AN/AAR-47 A(V)2 Upgrade Missile / Laser Warning Receiver

Executive Summary

- The Navy's AAR-47 A(V)2 is the upgrade to the widely fielded AAR-47 V(2). It is designed to reduce vulnerability to bright light sources. The AAR-47 A(V)2 is in full production following adequate testing on the KC-130J in FY06.
- The Navy's FY06 testing of AAR-47 A(V)2 on the KC-130J demonstrated that this upgraded sensor can be operationally effective at enhancing aircraft survivability when integrated properly into the host platform. However, all versions of the AAR-47 have a substantial limitation in certain environments that may significantly degrade threat detection, the details of which are classified. This limitation is independent of the specific platform installation.
- The Navy and Air Force need to ensure the pilots and crews relying on a version of the AAR-47 for protection clearly understand this common limitation.
- Although the Navy executed adequate ground-based missile simulation procedures for the FY06 tests, the Navy still has not formally incorporated standardized procedures.

System

- The AAR-47 is a defensive system that warns pilots of missile threats and commands dispensing of flares as an infrared countermeasure. This legacy missile warning sensor is installed on many aircraft, including C-130, C-5, C-17, AH-1, UH-1, H-46, H-60, P-3, H-47, H-53, and MV-22.

- The AAR-47 V(2) sensor upgrade program is designed to improve missile warning sensor performance and incorporates laser warning functionality.
- The new AAR-47 A(V)2 missile warning sensor incorporates an additional detector into the widely fielded AAR-47 V(2) sensor designed to reduce vulnerability to bright light sources.
- This is a Navy-led joint program with active Air Force and U.S. Special Operations Command participation.

Mission

Combatant commanders utilize AAR-47 A(V)2 to enhance survivability of several types of fixed- and rotary-wing aircraft against shoulder-fired, vehicle-launched, and other portable infrared-guided missile threats.

Activity

The AAR-47 A(V)2 is in full production as both the Navy's and Air Force's long-term upgrade to optimize missile warning sensor effectiveness, while limiting the warning sensors' sensitivity to bright light sources.

Navy

- The Navy's upgrade of the widely fielded AAR-47 V(2), designated the AAR-47 A(V)2, is in full production following testing on the KC-130J in FY06.
- The Navy conducted AN/AAR-47 A(V)2 sensor baseline and upgrade testing on the KC-130J in 1QFY06 at Naval Air Station Patuxent River, Maryland, to assess missile warning sensors sensitivity to bright light sources.
- Commander, Operational Test and Evaluation Force, the Navy's operational test agency, finalized planning for the 1QFY07 AAR-47 A(V)2 testing on the KC-130T.
- The Navy informally incorporated use of standardized ground-based missile simulator procedures to support a successful FY06 KC-130J/AAR-47 A(V)2 test.
- The Navy's testing of AAR-47 A(V)2 in FY06 was conducted in accordance with the Navy Test and Evaluation Master Plan (TEMP) approved by DOT&E in FY03.

Air Force

- The Air Force's Air Mobility Command tested the interim "smart" cable AAR-47 V(2) configuration on the C-130J in FY05 and reported these results in FY06.
- In FY06, the Air Force's Air National Guard Air Force Reserve Command Test Center (AATC), without informing DOT&E, conducted an operational utility evaluation of the AAR-47 V(2) as integrated on a different platform, the A-10 aircraft. This AAR-47 testing was a planned integration effort under the direction of the Air Force Air Combat Command, but was conducted without the Air Force Operational Test Command's (AFOTEC) involvement or DOT&E oversight.
- The Air Force fielded a unique version of AAR-47 V(2) that used "smart cables" to limit the sensors' exposure to bright light sources.

- In FY06, the Air Force transitioned the majority of C-130Js from the unique "smart cable" AAR-47 V(2) configuration to the long-term AAR-47 A(V)2 configuration, while initiating the upgrade on C-17s.

Assessment

Navy

- DOT&E assessed the AAR-47 A(V)2 as operationally effective, including reduced sensitivity to bright light sources, when integrated on the KC-130J.
- The AAR-47 A(V)2 is operationally effective, although its warning capability can be significantly degraded in certain environments, the details of which are classified. This substantial limitation is a function of the AAR-47's older warning sensor design technology. This limitation is independent of the specific platform integration.
- The Navy's KC-130J/AAR-47 A(V)2 testing in FY06 was adequate, including the use of ground-based missile simulation procedures. The Navy conducted this test because previous operational testing of the KC-130J/AAR-47 in 2004 was not adequate due to poor ground-based missile simulation procedures. The event also tested recent upgrades incorporated on the AAR-47 A(V)2.
- Although the Navy executed adequate ground-based missile simulation procedures, standardized procedures still have not been formally incorporated by the Navy, which increases the potential for future test adequacy issues.

Air Force

- The Air Force conducted the operational utility evaluation of AAR-47 as integrated on the A-10 aircraft in FY06 without the required DOT&E or AFOTEC oversight or involvement. DOT&E views this as very serious because of the dependence of self-protection system operational effectiveness and suitability on proper aircraft integration for new mission environments.
- DOT&E assessed the Air Force's AAR-47 interim "smart cable" configuration missile warning sensor as operationally effective on the C130-J. This was based on the Air Mobility Command flight tests conducted in FY05.
- Although testing of the AAR-47 A(V)2 upgrade on the C-130J is not complete, the Air Force can apply Navy test results of AAR-47 A(V)2 on the KC-130J to the C-130J because of the commonality of the platforms and AAR-47 integration.

Air Force and Navy

- There is not a revised AAR-47 TEMP that aligns the Air Force and Navy's test efforts or addresses who will conduct follow on testing of AAR-47 integration on new platforms. Additionally, there are still no formally standardized ground-based missile simulation procedures.

Recommendations

- Status of Previous Recommendations. One DOT&E recommendation from the previous annual report remains unresolved.
  FY05 #2: The Navy should strive to standardize ground-based missile simulator procedures and equipment across the joint test environment to maximize test efficiency. The Navy did informally incorporate improved ground-based missile simulation procedures for one test in FY06, but the procedures have not been formally standardized to support future tests. This recommendation remains valid.
- FY06 Recommendation. The Navy and Air Force should:
  1. Ensure the pilots and crews relying on the AAR-47 for protection clearly understand the one common limitation that may significantly degrade threat detection in certain environments.
  2. Gain DOT&E approval of an AAR-47 TEMP in FY07 that clearly aligns the:
     - Test strategies and Service responsibilities
     - Responsibility for follow-on testing of AAR-47 on new platforms
     - Use of standardized ground-based missile simulation procedures