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

Executive Summary

Army Special Operations Command

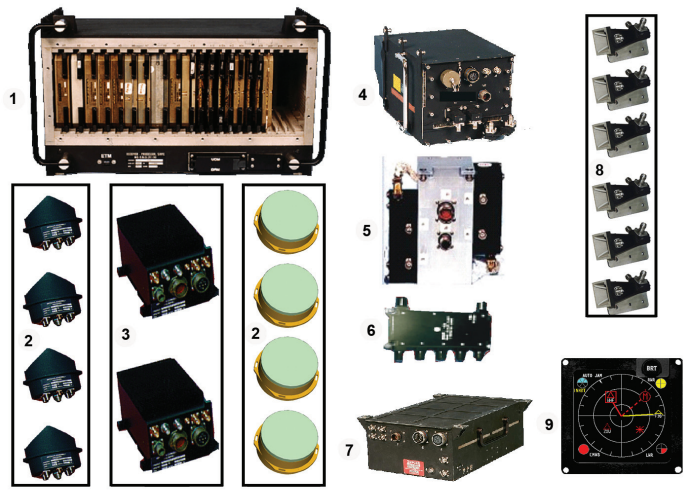
- After a lengthy engineering investigation, the Suite of Integrated Radio Frequency Countermeasures (SIRFC) Program Office directed a complete redesign of the radio frequency (RF) switch that was the primary source of poor system reliability. The Army was scheduled to receive the newly designed switch in late 2010 and should complete additional qualification testing in early 2011.
- Because of continued delays in resolving the RF switch reliability problem, DOT&E published the SIRFC IOT&E report to Congress in October 2010. In previous reporting, DOT&E stated that SIRFC was operationally effective based on preliminary analysis of operational test results. However, upon completion of a comprehensive analysis of all test data in context with SIRFC's ability to support operational mission accomplishment, DOT&E determined that the initial effectiveness assessment was incorrect. The final assessment (characterized below) and supporting analysis is included in the October 2010 IOT&E report.
- DOT&E assessed that SIRFC was not operationally effective and remains not operationally suitable. SIRFC does not provide sufficient survivability even with current aircrew tactics to allow penetration into the weapon engagement zone of many current radar-guided threat systems. Pending successful qualification and flight testing of the new RF switch, the SIRFC system should be operationally suitable.
- SIRFC provides more capability than the legacy RF countermeasures systems on the MH-47 and MH-60 aircraft; nonetheless, it is not effective against its intended threat environment.
- The SIRFC radar warning sub-system, which can operate separately from the RF countermeasures portion, provides aircrew with excellent situational awareness, rapidly detecting, identifying, and providing accurate relative bearing to threat radar systems.

Air Force Special Operations Command and Navy

- DOT&E released the CV-22 OT&E Report in January 2010, assessing SIRFC integration on that aircraft as not effective and not suitable.

System

- SIRFC is an advanced radio frequency self-protection system designed for installation on aircraft.
- Major SIRFC subsystems are:
  - 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 Army Special Operations Command (ASOC) MH-47 and MH-60 helicopters and Air Force Special Operations Command (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 a 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)

Major Contractor

ITT Electronics Systems – Clifton, New Jersey

Activity

Army Special Operations Command

- The SIRFC Program Office engineering investigation discovered deficiencies in the current RF switch design. As a result, the Technology Applications Program Office (TAPO) directed a complete switch redesign and is planning additional qualification testing to be completed in early FY11.
- As an interim solution, the SIRFC Program Office, in coordination with ASOC, reduced the power to the forward transmitter via a software change to minimize the chance of a switch failure. Testing of the reduced power was completed at Eglin AFB, Florida, in July 2009. Although limited in scope, the flight tests experienced no RF switch failures and indicated no change in system effectiveness against the very limited number of threats that SIRFC was effective against during IOT&E.
- DOT&E published the SIRFC IOT&E report to Congress in October 2010 based on the IOT&E and post-IOT&E testing.

Air Force Special Operations Command and Navy

- DOT&E released the CV-22 OT&E Report in January 2010 assessing the SIRFC integration as not effective and not suitable.

Assessment

- In previous reporting, DOT&E stated that SIRFC was operationally effective based on preliminary analysis of operational test results. However, upon completion of a comprehensive analysis of all test data in context with SIRFC's ability to support operational mission accomplishment, DOT&E determined that the initial effectiveness assessment was incorrect. The final assessment (characterized below) and supporting analysis is included in the October 2010 IOT&E report.
- Despite the common SIRFC hardware among all the platforms, some unique aircraft system integration challenges have resulted in a disparity in performance with each Service aircraft.
- Although the Services conducted SIRFC development and testing under two separate Test and Evaluation Master Plans, inter-program communication and coordination allowed the CV-22 program to benefit from the ASOC SIRFC program.

Army Special Operations Command

- SIRFC integration on ASOC helicopters is not operationally effective and remains not operationally suitable. The program's newly redesigned RF switch could resolve the suitability problems, pending successful qualification and flight testing.
- SIRFC provides more capability than existing RF countermeasures systems on the MH-47 and MH-60 aircraft, which include two legacy radar warning receivers (APR-39 and APR-44) and two legacy RF countermeasures systems (ALQ-136 and ALQ-162).
- Nonetheless, SIRFC does not provide sufficient survivability even with current aircrew tactics to allow penetration into the weapon engagement zone of many current radar-guided threat systems. It does, however, reduce the ability of some threat radars to track the aircraft and it reduces (but not eliminates) the ability of some radar-guided threat systems to shoot the aircraft. SIRFC has poor to marginal performance against a number of likely threats, and does not reduce the number of shots taken by an air defense system during an entire engagement sufficiently to provide the high survivability a slow-moving helicopter, operating covertly without support, requires.
- The SIRFC radar warning sub-system, which can operate separately from the RF countermeasures portion, provides excellent situational awareness, rapidly detecting, identifying, and providing accurate relative bearing to threat radar systems.

Air Force Special Operations Command and Navy

- As part of DOT&E's assessment of the CV-22 OT&E, SIRFC was assessed to be not operationally effective and not operationally suitable. Effectiveness performance was similar to that on the ASOC helicopters, but the suitability issues were unique to the CV-22 platform.

Recommendations

- Status of Previous Recommendations. The Services are satisfactorily addressing the two FY09 recommendations to conduct additional SIRFC flight testing on the RF switch redesign and to conduct CV-22 flight testing to verify correction of situational awareness problems in IOT&E; however, the recommendations have yet to be completed and therefore remain valid.
- FY10 Recommendations. None.