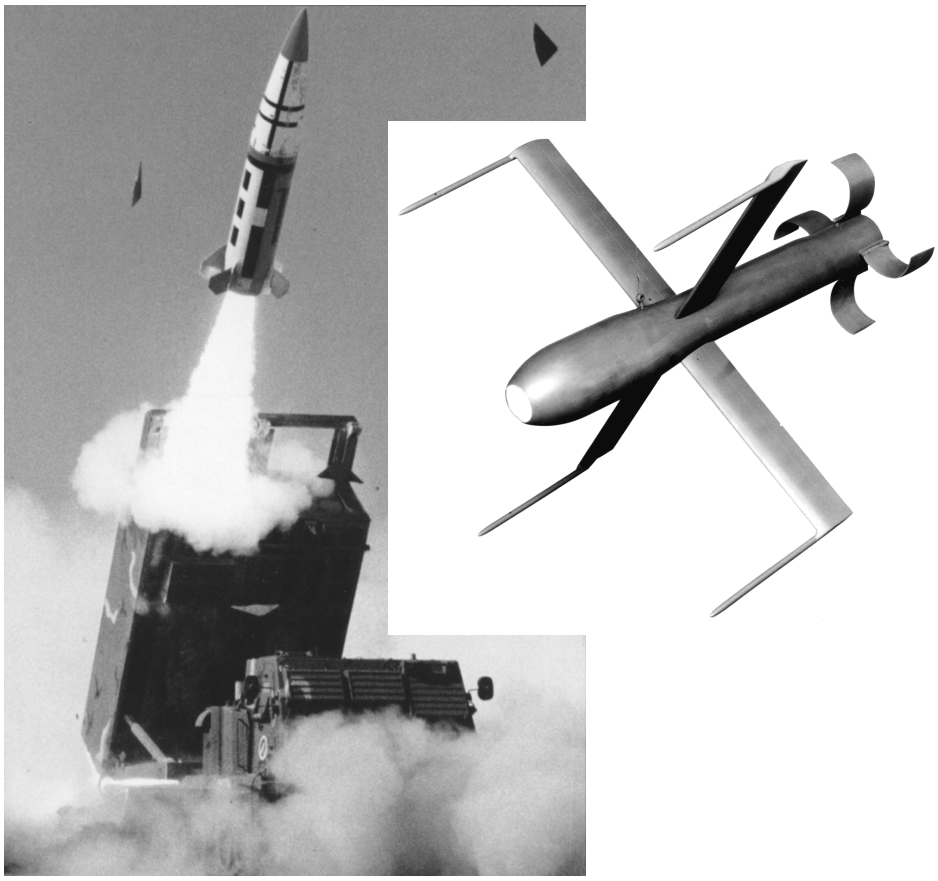
ARMY TACTICAL MISSILE SYSTEM (ATACMS) BLOCK II



Army ACAT ID Program

Total Number of BATs: (3,487 BAT + 8,478 P^{3}I BAT)	11,965
Total Number of Missiles:	919
Total Program Cost (TY$):	$3,238.8M
Average Unit Cost (TY$):	$3.524M
Full-rate production Decision:	4QFY02
P^{3}I BAT Cut-In Decision	4QFY02

Prime Contractor

Northrop Grumman Electronic Systems
(BAT submunition)
Lockheed Martin Missiles and Fire Control - Dallas
(Block II Missile)

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Army Tactical Missile System (Army TACMS) Block II/ BAT and Army TACMS Block II/ P^{3}I BAT systems are ***precision engagement*** weapons that integrate stand-off delivery accuracy with a submunition possessing the required capability to autonomously seek and kill moving and stationary armor in the deep battle zone. This ***precision engagement*** capability is designed to enable joint U.S. and combined allied forces interdiction of enemy formations through synchronized operations from dispersed

locations. This ability to engage deep targets will contribute to the joint effort that *ensures* ***dominant maneuver***.

BAT is a self-guided submunition that uses on-board sensors to seek, identify, and engage enemy combat vehicles. Thirteen BATs are dispensed from the Army TACMS Block II missile. The Army is developing two BAT variants. Basic BAT variant will engage moving armored vehicles using acoustic and infrared sensors. The acoustic sensor acquires and guides the submunition to the moving vehicles. Once in the vicinity of a threat vehicle, the infrared sensor guides the BAT to its aimpoint, where it uses a tandem-shaped warhead to destroy the vehicle.

P^3I BAT variant is designed to attack moving and stationary armor as well as transporter-erector-launchers (TEL) and multiple rocket launchers (MRL). As with the Basic BAT, P^3I BAT will use acoustic sensors to initially acquire moving vehicles. Once acquired by the acoustic sensor, the P^3I BAT uses its millimeter wave and imaging infrared sensor to track the target to impact. When the system engages stationary targets (armored vehicles and TELs and MRLs), the P^3I BAT will use its millimeter wave and imaging infrared sensors to detect, acquire, and track a target to impact.

BACKGROUND INFORMATION

Both Army TACMS Block II and Basic BAT were approved to enter low-rate production in February 1999. Formal LFT of the Basic BAT will be conducted from August 2000-February 2001. Army TACMS Block II/BAT will be operationally tested from May-August 2001, and will enter full-rate production in July 2002.

The P^3I BAT began continued development in July 1999. A DAB decision to change production from Basic BAT to P^3I BAT will be made in July 2002. Hard target live fire testing for P^3I BAT is currently planned for 1QFY02, and soft target live fire testing is planned for 1-3QFY04. The Army TACMS Block II/ P^3I BAT continued production decision will be made in 2QFY05, after a Limited User Test (LUT) and evaluation. The LUT will be fully operationally representative.

TEST & EVALUATION ACTIVITY

An operational test of the command and control architecture was completed in May 2000. The test included a Common Ground Station (CGS) that used simulated Joint Surveillance and Targeting System (JSTARS) information, as well as field artillery elements from corps to launcher.

Technical testing for the past three years has focused on missile firings of the Army TACMS Block II/BAT and demonstrating submunition reliability fixes. There have been 10 flight tests with 66 functional BATs against a moving array of real armored vehicles and five single-submunition drop tests. Tests were against clean and countermeasured vehicles with intentional aimpoint offsets replicating errors in target location. Three of the tests used full-up missiles with 13 functional BATs. All testing has been consistent with the DOT&E-approved TEMP. DOT&E and Army OTA representatives have observed all flight tests.

A variety of Basic BAT LFT&E activities were conducted in FY00. Warhead fragmentation and behind armor debris characterization tests were completed in February 2000. The first BAT LFT shot

was conducted in September 2000; seven Basic BAT rail shots against a T-72 tank are expected to be completed by February 2001.

P^3I BAT conducted two preliminary captive flight tests to collect target signatures and develop submunition algorithms. During the months of May-August 2000, the P^3I BAT contractor conducted the first series of Recoverable BAT (RBAT) submunition flight tests at White Sands Missile Range. RBATs have similar hardware and algorithm as the P^3I BAT, except when an RBAT locks onto a target, it is programmed to track momentarily and then deploy an additional parachute so that it can be recovered. In this way, multiple tests can be conducted with the same hardware. The first RBAT series tested recovery techniques and P^3I BAT's unique flight profiles. RBAT-1 did not have the dual mode seeker. Future RBAT series (three in all) will have the dual mode seeker. P^3I BAT LFT&E activities were also initiated in 4QFY00, with the completion of seeker simulant validation testing. The 12-shot warhead performance verification tests (PVT) are scheduled to be completed by December 2000. DOT&E is working with the Army to develop a robust test and evaluation strategy (both OT&E and LFT&E) for Army TACMS Block II/ P3I BAT, which will be included in an updated TEMP.

TEST & EVALUATION ASSESSMENT

Functional reliability of the components that make up the BAT submunition, performance against countermeasured targets, and system targeting are areas of concern. Accuracy and command and control tactics have been adequately demonstrated thus far in the program.

Last year's missile firings indicate that the missile will meet its accuracy requirement. In addition, 89 percent (115/130) of the BATs were successfully dispensed. However, one full-up missile damaged nine of the 13 BATs in the dispense phase of the flight. The missile problem was identified and a fix incorporated into the production design. The one missile flight conducted after incorporating the fix did not appear to have any dispense problems.

BAT submunition reliability is not currently meeting the ORD reliability threshold. A BAT is scored reliable if it functioned as designed. Reliability is a measure of hardware and software reliability, not mission effectiveness or the ability of the software to find targets. A reliable BAT can miss the target. In 1998 and 1999 EMD tests, 80 percent (32/40) of the submunitions successfully dispensed from missiles were reliable. The Milestone III requirement is 91 percent. Fixes for most of the reliability problems have been included in the production design. Due to production problems, there has been limited testing to date of the new production design. This year, six single-BAT drop tests from a Cessna and one missile firing were completed. One of the drop tests was not successfully executed. Three of the five successfully dropped BATs (60 percent) were reliable. Of the three reliable BATs: one hit a surrogate target; one hit a countermeasured BMP, and one missed (by less than one meter) a countermeasured tank. One unreliable BAT did not deploy its wings and the other one did not detonate its warhead, although it hit an uncountermeasured tank. During an August 2000 full-up missile firing carrying 13 BATs, a 77 percent reliability was achieved (10/13). Of the ten reliable BATs, eight BATs hit targets (five tanks, two infantry fighting vehicles, and one howitzer), one BAT hit the target track, and one either hit or near missed the howitzer noted above. The three unreliable BATs exploded in mid-air. This failure mode had occurred previously in EMD testing and a "fix" had been implemented. The contractor and PM believe the most recent mid-air explosions are the result of a different failure mode. In addition, during this investigation, the contractor identified the most probable cause for the non-detonating warhead in the drop test. A fix has been identified and technical testing will verify the fix before entering the operational testing planned for 2001.

There have also been problems with the Inertial Measurement Unit (IMU). While there have not been failures in the recent tests due to the IMU, some BATs with faulty IMUs have been rejected at various points in the production process. The contractor has identified a fix for this problem. The new design will be validated through technical testing and included in the May 2001 operational flight test. In addition, a new IMU will be included in the base BAT production line sometime after the production decision.

The Army recently contracted an independent panel to do a quick review of the BAT program. The panel found major issues in several areas including seeker and IMU reliability, as well as program, quality, producibility, and schedule problems. The project office is currently implementing the panel's recommendations.

It is unlikely that BAT will meet its 91 percent reliability requirement during OT because a test-fix-test reliability growth program was not implemented in the EMD technical tests. In addition, the production facilities were moved recently, which is partially responsible for production delays and may also increase OT reliability problems. However, computer simulation predicts BAT can meet most of its requirements with a lower submunition reliability.

However, to date, limited testing has been conducted on the recently approved Defense Intelligence Agency (DIA) countermeasures. Four of the single-BAT drop tests were tested with countermeasures. The OT will include four missions (five missiles) against the DIA-approved countermeasures. BAT's effectiveness against the most likely countermeasures will be unknown until completion of the OT.

The LFT&E strategy for the weapon system was developed to take advantage of expected hits on armored vehicles during the planned flight tests of Basic BAT submunitions with live warheads. There have been 22 BAT drops/dispenses with live warheads that have been scored to date; seven of these have hit targets (both tanks and light armored vehicles). One of the warhead hits did not detonate the warhead. These test results, along with the detailed lethality results from the 7 shots against a T-72 tank in dedicated LFT, will provide sufficient data to determine that the Basic BAT submunition can meet its lethality requirements given a hit against moving armored vehicles.

As part of Block II/BAT's total system evaluation, a command and control operational test was completed in May 2000. This test examined the ability of the Army's command and control system to track and target large armored columns. The operational test showed that the Army can produce targeting errors that are within Block II/BAT's stated operating parameters. Block II/BAT's ability to overcome these operational errors will be demonstrated in upcoming operational flights.

The ability to find and locate Block II/BAT targets is an area of concern. JSTARS is the only currently available and viable targeting source for Army TACMS Block II/BAT's target set of armored columns moving deep in the battlefield. The Army conducted a technical demonstration of JSTARS' ability to acquire Army TACMS Block II/BAT targets. The demonstration showed that if JSTARS is available, it is capable of producing accurate and timely data in flat terrain with little radar clutter and no extraneous targets. However, for reliability reasons, JSTARS was not able to provide any targeting information for half of the three days of testing. This, combined with other DOT&E JSTARS experience, makes it questionable whether JSTARS will be available consistently to provide Block II/BAT targeting information.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

The Army TACMS Block II/BAT Program has incorporated early and continued OT&E involvement during DT and the attendant modeling and simulation plan. Each test event has significantly contributed to the body of knowledge regarding the Army TACMS Block II missile and builds toward eventual ATEC accreditation of the IOT&E simulation strategy. This early involvement, combined DT/OT strategy, and robust modeling and simulation, has been key to the evaluation strategies for both the developer and operational testers.

System reliability, however, has been less remarkable. In 1997, a decision was made by the program to forego a test-fix-test approach in developing this system. While there are potential costs and time expenses in a test-fix-test strategy, there are clear advantages in developing a more reliable system over time. The most recent problems and required fixes to those problems BAT has been compelled to make have resulted in a *de facto* test-fix-test environment that, ironically, may benefit the system in the long run.