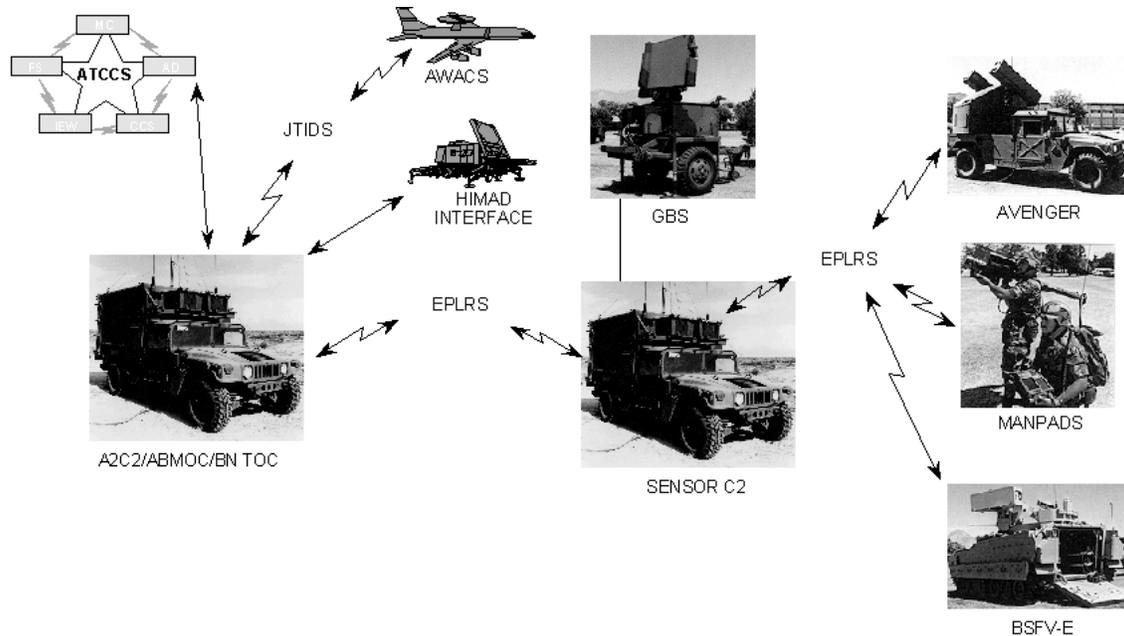


FORWARD AREA AIR DEFENSE COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE (FAAD C³I) SYSTEM



Army ACAT IC Program

Total Number of Systems:	15
Total Program Cost (TY\$):	\$1,149M
Average Unit Cost (TY\$):	\$76.6M
Full-rate production:	3QFY95

Prime Contractor

TRW
Hughes

SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2020

The Forward Area Air Defense Command, Control, Communications, and Intelligence (FAAD C³I) system is a network that connects the command posts, weapons, and sensors of the Army's short-range air defense units. In addition, the FAAD C³I system is one of the five components that make up the Army Tactical Command and Control System. The Ground-Based Sensor (GBS), also called Sentinel, provides air surveillance, target acquisition, and target tracking information to the weapons in the FAAD Battalion. The FAAD C³I and the Sentinel radar provide *information superiority* to help ensure a *dominant maneuver* force.

The FAAD C³I system consists of computer hardware, computer software, and communications equipment. The computer hardware includes central processing units and display screens. FAAD C³I software performs air track and battle management processing functions. The communications equipment consists of the Single-Channel Ground and Airborne Radio System, the Joint Tactical Information Distribution System, and the Enhanced Position Location Reporting System. In essence, FAAD C³I is an automated system that provides command, control, targeting, and other information to air defenders on the battlefield. The Sentinel TPQ-36A radar is a modified version of the Army's FIREFINDER counter-battery radar. Sentinel is a three-dimensional radar system that uses a phased-

array antenna and an Identification Friend or Foe device. The GBS system is mounted on a High Mobility Multi-Wheeled Vehicle and a towed trailer.

BACKGROUND INFORMATION

The first operational test of the FAAD C³I system was the Limited User Test in January and February 1993 at Ft. Bliss, TX. The Army made an LRIP decision to procure and field the FAAD C³I system to one light division, the 101st Air Assault Division, following the FAAD C³I Limited User Test.

FAAD C³I and GBS IOT&E was conducted from September-December 1994 at Ft. Hood and Ft. Bliss. Testing at Ft. Hood assessed the capacity of the FAAD C³I system to interoperate with other components of the Army Tactical Command and Control System. During testing at Ft. Bliss, command and control information, as well as air track data collected from the GBS radar and other sensors, was passed throughout the FAAD C³I system.

FAAD C³I and GBS IOT&E was adequate to assess operational effectiveness and suitability. Baseline testing using the Army's current air defense capabilities was also conducted during IOT&E. Thus, direct comparisons of the test results could be made between the FAAD C³I and GBS systems and the baseline despite inherent test limitations.

A major finding from IOT&E was that when there were no friendly aircraft flying, FAAD C³I and GBS clearly demonstrated improvement over the baseline system, and were considered to be effective. However, when friendly aircraft were added to the operational scenario, fratricide experienced by both the baseline and FAAD C³I units was unacceptably high, making FAAD C³I useful only when friendly aircraft were not present or as a self-defense system. The FAAD C³I and GBS systems were judged to be operationally suitable, although there were shortfalls in the generator and software reliability of the GBS system and mobility issues in both the FAAD C³I and GBS systems.

A new version of FAAD C³I software, version 4.R, was tested in an Early User Innovative Test at Ft. Bragg, NC, in June 1997. The version 4.R software is a re-hosting of current FAAD C³I software on the Army's next-generation Common Hardware and Software-2 hardware, replacing the current Common Hardware used by FAAD C³I. Additional regression testing of version 4.R FAAD C³I testing followed the Early User Innovative Test. The reliability problems discovered in IOT&E and associated with the GBS radar sub-system were fixed and successfully tested during the 1997 Performance Verification Test. This test also revealed a design flaw in the high mobility trailer used to transport the GBS system (which makes the trailer unsafe.) The Army identified an interim solution and a materiel release was issued in November 1998.

The latest software of the FAAD C²I system is version 5.2. The most significant upgrade of version 5.2 is the re-host of FAAD C²I software on Force XXI Battle Command, Brigade and Below (FBCB2) hardware. The FBCB2 V3 handheld computer will display either the air defense picture provided by FAAD C²I or the ground picture provided by FBCB2. This requires that FAAD C²I and FBCB2 transmit data over the same EPLRS needline network to the FBCB2 V3 computer.

TEST & EVALUATION ACTIVITY

Testing of the FAAD C³I system during FY00 consisted of Phase I of the Limited User Test of the version 5.2 FAAD C²I system. Phase I testing was conducted in conjunction with the FBCB2

Customer Test (CT) at Ft. Hood in April 2000. The primary objective was to examine the co-hosting of FAAD C²I and FBCB2 data transmissions over the same EPLRS network (needline competition) and the ability to display both the air picture and ground picture on the same FBCB2 computer.

Phase II of the Limited User Test (LUT) will be conducted in conjunction with PATRIOT PAC-3 IOT&E scheduled for late FY01. The LUT will support the materiel release and fielding decisions for Version 5.2 software.

TEST & EVALUATION ASSESSMENT

The FAAD C³I and GBS systems significantly enhance the accomplishment of low altitude, short-range air defense missions when compared to previous capability. The ability of STINGER-equipped units to engage hostile aircraft at longer ranges, particularly before ordnance release, offers greatly improved protection of friendly ground units. However at longer ranges, positive identification of "unknown" aircraft is more difficult, and fratricide, as observed during IOT&E, becomes a serious problem. During IOT&E, friendly aircraft were frequently engaged by friendly air defense fire units because the aircraft were identified as "unknown" to individual air defense gunners. This situation is operationally realistic and exists due to the inability of today's electronic identification devices to identify all friendly aircraft correctly. Thus, soldiers must perform visual identification of all "unknown" aircraft as either "friend" or "foe." Until such time as a highly reliable means of identification is available, FAAD C³I will most commonly operate in the more restrictive "weapons tight" or "weapons hold" postures. All future OT of FAAD C³I and GBS should examine the important issue of fratricide and employ both friendly and hostile aircraft. The next FAAD C³I operational testing to examine fratricide issues will be Phase II of the FAAD C³I LUT scheduled for 2001.

Future operational testing should also examine whether FAAD C³I and GBS systems can keep up with the maneuver force during highly mobile combat operations such as Operation Desert Storm. Additionally, the reliability problem with the GBS high mobility trailer is still an open issue; the Army continues to operate with a workaround and an interim safety release.

There were two primary issues for FAAD C²I to be addressed during Phase I of the FAAD C³I LUT. The first issue was the Tactics, Techniques, and Procedures (TTPs) for soldiers operating the FAAD C²I system on the same computer as the FBCB2 system. In essence, TTPs need to be developed for soldiers using both the FAAD C²I air picture and the FBCB2 ground picture. The second issue was whether there was sufficient bandwidth so that air track data could meet the 4-second update rate required to effectively operate the slew-to-cue capability of AVENGER and LINEBACKER air defense fire units. The preliminary results suggest the soldiers liked the concept of having both the air and ground pictures on a single computer.

FAAD C³I upgrades and interoperability associated with its role in the Army Battle Command System Version 6 will be examined during Force XXI Battle Command, Brigade and Below testing during FY00-02. A revision of the FAAD C³I TEMP is in staffing, and the test plan for Phase II of the LUT is expected soon.

CONCLUSIONS, RECOMMENDATIONS AND LESSONS LEARNED

The fratricide problems identified during IOT&E would not have surfaced if operationally realistic combat identification and engagement procedures had been excluded. Previous testing, such as

the Limited User Test in 1993, did not exhibit high fratricide rates because testing only examined the ability of the FAAD C³I system to pass information around the battlefield. The Limited User Test held in 1993 did not require Army gunners to use FAAD C³I information to complete an engagement.