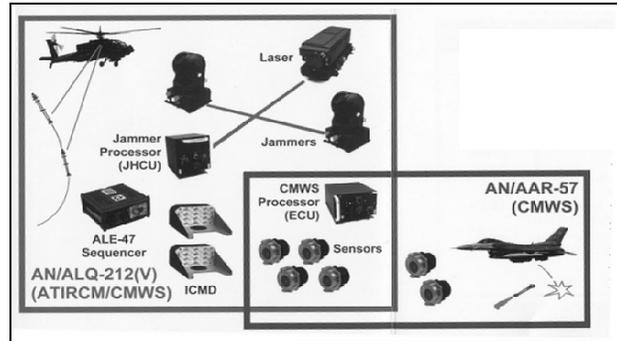


**SUITE OF INTEGRATED INFRARED COUNTERMEASURES AND  
COMMON MISSILE WARNING SYSTEM (CMWS, AN/AAR-57)  
(SIIRCM/CMWS) INCLUDES: ADVANCED THREAT INFRARED  
COUNTERMEASURES (ATIRCM, AN/ALQ-212)**



The Suite of Integrated Infrared Countermeasures (SIIRCM)/Common Missile Warning System (CMWS) enhances individual aircraft survivability against an increasing worldwide proliferation of advanced infrared (IR) guided missiles. The SIIRCM concept of IR protection includes new IR flare decoys, the Advanced Infrared Countermeasures Munitions, and passive IR features. These passive IR features include host platform modifications such as engine exhaust/heat suppression and special coatings intended to reduce the platform IR signature. Advanced Threat Infrared Countermeasure (ATIRCM) is a sub-set of the SIIRCM program, and is specifically comprised of an active IR jammer and the passive CMWS.

The ATIRCM/CMWS design is modular to allow multiple configurations on a wide range of aircraft and other vehicles. The Army's lead platforms for EMD are the MH-60K and the EH-60. Two ATIRCM laser jam heads are the normal configuration for some helicopters and one ATIRCM jam head is now planned for tactical helicopters. CMWS is a software re-programmable system intended to provide automatic passive missile detection, threat declaration, positive warning of a post-launch missile that is homing on the host platform, countermeasures effectiveness assessment, false alarm suppression, and cues to other on-board systems such as expendable countermeasures dispensers. For the helicopter applications, the ATIRCM adds active directional countermeasures via an arc lamp and laser. ATIRCM is required to demonstrate integration with the Army's Suite of Integrated Radio Frequency Countermeasures (SIRFC).

**BACKGROUND INFORMATION**

The SIIRCM/CMWS is a Joint Service, Army lead program. In January 1995, the USD (AT&L) approved the merger of the Army ATIRCM program with the Navy/Air Force Advanced Missile Warning System program. The program entered EMD in September 1995. After expanding the EMD Critical Design Review process, experiencing delays in initial EMD hardware/software production, and adjusting detailed T&E planning, the Acquisition Program Baseline schedule was approved in June 1997, moving the MS III from August 2000 to September 2001. The Operational Requirements Document was also changed in FY97 to include a more realistic threshold-to-objective range for ATIRCM effectiveness.

DOT&E approved a TEMP update in November 1998. Additional developmental delays have changed the MS III date to 2QFY03. A Limited Rate of Initial Production (LRIP) decision in April 2002 has been added to the program. An Operational Assessment, to be conducted in early 2002, is designed to provide data to support the LRIP decision. Until this year, CMWS was to be used on both helicopters and fixed wing aircraft. However, funding constraints have led the Air Force to drop out of the program. Therefore, for the immediate future, the only application of ATIRCM/CMWS will be on Army helicopters. The Air Force will assist the Army in conducting fixed-wing (QF-4) tests that are crucial to obtaining data for the modeling and simulation (M&S) program, and to provide data to evaluate CMWS performance on high speed, fixed-wing platforms in the event the Air Force and/or the Navy decide to use CMWS in the future.

During FY01, the program manager decided to make a change in the CMWS hardware configuration. All of the T&E was planned using the EMD version of CMWS. In parallel, the United Kingdom is buying a productionized version of CMWS that is claimed to have better performance, fewer parts, and greater reliability. Although the EMD version of CMWS has performed well, the PM decided that the cost, reliability and performance advantages of a production design upgrade (PDU) version of CMWS were sufficient to warrant a change late in the test program.

### **TEST & EVALUATION ACTIVITY**

Considerable testing and evaluation was accomplished in FY01, i.e., false alarm tests at Eglin AFB in January-February (DT), live fire tests at the Aerial Cable Facility (ACF) at White Sands in April (DT/OT), captive seeker tests at Fort Huachuca in May (DT/OT) and the sled test at Holloman in July. The false alarm tests were conducted with the ATIRCM/CMWS system integrated into an EH-60 helicopter combined DT/OT test period. It was among the most comprehensive tests conducted to date for an IR countermeasures system. The false alarm susceptibility of most all battlefield false alarm sources (e.g., JP-4 fires, 120mm cannons, 30mm guns, arc welders, wingman flares) was determined for the system. More realism was injected into these tests by using the Super Multi Spectral Electro Optic Simulator (SMEOS), which allowed simulated missiles to be fired during the time that the false alarm sources were activated. The false alarm signatures were recorded using calibrated radiometers. These signatures were then used to update the end-to-end model that has been developed for the system. The ATIRCM/CMWS demonstrated a low susceptibility to most of the battlefield false alarm sources.

Twelve shots of four different missile types were fired at the Aerial Cable Range (ACR). The ATIRCM/CMWS successfully countered all shots. Similarly, with the system integrated on the MH-60 helicopter, ATIRCM/CMWS demonstrated effectiveness against all the missile seekers used during the test. Also, IR jammer effectiveness was demonstrated during the sled tests. The EMD model CMWS was the primary missile warning sensor used for all these tests. The CMWS PDU version was incorporated into the ACR tests. Also, the PDU and EMD CMWS versions were checked in side-by-side performance tests at the Wright Patterson Laser Laboratory. In addition, the PDU is being evaluated in the BAE Hardware in the Loop (HITL) facility. The PM conducted an abbreviated false alarm test at Ft Rucker on an MH-60 helicopter.

Hardware-in-the-Loop modeling capabilities are essential to providing an assessment of the operational effectiveness and operational suitability of the ATIRCM/CMWS system. Actual missile firings and drone target requirements have been reduced from nearly 400 to 175 events by developing new T&E concepts that rely heavily on M&S. A major step towards achieving this capability was realized in FY01 with the successful demonstration of the contractor's HITL facility. The system is now

being used in to predict the drone shots planned on the CMWS equipped QF-4 drone, scheduled for the 2QFY02.

## **TEST & EVALUATION ASSESSMENT**

The ATIRCM/CMWS has demonstrated reasonably good effectiveness to date. The tests have shown the need to modify the software for certain operational conditions, and these modifications need to be re-evaluated during subsequent testing, especially with live fire shots at the aerial cable facility. Testing to date has surfaced some suitability problems with the IR jammer. Although effective, several reliability problems were experienced during the open air testing as well as during the reliability development growth test (RDGT) that was started in April 2001 and stopped in August 2001. The jam head will require the re-design of several of its mechanical components. The program office plans to fix these problems during LRIP (scheduled for January 2002), then re-test the system in the 3QFY02 and include additional RDGT tests. A robust DT of jam head changes prior to IOT&E should be done and the IOT&E should include completion of PDU sensor tests. The PDU version of CMWS has demonstrated equal or better performance over the EMD CMWS in the ACR and laboratory tests. To date, the results of the false alarm tests at Ft. Rucker have not been evaluated.

Modeling and simulation are critical elements of the test and evaluation program because the matrix of potential missile-aircraft interactions to be evaluated would require a substantial increase in the number of test firings. The development of the end-to-end model has progressed this past year to the point that it now can be used for test predictions and some scenario evaluations. However, it is yet to be completely verified, validated, and accredited for use in operational evaluation. Without a properly validated and verified HITL, DOT&E does not believe the M&S methodologies developed by the Project Office will be credible.

The operational configuration for tactical helicopters calls for only one ATIRCM jam head on top of the platform behind the rotor (two jam heads are to be used for transports and large helicopters). The single jam head configuration, for tactical rotary-wing aircraft, may not ensure complete 360 degree defensive protection when the single jam head is masked by the aircraft fuselage.

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