UNMANNED AERIAL VEHICLE (UAV) TACTICAL CONTROL SYSTEM (TCS)

**Joint ACAT II Program**
- Total Number of Systems: 24 USN, 22 USMC, 44 USA, 12 USAF
- Total Program Cost (TY$): $188.7M*
- Average Unit Cost (TY$): TBD
- Average PA Unit Cost (TY$): TBD
- Full-rate production: 2QFY01, 4QFY05

*(RDT&E $ only, GCS production funds are managed by each Service separately)*

**Prime Contractor**
Raytheon Systems Co.

**SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020**

The Unmanned Aerial Vehicle (UAV) Tactical Control System (TCS) will provide the UAV operator the necessary tools for computer related communications, mission tasking, mission planning, mission execution, data processing, and data dissemination for all tactical and medium altitude endurance UAVs. TCS will support long-range communications from one TCS to another. TCS will provide the tactical commander with *information superiority*, contributing to the *full-dimensional protection* of his force and supporting *precision engagement* of the enemy.
TCS is designed to provide the Warfighter with a scalable and modular capability to operate UAVs on existing computer systems and future C4I processing systems. *Scalable* refers to the ability to provide five levels of air vehicle interaction that range from receipt and transmission of secondary imagery to full functional control of the UAV during take-off to landing. *Modularity* allows the use of common hardware. It provides the flexibility to increase or decrease the system’s operational capability by adding or removing electronic cards. This allows TCS to be configured to meet the user's deployability or operational limitations. TCS is a software-intensive system required to be compliant with joint tactical architecture, common imagery ground/surface system, and defense information infrastructure and common operating environment.

The TCS will be integral to the US Army TUAV ground control station (GCS) and the US Navy/US Marine Corps VTUAV GCS. The USN TCS will provide varying levels of interaction across the fleet with tactical, MAE, and HAE UAVs. TCS will be the control system for all ship-based UAVs, and for USN ships without UAVs, a TCS equipped workstation may be integrated with the ship to provide the required connectivity to UAV operations.

The USAF RQ-1 Predator GCS will provide sensor and payload control, flight control, and launch and recovery capability for the Predator air vehicle. TCS will be incorporated into the Predator GCS to provide TCS direct data receipt and data dissemination to the required TCS C4I architectures.

TCS will be interoperable with a wide range of Joint and Service C4I systems for imagery, data dissemination, and mission planning. The TCS, however, does not contain organic communications capability. For those UAV systems that have organic communications, additional C4I interfaces may be provided by the TCS.

The TCS consists of six sub-systems: (1) the line of sight antenna assembly; (2) the integrated data terminal; (3) the data link control module; (4) the computer; (5) the synthetic aperture radar sub-system; and (6) the workstation. Various configurations of these pieces have been used in operational exercises and technical demonstrations.

**BACKGROUND INFORMATION**

The Joint Requirements Oversight Council initially validated the TCS Operational Requirements Document (ORD) on February 3, 1997 (JROCM 011-97). This ORD identified the urgent need to provide a common tactical control system for the current and future family of tactical and medium altitude endurance UAVs. The JROC reviewed and revalidated the revised TCS ORD on February 3, 2000 (JROCM 010-00). The primary changes in the revised ORD were to make the control of the USAF Predator air vehicle and payload by other Service’s TCS an objective vice threshold requirement.

The Navy Acquisition Executive is the Milestone Decision Authority for this joint program. The developing agency is the Navy’s PMA-263, Program Executive Office for Strike Weapons and Unmanned Aviation (PEO(W)). The Army, Navy, Air Force, and Marine Corps are participating in the program. ASN(RDA) approved the Milestone II to enter EMD on February 25, 2000.

The U.S. Joint Forces Command provides joint warfighter oversight for TCS. This includes supporting test plan development, involvement in operational demonstrations, and access to the Joint Operational Test Bed System. The Joint Interoperability Test Command (JITC) has the lead
responsibility for the conduct and evaluation of joint interoperability test activities and standards conformance testing.

TCS is primarily software integrated into a host UAV system. Incremental implementation of TCS during the concept exploration phase led to six releases of software called Engineering Builds (EB). Participation in warfighting exercises and demonstration using these incremental builds led to the convergence into a baseline Block 0 system. A baseline Block 1 system will be the Army TUAV TCS, and the baseline Block 2 system will be the Navy VTUAV TCS and Air Force Predator retrofit. Eventually, Block 1 and Block 2 will be merged into a Block 3 TCS interoperable with all Services’ UAVs.

During EMD, four Engineering Development Units (EDU) will be delivered for formal developmental and operational testing. EDU 1 and 2 will be test assets for the sea-based and land-based configurations. EDU 3 will be the Block 1 asset for the TUAV program and EDU 4 will be a Block 2 asset for VTUAV testing.

TEST & EVALUATION ACTIVITY

No operational tests, demonstrations, or exercises were conducted with TCS inter-operating with a UAV platform this year. Many scheduled events were cancelled such as EB5 manual launch and recovery, EB6, Pioneer-TCDL demonstrations, and participation in JTFEX 00.

This office approved the TCS TEMP in November 2000, with the guidance that the operational testing of TCS should be conducted with the UAV system it supports in an operationally realistic environment. This has been problematic to define to date because there are no joint tactics, techniques, or procedures (TTPs) in place for one Service to interoperate with another Service’s UAV. Each Service will conduct a system-specific IOT&E tied to their ORD. A subsequent capstone IOT&E must be developed to consist of a combined test with TUAV, Predator, and VTUAV all operated by the same TCS. Service approved TTPs must be developed prior to this test.

TEST & EVALUATION ASSESSMENT

The JITC continues to work with the TCS program office and contractor for C^4I interoperability certification. None of the TCS C^4I products are certified at this time.