

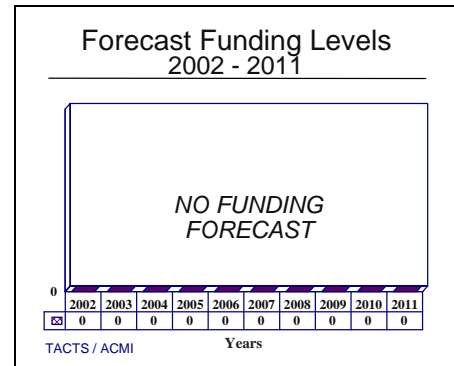
ARCHIVED REPORT

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TACTS/ACMI - Archived 11/2003

Outlook

- According to the US Navy FY 2003 RDT&E descriptive summary, 2001 was the last year the Department of the Navy funded the Tactical Aircrew Combat Training System project
- The Air Combat Maneuvering Instrumentation program is no longer a distinct, active project of the United States Air Force
- Barring developments, Forecast International will archive this report in 2003



Orientation

Description. The Tactical Aircrew Combat Training System (TACTS) is a US Navy research and development effort. The Air Combat Maneuvering Instrumentation (ACMI) is a US Air Force research and development endeavor. Together, the two programs provide realistic air-warfare training for tactical aircrews flying fighter aircraft.

Sponsor

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(Prime: ACMI and ACT-R development/installation)

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(Preproduction JTCTS models)

Status. The year 2001 was the last year the US Department of the Navy funded the Tactical Aircrew Combat Training System project. The Air Combat Maneuvering Instrumentation program is no longer a distinct, active project of the United States Air Force.

Total Produced. At least 41 TACTS/ACMI ranges have reportedly been installed and are operational.

Application. To provide air-to-air, air-to-surface, and defense suppression pilot training.

Price Range. Indeterminate for in-service systems, as these programs have typically not covered the purchase of one specific type of equipment.

Technical Data

Design Features. The Tactical Air Crew Training System/Aircrew Combat Maneuvering Instrumentation (TACTS/ACMI) is a training program. The program uses airborne pods, ground sensors, computers, and associated displays to provide realistic air-warfare training for tactical aircrews flying fighter aircraft. Aircraft attitude, speed, location, *g*-force, proximity to other aircraft, and accuracy of weapon firings are displayed in real time at appropriate facilities, and are recorded for post-mission debrief and analysis.

TACTS/ACMI consists of seven ground stations, one manned master station, and six remote unmanned stations. Five are located on the circumference of a circle with one remote station at the center. The ground stations allow for tracking redundancy so that aircraft engaged in training procedures are never out of radar or telemetry contact with the range. Descriptions of the TACTS/ACMI basic subsystems follow:

Airborne Instrumentation Subsystem (AIS). The instrument pod is about the size of a Sidewinder missile. It contains an air-data sensor probe, a small air scoop, an antenna, a transponder, a weapons bus monitor, and an attitude heading reference system. The weapons bus monitor can be configured to represent characteristics of a Sidewinder or a Sparrow missile. A strap-down inertial measurement system developed by Lear Siegler is also included in this package. It contains a computer, rate integration gyros, and linear accelerometers. This instrumentation is carried internally aboard the F/A-18, obviating use of pod-mounted equipment.

The latest version of the AIS features MIL-STD-1553 and MIL-STD-1760 databus interfaces to provide a full complement of aircraft system data to the TACTS/ACMI in real time, speech synthesizers to communicate missile hits to the pilot privately and automatically, and a radar altimeter to provide accurate altitude data at extremely low altitudes.

Tracking Instrumentation Subsystem (TIS). This subsystem consists of solar-powered, remote data collection and relay stations located throughout a 30x50-mile-range area. The devices communicate data to and from participating aircraft, and relay their data (via the remotely controlled master station and microwave link) to both the Computation & Control and Display & Debrief subsystems. It is a high-speed, phase-locked looped ranging system that operates in the L-band.

Computation & Control Subsystem (CCS). The CCS consists of state-of-the-art computers and supporting peripheral equipment. The computers perform data processing, update transmissions to the Aircraft Instrument subsystem, process material for the Display & Debrief subsystem, and prepare missile simulations to define missile-firing envelopes for the airborne pilot's real-time instructions.

The newest version can handle upwards of 36 aircraft and 50 missile simulations simultaneously. The CCS computes in real time the stated vector of each aircraft and the relative position of each aircraft in the exercise, and processes real-time weapon simulations for all aircraft, allowing for multiple simultaneous weapons firings. The data are recorded by the CCS and transmitted to the Display & Debrief subsystem.

Display & Debrief Subsystem (DDS). The DDS utilizes advanced technology, multicolored/multifunction large-screen displays and consoles to provide three-dimensional displays, engineering data, and aircraft launch modes for weapons delivery and air combat maneuvering.

Each DDS consists of two vans with identical sets of displays, each with three cathode ray tubes (CRTs) and a control and communications panel. An input device allows the instructor pilot to impose limits on each safety function, the level of the pilot's training, and the scenario of each mission. Communications are via four UHF radio channels and a telephone intercom between the various ground stations. The USAF refers to the DDS as the Measurement and Debriefing System (MDS).

CRT. Within the DDS, one CRT presents flight status, range status, and summary information on ACMI operations. A second CRT provides the instructor with real-time aircraft position in three dimensions, while history ribbons provide the real-time flight path of the aircraft. Zoom controls allow for close examination of a particular area and coordinate rotation, aircraft identification, and assessment. If an aircraft exceeds safety parameters, an aircraft indicator flashes. The third CRT presents parameters of the operation and provides safety information.

All data are stored on magnetic tapes which also preserve four voice data channels. This information can be replayed several times with stop action, backup, and zoom to assist pilot debriefing.

Variants/Upgrades

Basic Upgrades. A number of ongoing upgrades funded with USN and USAF RDT&E, with the emphasis on providing more advanced software suitable for a wider variety of applications.

Joint Tactical Combat Training System (JTCTS). A joint-service program that descended from TACTS and ACMI is the JTCTS, which will provide the US Navy and Air Force with a mobile, rangeless capability; a fixed air range capability; and a fleet battle group capability, for shore-based and at-sea training.

GPS Aids ACMI. In June 1998, the USAF announced that a P4B Airborne Instrumentation subsystem pod used in training was upgraded to incorporate a GPS. This allows the pod to downlink position information directly to ACMI ground stations. Using acquisition streamlining, the project was conducted in two years, at a cost of US\$6 million. The pods are carried on any

aircraft wing where a Sidewinder missile is normally hung. Whereas a typical 40x100-mile test range utilizes 10 to 12 ground and ocean towers, the GPS-capable pods are intended to reduce the number of towers needed to monitor combat training and testing from three to one, and will also extend the range of coverage.

ACT-R. Cubic Defense Systems has developed an upgrade, or replacement, for ACMI called the Air Combat Training – Rangeless (ACT-R), which operates entirely with an airborne GPS-capable pod that eliminates the need for a fixed (ground-based) range. This “smart” pod can store all the information normally transmitted to ground stations, then download the information to computers on the ground for study. It can also operate with ground stations for analysis in real time.

Program Review

Tactical Aircrew Combat Training System (TACTS). Research and development funding for the Tactical Aircrew Combat Training System (TACTS) is provided under Program Element 0204571N, Project W0431. During 1995, Project W0431 continued developing a No-Drop Weapons Scoring (NDWS) capability for the AV-8B and F-14A/B Navy aircraft. The development of a Computer-Generated Threat Simulation (CGTS) training capability for the AV-8B was also complete in 1995.

In 1996, Project W0431 finished the development of an NDWS capability for the AV-8B and F-14A/B aircraft. The project also completed developing simulation capabilities for the 2S6 AAA and SA-11 SAM aircraft in 1996. Efforts for the TACTS project in 1997 entailed the completion of the development of two training capabilities for the F/A-18E/F and an initial AMRAAM training capability for the F/A-18.

In 1999, Project W0431 finished the development of block 6.0/A10 software. The project also completed developing a training capability for a Joint Stand-Off Weapon (JSOW) during 1999.

In 2001, Project W0431 finished developing Block 5.2 CCS software and integrating it into aircraft weapons systems. Also in 2001, the project completed development and integration of AIS A10 software.

According to the US Navy FY 2003 RDT&E descriptive summary for the Tactical Aircrew Combat Training System, 2001 was the last year any work under Project W0431 took place. The year 2001 was also the last year the US Department of the Navy funded the project.

Air Combat Maneuvering Instrumentation (ACMI). The Air Combat Maneuvering Instrumentation program is no longer a distinct, active project of the United States Air Force.

Funding

According to the US Navy FY 2003 RDT&E descriptive summary, the Bush administration did not allocate funds for Project W0431, Tactical Aircrew Combat Training System.

Recent Contracts

No recent contracts have been located for the Tactical Aircrew Combat Training System program or the Air Combat Maneuvering Instrumentation program.

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1968	Concept formulation
Sep	1969	RFP issued to industry
May	1971	Contract awarded to Cubic Defense Systems
	1972	Sources sought notice published for interim ACMR; option for second ACMR delivered
Nov	1972	First ACMR delivered
	1979	ACMR changed to TACTS
Jun	1989	Kollsman selected over Cubic for ACMI range construction in Alaska and Wisconsin
	1992	Development of aircraft interfaces begins
	1997	Initial AMRAAM training capability for F/A-18 completed under TACTS
	1997	ACT-R delivered to US Air Force to replace ACMI at Kadena Air Base, Okinawa
	1998	Initial Phoenix training capability for F-14 completed under TACTS
	1999	Completion of development of Block 6.0/A10 TACTS JSOW
	2001	Last year any work took place under Project W0431, Tactical Aircrew Combat Training System. Last year US Department of the Navy funded Project W0431

Worldwide Distribution

The majority of **US Navy** TACTS and **US Air Force** ACMI ranges are located at Naval Air Stations and Air Force bases in the continental United States. ACMI ranges have also been (or are scheduled to be) installed in **Australia, Canada, Egypt, Italy, Japan, South Korea, Taiwan, Thailand, and the United Kingdom.**

TACTS Installations

Date	Location	Date	Location
1971	Oceana NAS	1985	Fallon IOC
1973	Yuma NAS	1986	Cecil NAS
1981	Miramar NAS	1987	El Toro NAS
1981	Cherry Point NAS	1987	Southern California NAS
1983	Fallon NAS	1989	Fallon FOC
1984	El Centro NAS		

ACMI Installations

Date	Location	Date	Location
1975	Nellis AFB	1984	George AFB
1976	Eglin/Tyndal AFB	1985	Korat, Thailand
1977	Decimomannu AB, Italy	1985	Charleston ACMI
1977	Langley ACMI	1985	Shaw AFB
1979	Luke AFB	1986	Holmstead AFB
1982	Cold Lake, Canada	1990	Kadena Air Base, Japan (ACT-R/KITS in 1998)
1982	Holloman AFB	1991	Alaska ACMI
1982	Korea ACMI	1991	Wisconsin ACMI
1983	McDill AFB	1991	National Training Center, Ft. Irwin
1984	Seymour-Johnson AFB	1999	Yukon JTCTS site slated

ACMI Installations

Date	Location	Date	Location
1984	McDill ACMI		

Forecast Rationale

The Tactical Aircrew Combat Training System (TACTS) project is a US Navy research and development effort. The Air Combat Maneuvering Instrumentation (ACMI) program is a US Air Force research and development endeavor. Together, the two programs provide realistic air-warfare training for tactical aircrews flying fighter aircraft.

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Ten-Year Outlook

With the unavailability of funding information, the **Ten-Year Outlook** chart has been omitted.

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