electronics Systems, Clifton, New Jersey

Activity

Army Special Operations Command

- USASOC completed destructive testing and analysis of the high-power radio frequency switch during FY09 in an effort to determine the root cause of the repeated in-flight switch

failures on the MH-47 and MH-60. These failures were first confirmed during DOT&E-directed tests at Eglin AFB, Florida, in 1QFY09.
- Analysis results yielded deficiencies in the current switch design thought to be responsible for the observed failures. As a result of these findings, USASOC requested a complete switch redesign and additional qualification testing to be completed no later than November 2010.
- DOT&E completed the effectiveness and suitability analysis of SIRFC IOT&E flight data during FY09.

Air Force Special Operations Command and Navy
- AFSOC, in coordination with the Navy and the Air Force Operational Test and Evaluation Center, completed operational testing of SIRFC on the CV-22 aircraft during the 3QFY08 CV-22 IOT&E.
- AFSOC is conducting ongoing system software block upgrades to address the problems identified in IOT&E.
- DOT&E released the CV-22 Operational Test and Evaluation Report in early 2010.

Assessment
- Despite the common SIRFC hardware among all the platforms, unique aircraft system integration challenges have resulted in different aircraft effectiveness and suitability results with each Service.
- Although the Services conducted SIRFC development and testing under two separate Test and Evaluation Master Plans, inter-program communication and coordination is good and allows the CV-22 program to benefit from the USASOC SIRFC program.

Army Special Operations Command
- DOT&E's post-IOT&E assessment is that SIRFC is effective, but not suitable due to the reliability problems associated with the radio frequency switch hardware failures.

Air Force Special Operations Command and Navy
- DOT&E's assessment of the results of the FY08 CV-22 IOT&E and all SIRFC-related test events showed that:
  - The SIRFC Radar Warning Receiver software load flown during the CV-22 IOT&E caused some unintentional and undesirable effects on aircrew Situational Awareness. An improved algorithm that is designed to correct these deficiencies has been planned into a future SIRFC software block.
  - SIRFC jamming on CV-22 was less effective than that observed on the USASOC aircraft, but the system experienced no failures of the radio frequency switch. The less effective jamming and lack of radio frequency switch failures are likely related to the lower power transmitter installed on the CV-22. Operational flight testing with a new higher power transmitter will be required to confirm this assessment.

Recommendations
- Status of Previous Recommendations. The Services are satisfactorily addressing the two FY08 recommendations.
- FY09 Recommendations.
  1. USASOC should conduct additional SIRFC flight testing to confirm that the radio frequency switch redesign effort has corrected the deficiencies observed in previous flight testing.
  2. The Air Force and Navy should conduct CV-22 flight testing to confirm that the problems related to aircrew Situational Awareness that were observed during IOT&E have been resolved when the new software becomes available.