

SHADOW 2000 TACTICAL UNMANNED AERIAL VEHICLE (TUAV) SYSTEM



Army ACAT II Program

Total Number of Systems:	44
Total Program Cost (TY\$):	\$738.9M (RDT&E and Procurement)
Average unit Procurement cost (TY\$)	\$ 8.0M

Prime Contractors

AAI Corporation

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Tactical Unmanned Aerial Vehicle (TUAV) system is a ground maneuver brigade commander's primary day/night reconnaissance, surveillance, target acquisition, and battle damage assessment system. The TUAV provides the commander with a number of benefits to include: enhanced situational awareness, a target acquisition capability, ability to conduct battle damage assessment, and enhanced battle management capabilities. The combination of these benefits contributes to the commander's dominant situational awareness allowing him to maneuver to points of positional advantage with speed and precision in order to conduct decisive operations. The TUAV, in conjunction with other systems, will provide the tactical commander with *information superiority* contributing to the *full-dimensional protection* of his force and *precision engagement* of the enemy.

The Shadow 200 is a small, lightweight, tactical UAV system. A system comprises three air vehicles, two HMMWV-based ground control stations, an air vehicle transport HMMWVs, two HMMWVs with trailers for personnel, a HMMWV with Maintenance Shelter, one portable ground control station, and four remote video terminals. The air vehicle has a gross take-off weight of 350 pounds with a wingspan of 13 feet. It can carry a 60-pound payload and is currently equipped with the

POP 200 electro-optic and infrared camera. The POP 200 provides full motion color TV and infrared video. The maximum range is 125 kilometers (limited by data link capability), and the air vehicle can loiter up to four hours at 50 kilometers. Operations are generally conducted from 8,000 to 10,000 feet above ground level during the day and 6,000 to 8,000 feet above ground level at night. Automatic landing and take-off can be from unimproved areas as small as 100 meters by 50 meters.

The operational tempo calls for the TUAV to provide 12 hours of continuous operations on station within a 24-hour period. The system will be required to surge to 18 hours within a 24-hour period for up to three consecutive days. After 72 hours, the TUAV system may be reconstituted during a recovery day when the operational tempo requires only 8 hours of operations on station within 24-hour period. The system must be able to keep pace with the brigade's movement and rapid setup and tear down times are required. The control of the air vehicle may be passed between from other control stations or the portable ground control station to facilitate rapid movement and allow continuous flight operations.

BACKGROUND INFORMATION

In October 1995, JROC recommended termination of the Hunter Short Range Joint Tactical UAV (JTUAV) program and proposed an ACTD approach to satisfy JTUAV requirements and complement the newly developed Predator endurance UAV. In May 1996, the Joint Program Office awarded Alliant Techsystems a two-year ACTD contract to deliver six complete Outrider systems with spares by March 1998. The Outrider program experienced many setbacks and delays. Military participation in the program was reduced from two years to two months, and this limited the Services' ability to fully assess the Outrider's military utility. In November 1998, the JROC directed the Navy and the Army to pursue separate air vehicle solutions to satisfy their tactical UAV requirements. The JROC subsequently validated the Army's TUAV ORD in March 1999 and approved three Key Performance Parameters: MOGAS fuel for the air vehicle and generators, day/night passive imagery payload, and C⁴I interoperability with the Army's Joint Tactical Architecture, the Army Battle Command System (ABCS), and JSTARS Common Ground Station.

The Army conducted a systems capability demonstration (SCD) with four contractors participating during October and November 1999 at Ft. Huachuca, AZ. The SCD was used to establish the baseline for system technical and operational performance, and was a significant evaluation factor during the TUAV source selection process. The U.S. Army Test and Evaluation Command provided the source selection board an assessment of each system's potential operational effectiveness and suitability. In December 1999, a Low Rate Initial Production contract was awarded to AAI, Corporation for four Shadow 200 TUAV Low Rate Initial Production systems. The program manager is using a best value approach; i.e., allowing the contractor to trade-off threshold performance characteristics in order to meet higher priority requirements.

Although JROC encouraged the Army to pursue a system that could operate at 200-kilometer ranges and permit a single TUAV system to meet all the Army's UAV requirements, the Shadow 200 is limited in range, endurance and payload capacity. A Block II study is currently underway to define a TUAV system that will come as close as possible to the objective requirements of the TUAV program.

TEST & EVALUATION ACTIVITY

The TEMP was approved prior to the Milestone II and contract award. The document is being updated and will be coordinated prior to the next Milestone.

No operational testing was conducted this year on the Shadow 200. The first flight of the Block 0 Shadow 200, since the SCD, took place June 5, 2000 at Aberdeen Proving Ground, MD. The prime contractor Block 0 flight tests are to evaluate components planned for the Block I Low Rate Initial Production systems. The conversion from Block 0 to Block I involves the integration of several systems into the TUAV like the Tactical Automatic Landing System and the POP 200 payload.

The first Block I system arrived at Ft. Huachuca, Arizona in December 2000 for system performance and government acceptance testing. Training of military operators will begin October 30, 2000 and will consist of 4 weeks in the classroom and 2-3 weeks of flight operations. A second system will be delivered to Ft. Huachuca in order to complete training.

In February 2001, an OP TEMPO test will be conducted at Ft. Huachuca, AZ and Ft. Hood, TX. The majority of testing will take place at Ft. Huachuca, with the remainder of the testing focusing on C⁴I taking place at Ft. Hood. This test is to reduce risk prior to IOT&E, and will evaluate critical technical parameters, demonstrate the OMS/MP, and assess C⁴I connectivity in the Brigade TOC. The IOT&E test unit and first unit equipped is the 1st Brigade of the 4th Infantry Division. The 4th ID uses more advanced versions of the ABCS than the rest of the Army. This could create some problems for testing the Shadow 200 since one of its KPPs is interoperability with the ABCS. The plan is to test the Shadow 200 with the lower version of ABCS in a laboratory environment and fully certify interoperability in follow-on testing and evaluation. IOT&E is scheduled to begin in April 2001 at Ft. Hood, TX.

On account of the compressed schedule between contract award and IOT&E, the JROC-required interoperability with the tactical control system will be integrated as a block upgrade.

TEST & EVALUATION ASSESSMENT

On June 12, 2000, one of the prototype air vehicles went into a sudden spin at 1,500 feet above ground level. An external pilot was able to stop the spin but was not able to arrest the descent and impact. The airframe was a total loss. An accident investigation found the likely cause of the spin entry was a short or open 15 volt avionics power supply; however, it is not know what caused the short or why the external pilot was not able to control and land the air vehicle. A 3-week delay in testing occurred while another prototype air vehicle was properly configured.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

Commercial off-the-shelf and non-developmental UAV programs to date have not stood up to the rigors of operational environments. The OP TEMPO test should include as much operational realism as possible, including the use of military operators and the deployment of realistic operational targets for assessing UAV image quality and final products.

