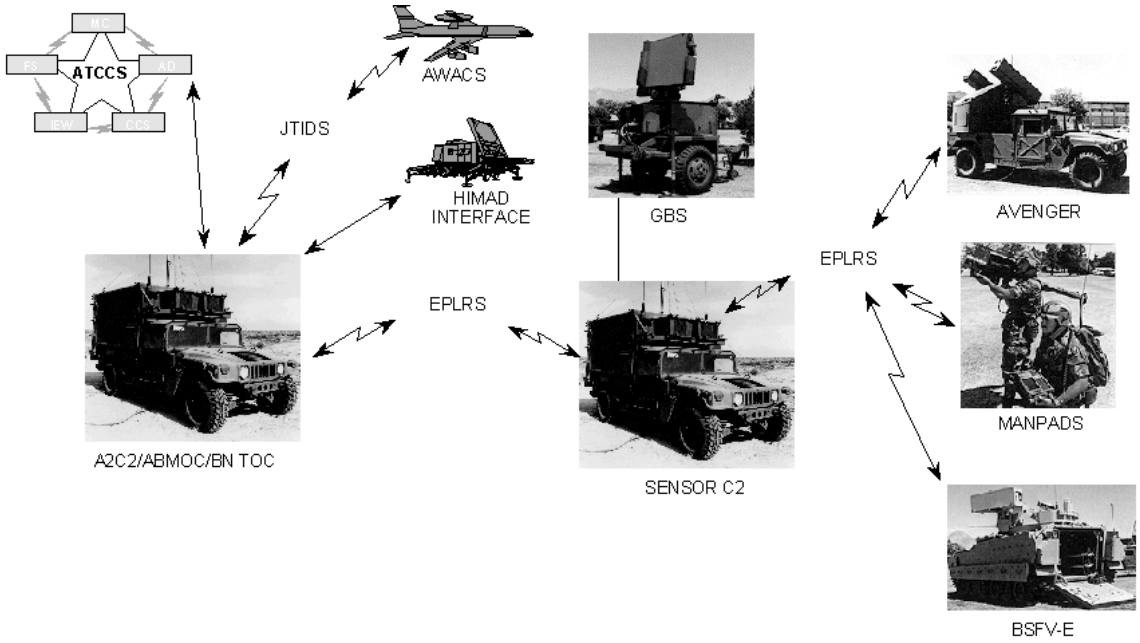
# FORWARD AREA AIR DEFENSE COMMAND, CONTROL, COMMUNICATIONS, AND INTELLIGENCE (FAAD C3I) SYSTEM GROUND-BASED SENSOR (GBS)




| **Army ACAT IC Program** | | **Prime Contractor** |
|---|---|---|
| Total Number of Systems: | 15 | TRW |
| Total Program Cost (TY$): | $1149M | Hughes |
| Average Unit Cost (TY$): | $76.6M | |
| Full-rate production: | 3QFY95 | |

## SYSTEM DESCRIPTION & CONTRIBUTION TO JOINT VISION 2010

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 FAAD Battalion. 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) provides air surveillance, target acquisition, and target tracking information to the weapons in the FAAD Battalion. The FAAD C3I and GBS systems 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 TPQ-36A radar is a modified version of the Army's FIREFINDER counter-battery radar. GBS 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-February 1993 at Ft. Bliss, TX. The Army made a 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, TX. 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, were passed throughout the FAAD C3I system.

FAAD C3I and GBS IOT&E were 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 subsystem 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 changes to the Engagement Operations Software for version 5.1 are: EPLRS/SINCGARS simulcast capability; TADIL-B link to Patriot and adjacent FAAD units; and a low-level, air-picture interface with NATO radars. There are no changes to the Force Operations software. Software version 5.2 upgrades will include changes that provide interoperability with Force XXI Battle Command, Brigade and Below software, an important step towards Battlefield Digitization goals.

## TEST & EVALUATION ACTIVITY

Testing of the FAAD C3I system during FY99 has been limited to developmental tests of upgraded Version 5.1 system software. Developmental testing was carried out in the contractor's

facility, but the software also participated in exercises such as Roving Sands 99. The assessment for Version 5.1 is ongoing, and will support the Army's goal of a Materiel Release in 3QFY00.

## 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 correctly identify all friendly aircraft. 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 a FAAD C3I LUT scheduled for 1QFY01 and the Stinger Block II IOT&E scheduled for FY05.

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 trailer is still an open issue; the Army continues to operate with a workaround and an interim safety release.

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

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