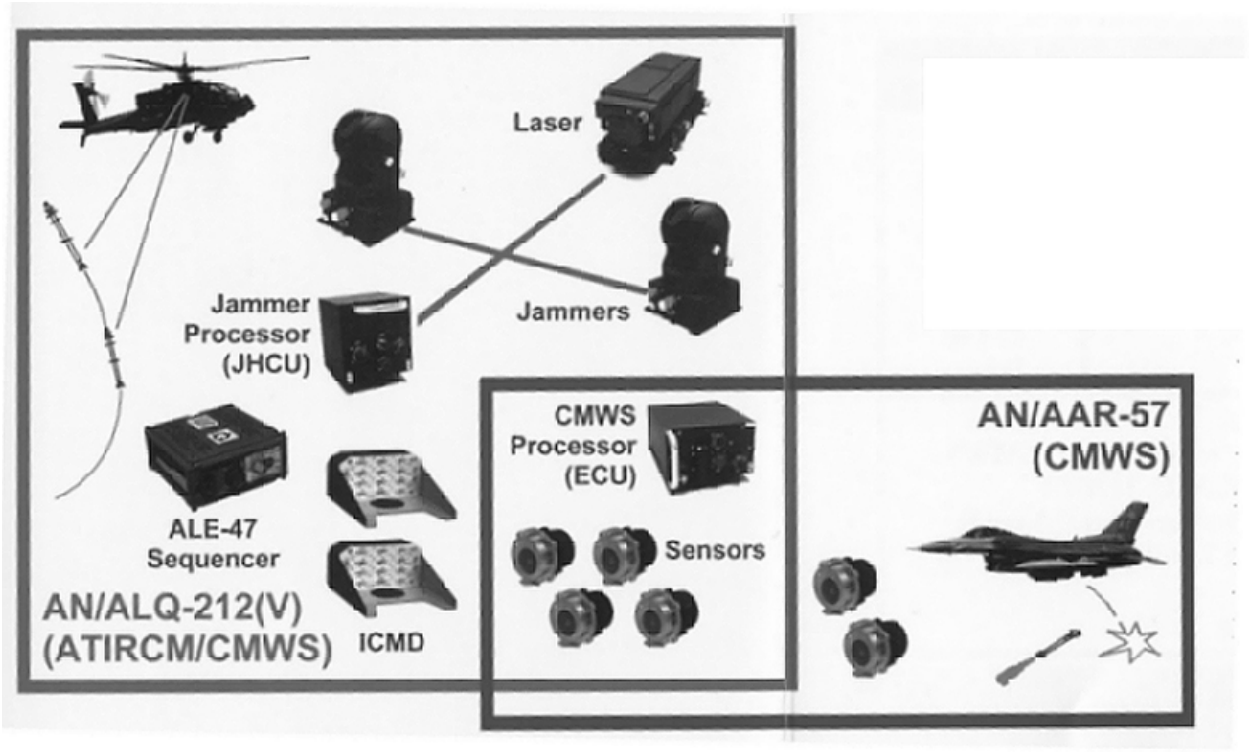
SUITE OF INTEGRATED INFRARED COUNTERMEASURES AND COMMON MISSILE WARNING SYSTEM (CMWS, AN/AAR-57) (SIIRCM/CMWS) INCLUDES: ADVANCED THREAT INFRARED COUNTERMEASURES (ATIRCM, AN/ALQ-212)



Army ACAT IC Program

Total Number of Systems:	1,047
Total Program Cost (TY$):	$3,117.2M
Average Unit Cost (TY$):	
ATIRCM B-KIT:	$2.7M
CMWS B-KIT:	$1.6M
Full-rate production:	2QFY03

Prime Contractor

SANDERS, a Lockheed Martin Company

Major Subcontractor (CMWS-sensors)

Lockheed Martin Infrared Imaging Systems

Group A Contractors

Boeing, Lockheed Martin Tactical Aircraft Systems, Northrop Grumman

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Suite of Integrated Infrared Countermeasures (SIIRCM)/Common Missile Warning System (CMWS) contributes to the ***Joint Vision 2020*** concept of ***full spectrum dominance*** by improving individual aircraft's (or ground vehicle's) probability of survival against an increasing worldwide proliferation of advanced infrared (IR) guided missiles. This will provide aircraft and offensive ground vehicles added capability to achieve ***dominant maneuver*** and ***precision engagement*** over enemy forces.

The Advanced Threat Infrared Countermeasures (ATIRCM) is part of the U.S. Army's SIIRCM concept of IR protection including 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. ATIRCM is a sub-set of the SIIRCM program, and is specifically comprised of an active IR jammer for use on helicopters and the passive Common Missile Warning Receiver. 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 ATIRCM/CMWS design is modular to allow multiple configurations on a wide range of aircraft and other vehicles. The Army's lead platform for EMD are the MH-60K and the EH-60. Previously, the AV-8B and the F-16 Block 40-Close Air Support aircraft were the lead aircraft for the Navy and Air Force, respectively. Two ATIRCM laser jam heads are the normal configuration for most helicopters and transport aircraft, though only one ATIRCM jam head is now currently 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.

BACKGROUND INFORMATION

The SIIRCM/CMWS is a Joint Service, Army lead program. In January 1995, USD (AL&T) 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. The IPT formed in June 1995, and produced a TEMP, which was approved by OSD in April 1996. 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 objective/threshold from February-August 2000 to March-September 2001. 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. The Operational Requirements Document was changed in FY97 to include a more realistic threshold-to-objective range for ATIRCM effectiveness.

The Joint Project Office (JPO) was relocated from ST Louis, MO to Huntsville, AL, during 4QFY97, as part of a Base Realignment and Closure move of the Army Aviation Electronic Combat Project Office. Since the relocation, the JPO has been established and staffed as a separate Project Managers Office directly under PEO Aviation.

In FY98, an Integrated Product Team developed a fully coordinated TEMP update to maintain adequate T&E concepts/resources by accepting additional program schedule risk. T&E funding for the program has been reduced to free funding for other program cost growth and to keep the program executable within available funding levels. DOT&E approved a TEMP update in November 1998.

Fiscal Year 1999 test activity was mostly centered on Test and Measurement (T&M). T&M efforts have continued to gather both instrumented ground truth and prototype sensor views of environmental, threat, and false alarm data. T&M collection events planned during the year slipped to

the end of FY99 due to CMWS sensor availability, Operational Flight Profile (OFP) development difficulties, and cost of the T&M effort.

TEST & EVALUATION ACTIVITY

Many of the hardware and software problems experienced earlier were partially resolved in late FY99, allowing the contractor to conduct extensive environmental qualification tests early in FY00. Some vibration related problems have been experienced in these tests, especially with the IR jammer, but the system performed well enough to install it on both the MH-60 and EH-60 helicopters. A series of contractor flight tests have been conducted this year to assess false alarm performance and to test jammer effectiveness against ground mounted missile seekers. Contractor testing will continue into late FY00, to include sled tests at Holloman AFB and some additional contractor flight tests at Ft. Rucker, AL. Upon successful completion of these tests, ATIRM/CMWS will enter into government development testing in early FY01.

Some multi-spectral test and evaluation limitations can only be overcome through iterative (i.e., model, test, model) M&S in conjunction with DT/OT events that construct and validate an end-to-end OPEVAL environment. Use of digital M&S in conjunction with a Hardware-In-The-Loop (HITL) modeling will be the primary way to perform an end-to-end test of the system. Supporting system development and some aspects of the M&S effort are dependent on the prime contractor's system design process and hardware deliveries. The approved TEMP T&E concept for the CMWS included HITL testing that was under development at AFEWES, Ft. Worth, TX. Project Office development of the HITL began in December 1998, with a Proof of Concept (POC) demonstration conducted in March and October 1999. Use of a dome HITL for the end-to-end testing of IR/UV missile warning sensors has not been done before and presents several technical challenges. Data from the POC's have revealed that the technology is not sufficiently mature to proceed with AFEWES development. An alternative hardware in the loop capability is being developed at the contractor's plant to support the program's T&E strategy for CMWS testing and validate IR threats in a multi-spectral threat environment.

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. Without a properly validated and verified HITL, DOT&E does not believe the M&S methodologies developed by the Project Office will be credible.

In March 1999, ATIRCM/CMWS sensor and jam head laser production difficulties, OFP development delays, and other EMD issues resulted in a cost and schedule breach and subsequent re-baselining of the program. The Project Office's primary efforts during FY99 were the restructuring of the program, though T&E resourcing and M&S development efforts continued. M&S efforts and software development showed good progress as evidenced by implementation of software engineering control standards and incremental M&S software development. Progress has also been made towards integrating M&S into the Systems Integration Laboratories (SIL) (located at the contractor's plant and several government facilities). Nearly all T&E test assets have been procured, with scheduled test activity awaiting contractor delivery and government acceptance testing of system components. The new schedule allows: (1) the Project Office to solve EMD delays; (2) delivery of a more robust Operational Flight Profile (OFP) for M&S with HITL; and (3) more coordinated DT/OT testing.

TEST & EVALUATION ASSESSMENT

It is highly unlikely that the program can deliver the required performance within its current budget and schedule. What is being attempted in this program is technologically hard to do and may not work. This program will need robust and rigorous testing to illuminate the technical challenges. This program is organizationally difficult to manage because of its multi-Service character and the fact that it is a sub-system supporting other programs, which results in inconsistent funding, interest, and support. And finally, the test program is heavily dependent on an end-to-end modeling and simulation process that has yet to be Verified, Validated, and Accredited (VV&A). The VV&A requirement is a significant challenge. There are no doubt unknown challenges to be discovered; yet the entire T&E schedule is success oriented due in large part to past delays in the program. As a result, there is little time allocated for problem correction. In October 1998, the JPO identified funding shortfalls that would adversely impact delivery of required EMD components to support DT. Delays in completing the system design and initial EMD hardware deliveries resulted in subsequent delays in completing T&E related events. Most notably this has contributed to delays in the development of system OFP software required to complete challenging modeling and simulation activities.

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. M&S will be used to examine many of those interactions while simultaneously reducing program costs. However, the FY99 slip in the program schedule, caused by continued EMD hardware development difficulties, has adversely impacted software deliveries essential to the M&S effort. The aggressive continuum of M&S intended to support development, hardware (and software) in the loop testing, open air range testing, installed equipment testing, and IOT&E of the system is dependent upon timely delivery of OFP and system hardware. The contractor has made progress during the past year in software and hardware development and testing; however, continued delays in contractor-furnished EMD hardware/software delayed completion of contractor ground and flight tests until 1QFY01.

Delayed EMD deliveries have resulted in an Air Force decision to drop out of the program. The Air Force will, however, assist the Army in conducting fixed-wing (QF-4) tests that are crucial to obtaining data for the 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. Some of the Air Force funding allocated for fixed-wing testing will be used to conduct the drone tests. Additional program schedule risk accepted by the Project Office in the current TEMP is attributable to a reduction in available T&E resources (QF-4 drone targets, test instrumentation packages, spare threat missiles, and missile telemetry kits, etc.) to absolutely bare minimums. Mitigating features of the test design and M&S efforts are intended to help control scarce test resources. Again, the program's schedule contains little allowance for developmental delays. If expenditure of EMD resources exceeds the rates anticipated, system integration efforts are delayed, or fixed wing T&E funding is not retained in the program, the test program will be forced to halt pending: (1) identification of the EMD integration and test problems; (2) procurement of additional funding sources; and (3) time required for the procurement and build-up of replacement test resources to complete the minimum adequate IOT&E identified in the TEMP. To reduce risk and cost, the multi-Service Test Team proposed a test strategy that utilized the Aerial Cable Facility (ACF) at the White Sands Missile Range for all rotary-wing live missile-firing events. DOT&E approved the test strategy, and further believes that use of the ACF is central to an adequate and suitable test program. A System Assessment, based on all credible data collected through the end of Integrated DT/OT sled testing, will be provided to support the LRIP decision. A dedicated OT in support of the MS III decision will follow the Integrated DT/OT, and will focus primarily on M&S and

on data collection concerning supportability, Potential False Alarm Sources, and pilot usability aspects of system performance as the aircraft is exposed to maneuvers expected on the modern battlefield.

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). DOT&E is concerned that the single jam head configuration for tactical rotary-wing aircraft may not ensure adequate defensive protection when the single jam head is masked by the aircraft fuselage during tactical employment of host platforms. The operational consequences of a single jam head needs to be examined to ensure adequate defensive protection exists when the single jam head is masked by the aircraft fuselage during tactical employment of host platforms.