

AN/AAR-47 V2 Upgrade Missile/Laser Warning Receiver

Executive Summary

- Recent Navy and Air Force tests of AAR-47 have focused on assessing the modifications designed to reduce the Missile Warning Systems (MWS) sensitivity to bright ultra-violet light sources. FY05 tests were conducted by the Air Force on C-130J and C-17 aircraft. The Navy plans more testing of AAR-47 on the KC-130J in early FY06 to evaluate deficiencies noted during the FY04 KC-130J operational test and evaluation.
- The Air Force configured AAR-47 (V)2 with an interim hardware modification using smart cables to reduce sensor vulnerability to bright light sources. This was flight tested by Air Mobility Command in 2005 on a C130J. DOT&E assessed the overall system as effective.
- The Navy hardware and software modifications on AAR-47, designed to reduce vulnerability to bright light sources, is designated AAR-47 A(V)2. This was flight tested by the Air Force's Air Mobility Command on C-17s in FY05. The test results are under review.

System

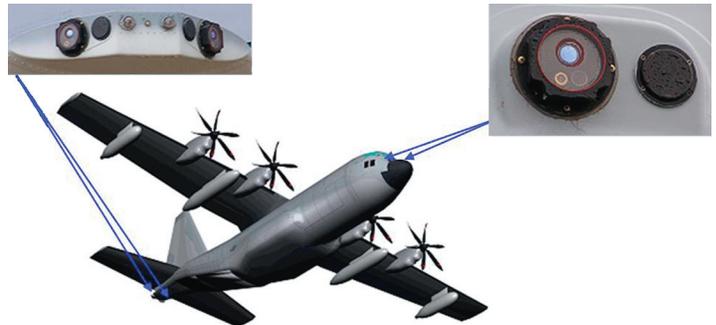
- This is a Navy-led Joint program with active Air Force and U.S. Special Operations Command participation.
- The AAR-47 warns pilots of missile threats and then commands dispensing of flares as the infrared countermeasures.
- AAR-47 is a legacy MWS on many aircraft, including C-130, C-5, C-17, AH-1, UH-1, H-46, H-60, P-3, H-47, H-53, and MV-22.

Activity

- DOT&E hosted a Joint AAR-47 conference to align the test efforts of the Navy led program, across the Navy, Air Force, and Special Operations Command users.
- The Navy and Air Force conducted FY05 tests in accordance with the DOT&E-approved test plans.

Air Force

- The Air Force AAR-47 program manager upgraded the AAR-47 configuration to incorporate a hardware solution using smart cables to limit the sensors exposure to bright light sources. The Air Force smart cables are an interim solution for deployment with the production AAR-47 until the Navy-developed AAR-47A(V)2 upgraded sensors become available.
- Recent Air Force tests of AAR-47 with the interim solution assessed the modifications designed to reduce the MWS sensitivity to bright ultra-violet light sources.



- AAR-47 (V)2 is in full production. Current modifications include the A(V)2 sensor upgrade and are designed to improve effectiveness. No major improvements are planned for this system.
- AAR-47 (V)2 is designed to improve missile warning performance and reduce false alarms as compared to the baseline AAR-47.

Mission

- Combatant commanders utilize AAR-47 (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.
- AAR-47 (V)2 incorporates laser warning functionality.

- Air Mobility Command Test and Evaluation Squadron conducted flight tests of the Air Force smart cable configured AAR-47 (V)2 on C-130J aircraft from September–November 2004.
- Air Mobility Command conducted flight testing on C-130J aircraft at the Naval Air Warfare Station, China Lake, California, Electronic Combat Range in May 2005 to assess mission functionality of the smart cable configured AAR-47 system.

Navy

- The Navy began development and testing of more sophisticated hardware and software modifications on AAR-47 to reduce the MWS sensitivity to bright ultra-violet light sources. This is the long-term solution that will be the configuration for both the Navy and Air Force and is referred to as the A(V)2 sensor upgrade.

NAVY PROGRAMS

- The Navy conducted AN/AAR-47 A(V)2 sensor baseline and upgrade testing on the KC-130J in the first and second quarters of FY05.
- The Air Force Air Mobility Command also conducted flight tests at Electronic Combat Range in June 2005 to assess mission effectiveness of the Navy's AAR-47 A(V)2 configuration on Air Force C-17 aircraft. These tests supported the Navy's sensor development efforts.
- The Navy configured 10 operational U.S. Marine Corps KC-130Js with the Air Force AAR-47 (V)2 smart cable (interim) configuration.
- The Navy finalized plans for KC-130J AN/AAR-47 A(V)2 mission effectiveness testing in 1QFY06 to evaluate deficiencies noted during the FY04 KC-130J operational test and evaluation.
- Operational Test and Evaluation Force, the Navy's Operational Test Agency, ensured this test is an operationally representative test, while initiating closer oversight of ground-based missile plume simulator procedures.
- The Navy modifications on AAR-47 to reduce sensor vulnerability to bright light sources were tested by the Air Force's Air Mobility Command on C-17s in FY05. The test results are under review.

Assessment

The sharing of test plans, resources, and system performance lessons resulting from the Joint conference, improved Navy and Air Force AAR-47 test efficiency.

Air Force

- DOT&E assessed the Air Force's AAR-47 smart cable configuration MWS as effective on the C130-J. This was based on the Air Mobility Command flight tests conducted in 2005.

Navy

- The Navy's operational testing in 3QFY04 was not adequate to assess AAR-47 (V)2 system effectiveness due to lack of onboard data instrumentation for verifying the ground-based threat missile simulations. As a result, the Navy planned a follow-on test of AAR-47 A(V)2 installed on the KC-130J for 1QFY06 to adequately assess system effectiveness. Preliminary review of the recent test results indicate that testing was adequate to assess AAR-47 A(V)2 system effectiveness as installed on the KC-130J.
- The Navy's execution of ground-based missile simulator procedures and shortage of calibration equipment led to inconsistent threat simulation presentations for AAR-47 tests in 2004 and 2005, which challenged test adequacy.

Recommendations

1. The Navy and Air Force should continue to improve the Joint interaction and testing of the AAR-47 MWS.
2. The Navy should strive to standardize ground-based missile simulator procedures and equipment across the Joint test environment to maximize test efficiency.