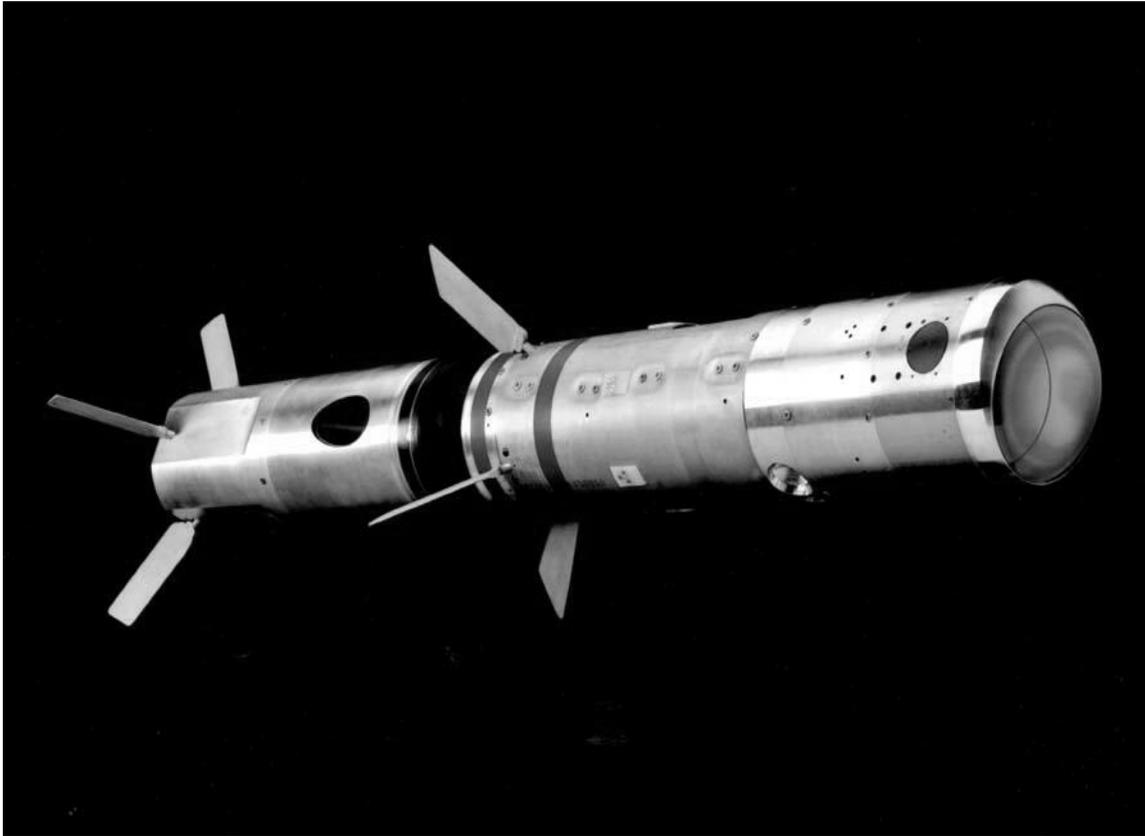


TOW FIRE AND FORGET (TOW-F&F)



Army ACAT II Program

| | |
|----------------------------|---|
| Total Number of Systems: | 4,000 Missiles 1,841 Appliqué kits |
| Total Program Cost (TY\$): | \$861M (\$181M-RDT&E \$603M-Procurement \$77M-O&S) |
| Average Unit Cost (TY\$): | \$150K |
| Full-rate production: | 2QFY06 |

Prime Contractor

Raytheon Systems Corp.

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

TOW Fire and Forget (TOW-F&F), along with Line of Sight – Anti-tank (LOSAT), provides heavy antitank capabilities for light forces while the Javelin provides a medium antitank capability for dismounted (including light) forces.

The TOW Fire and Forget (F&F) anti-tank missile system includes the TOW F&F missile and associated High Mobility Multi-Purpose Wheeled Vehicle (HMMWV) integration appliqué kit for compatibility with the TOW Improved Target Acquisition System (ITAS). The ITAS provides target tracking and guidance commands to the missile. Relative to HMMWVs currently equipped with the

baseline TOW missile, the TOW F&F is intended to improve effectiveness and survivability through a fire-and-forget capability that does not require the gunner to guide the missile through its flight. A back-up alternative wireless command-guided mode is required to improve the ability to engage targets in conditions that prevent lock-on in the fire-and-forget mode. Also, the missile will include the ability to defeat targets equipped with an Active Protection System and will have slightly greater range than existing TOW missiles.

The missile is intended to be a “wooden-round”, which is not maintained by troops in the field and is based on a modular design for accommodating future design changes and technological enhancements aimed at extending the nominal 10-year shelf life. The program includes modification of current TOW ITAS training devices to add the characteristics of the TOW F&F.

The ITAS is a planned upgrade to the TOW 2 anti-tank weapon system for the light forces. It is an integrated day/night sight that employs a second-generation Forward Looking Infrared sight to aid gunners in acquiring targets at ranges greater than achievable with the current TOW sight. In addition, ITAS has an eye-safe laser range finder, automatic boresighting, aided target tracker, and Built-In-Test/Built-In-Test Equipment (BIT/BITE). It also incorporates an embedded training capability that will support TOW F&F when upgraded.

TOW F&F contributes to *Joint Vision 2020* as a *precision engagement* system, enhancing the Army's *dominant maneuver* capabilities in the ground battle. Improved survivability from rapid displacement after missile launch contributes to *force protection*.

BACKGROUND INFORMATION

For the light, early entry forces equipped with the HMMWV-mounted ITAS, the TOW F&F is designated an interim missile system. It bridges the gap between the aging TOW 2A and TOW 2B missiles currently in the stockpile and the Common Modular Missile conceptualized to be deployed around 2010. The TOW F&F acquisition strategy capitalizes on cannibalization of existing components, e.g., rocket motors and warheads, from the missiles currently in the stockpile.

A Heavy Antitank/Assault Weapon Systems Qualitative Materiel Requirement was approved in 1989, identifying the need for an improved weapons system to replace the TOW missile, which has been the US Army Infantry's primary antitank system for nearly three decades. The TOW F&F missile system requirements are documented in the TOW F&F Operational Requirements Document dated July 16, 1999. The TOW F&F program is a successor to the Follow-on to TOW program, which was terminated in 1998.

The E&MD contract was awarded on September 15, 2000. The Army intends to purchase 350 missiles in LRIP and 3,650 in FRP for a total of 4,000 missiles.

TEST & EVALUATION ACTIVITY

Developmental, operational, and Live-Fire test strategies have been completed and incorporated into a Test & Evaluation Master Plan (TEMP) to support Milestone II and subsequent contractor selection. One of DOT&E's identified major concerns with initial TEMP drafts was the relationship between modeling and simulation (M&S) as a risk reduction endeavor and the desire by the PM to reduce

costs through the use of M&S. This would permit a reduction the number of missiles fired during the Initial Operational Test and Evaluation (IOT&E). With DOT&E's guidance concerning test unit size and number of missiles to be fired, a better balance between risk reduction, cost, and an adequate IOT&E scope has been achieved.

Furthermore, DOT&E was concerned with the degree to which the upgraded TOW training devices would match TOW F&F performance and signature. If the training devices do not faithfully emulate the performance of the real system, then there is the potential for significant negative training by soldiers preparing for combat, such as training device firing signature being much less than that of the actual missile. Additionally, poor emulation by the training devices could unduly compromise any performance comparisons of TOW F&F to predecessor systems in force-on-force exercises during operational tests.

OSD approved the TEMP on May 22, 2000. The issues of trainer performance and fidelity will be addressed in a TEMP revision after contract award and examination of contractor proposed technologies.

There will be a number of operational events designed to reduce program risk. These include an early user demonstration in FY01 and a limited user test in FY03. IOT&E is planned for FY04.

The TOW F&F LFT&E program includes four phases that will begin with warhead testing and then progress through end-to-end firings against representative tank targets. Because neither the technological approach nor the maturity of the eventual warhead was known during development of the initial LFT&E strategy, the strategy included four notional options. After the contract was awarded, the scope of the LFT program was reassessed to reflect the winning contractor's use of the existing TOW IIB warhead.

TEST & EVALUATION ASSESSMENT

TOW F&F has undergone no testing to date. However, since TOW F&F is to add longer range and a fire-and-forget capability to ITAS, it is appropriate to highlight those aspects of the ITAS that may influence TOW F&F effectiveness, suitability, and survivability.

DOT&E had assessed ITAS to be both operationally effective during an IOT&E in 4QFY96, and suitable during a limited user test in February 1999. ITAS has demonstrated an increased capability to detect and recognize targets at greater range and under conditions of limited visibility, as well as an improved capability to hit targets with the TOW missile.

DOT&E identified ITAS training issues with a recommendation to the Army for further examination. The Army currently lacks an appropriate training device to support basic ITAS gunnery skills training. The Field Tactical Trainer, while adequate to support force-on-force training, does not meet the need for basic gunner training. Such gunner skills as laser range finder proficiency, vehicle thermal signature identification, target tracking, and BIT/BITE recognition can only be trained economically and efficiently with an appropriate basic gunnery skills trainer.

TOW F&F will employ the same warhead as the existing TOW IIB, for which some lethality data exist. Although the assessment of the applicability of the data is incomplete, it is expected that basic warhead performance testing during the early phases of Live Fire Testing can be minimized.

CONCLUSIONS, RECOMMENDATIONS, AND LESSONS LEARNED

One of the key lessons learned from the Javelin OT&E experience was that high-fidelity training equipment must be developed, tested, and assessed prior to IOT&E to support better troop training of antiarmor gunners (this applies to the IOT&E as well as to the normal pre-combat training). Furthermore, this is also required to ensure accuracy in scoring force-on-force target kill effectiveness (in the IOT&E and for subsequent force-level training opportunities). This lesson applies equally to the TOW F&F program as well as to the LOSAT program.

By drawing lethality data from planned end-to-end missile firings against threat tank targets coupled with existing test data, the TOW F&F LFT&E program continues the successful trend of other recent Live Fire programs. Because the fired missile selects its own hitpoint, this approach allows for the most realistic hitpoint selection for lethality evaluation. Also, the approach is efficient because it uses missile firings planned to collect DT or OT data. However, the number of such firings against threat targets is relatively small, so even a few misses could cause a loss of data. Backup firings and the use of a multi-phase test approach will mitigate this risk.