

Excalibur Family of Artillery Projectiles

SUMMARY

- The Army has not submitted an Excalibur Block I Test and Evaluation Master Plan (TEMP) to OSD for approval due to delays in approving the Operational Requirements Document (ORD) and Acquisition Program Baseline (APB).
- The Joint Requirements Oversight Council (JROC) approved the ORD on September 16, 2004, and the Army is developing the APB. DOT&E is working with the Excalibur Integrated Product Team to develop a Block I TEMP that integrates live fire, developmental, and operational test and evaluation.
- Integrated projectile testing began in September 2004.

SYSTEM DESCRIPTION AND MISSION

Excalibur is a family of precision-guided, extended-range artillery projectiles. Cannon artillery units will use Excalibur to provide close support to maneuver forces in urban or complex terrain. The Army is developing three variants of Excalibur within an evolutionary acquisition strategy. Block I consists of a high explosive, “unitary” munition. Block II will be a “smart” munition designed to search, detect, and engage moving and short-dwell targets. Block III will be a “discriminating” munition designed to distinguish specific target characteristics and selectively engage individual vehicular targets. All variants will employ advanced technologies, including Global Positioning System (GPS)-aided inertial guidance and navigation, to achieve increased accuracy and extended ranges beyond 30 km.

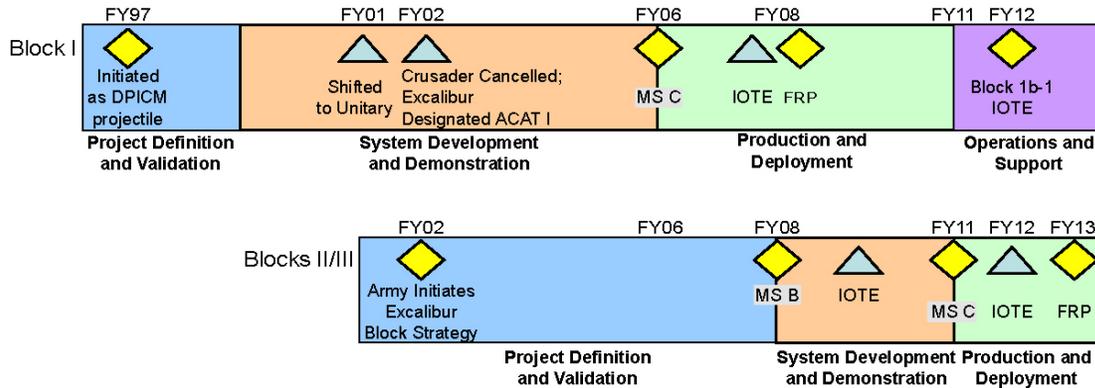
Block I (Unitary) will consist of three spiral fieldings of increasing capability. The Army intends to field the first spiral (1a-1) by 4QFY06. It will be an early fielding to Stryker Brigade Combat Team #5 (25th Infantry Division), equipped with the M777A2 Joint Lightweight Howitzer. This projectile is required to have a circular error probability (CEP) of 20 meters and is not intended to be resistant to GPS jamming. M777A2, M109A6 Paladin, and Future Combat System (FCS) Non-Line-of-Sight Cannon units will fire the second spiral (1a-2). It must achieve a 30-meter CEP when the enemy applies GPS jamming as a countermeasure. It must attain a 20-meter CEP when not jammed. The Army will base its Milestone C and full-rate production decision for Block I upon the testing of this second spiral. The third spiral (1b) must achieve a 10-meter CEP when not jammed and a 20-meter CEP when jammed. The Army will conduct a separate Initial Operational Test and Evaluation (IOT&E) in FY12 for this projectile.



Cannon artillery units will use Excalibur to provide close support to maneuver forces in urban or complex terrain.

ARMY PROGRAMS

TEST AND EVALUATION ACTIVITY



Between March and July 2004, the contractor conducted multiple component and section level tests. During these tests, the projectile demonstrated stable airframe flight. The testing also verified the survivability and functioning of the improved canard cover retention system; the inertial measurement unit; the guidance and navigation unit; the tactical spinning base; and the live warhead. Finally, the testing demonstrated that the warhead could penetrate a concrete structure that meets objective requirements specified by the ORD. Live Fire Test and Evaluation (LFT&E) activities included arena and insensitive munitions testing of the unitary warhead.

The Army temporarily postponed Guided-Gunfire A, originally scheduled for September 2004, pending correction of two anomalies found during recent developmental testing. Guided Gunfire A will be the first flight that will evaluate the entire system's ability to acquire GPS and navigate to a designated target on the ground.

TEST AND EVALUATION ASSESSMENT

Excalibur must overcome several technical and integration challenges. Those challenges include achieving reliable fin and canard deployment, integrating the warhead and fuze, and gun-hardening the inertial measurement unit.

Previous efforts to field "smart" projectiles have been successful against benign targets, but have been less successful against targets that employ active and passive countermeasures. U.S. and Swedish program partners are working to make the technology more effective for Blocks II and III. To date, however, technology that discriminates between individual targets is unproven. The program office is examining options for future blocks that involve lower technical risk.

Additional effort is required to mitigate GPS jamming. If the enemy uses GPS jammers near the target, the Army expects Excalibur to use its inertial navigation system to hit the target. However, if jamming prevents initial GPS acquisition while in flight, the round will follow a ballistic trajectory instead of achieving guided flight. In that case, the round will "fail-safe" and will not detonate on impact. To further mitigate the risk to friendly forces and civilians, the firing solution will aim the howitzer at a designated "safe to discard" impact point on the ballistic trajectory.

Weapon accuracy required for engaging area targets should be achievable, but achieving the greater accuracy to attack structures and other point targets will be more difficult and involves higher risk. Additionally, Excalibur will require very accurate target location data in order to achieve the desired effects for the unitary variant. Target location errors will need to be 35 meters or less for personnel targets, and approximately 10 meters or less for targets requiring a direct hit.

Testing of XM982-Unitary munition developmental and operational testing fully integrates the LFT&E. The Army plans to conduct gun-fired lethality testing during developmental testing using a "Live Fire Target Array" consisting of mixed personnel and light materiel targets. Structures will be attacked that are representative of expected threat targets. The Army will complete warhead technical testing and some gun-fire testing in time to support a Milestone C decision in 4QFY06.