

JOINT SURVEILLANCE TARGET ATTACK RADAR SYSTEM (JSTARS) E-8C, COMMON GROUND STATION (CGS), MULTI-PLATFORM RADAR TECHNOLOGY INSERTION PROGRAM (MP-RTIP), MULTI-PLATFORM COMMON DATA LINK (MP-CDL)



The Joint Surveillance Target Attack Radar System (JSTARS) is a surveillance, battle management, and targeting radar system. It is a joint Air Force and Army program with the Air Force as the executive service. The system is required to perform surveillance and battle management for both air and land component forces. It is intended to meet the operational need for locating, classifying, and supporting precision engagement of time-sensitive moving and stationary targets. Three separate systems combine to perform the JSTARS mission, an Air Force E-8C aircraft, known as the JSTARS; an Army Common Ground Station (CGS); and the data link connection between the two. The system now includes the follow-on to the JSTARS sensor, the Multi-Platform Radar Technology Insertion Program (MP-RTIP) and the next generation data link, the Multi-Platform Common Data Link (MP-CDL).

The JSTARS airborne platform is a Boeing 707 designated the USAF E-8C. The basic airframe is 25 to 30 years old and has been extensively refurbished and updated with the JSTARS radar system, communications gear, 18 mission workstations, and air refueling capability.

The CGS receives, processes, and displays JSTARS radar imagery transmitted from the E-8C. The CGS is mounted on a High Mobility Multi-Purpose Wheeled Vehicle (HMMWV). It consists of computer workstations, communications equipment, and data link capability to integrate with the JSTARS aircraft, intelligence networks, and national level information sources. The CGS is expected to provide the Army ground elements with the capability to prosecute air and land engagement of time-sensitive targets and support the intelligence preparation of the battlefield.

The JSTARS program office planned four block upgrades and modifications for the E-8C. Block 10 provided the Tactical Digital Information Link (TADIL-J) Upgrade (TJU); Block 20 was the Computer Replacement Program (CRP); and Block 30 integrates satellite communications (SATCOM), the Attack Support Upgrade (ASU), and Improved Data Modem (IDM). The Multi-Platform Radar Technology Insertion Program (MP-RTIP) was restructured from the original Block 40 JSTARS radar upgrade. MP-RTIP is a program to develop modular, scalable, high-performance radars suitable for integration on a variety of air platforms, including Global Hawk. The current data link will be replaced by the Multi-Platform Common Data Link (MP-CDL), a program to develop a network-based application

of the standard DoD data link for the dissemination of intelligence, surveillance, and reconnaissance data.

BACKGROUND INFORMATION

Although a Multi-Service Operational Test and Evaluation (MOT&E) was scheduled for FY96, the system was evaluated during the operational deployment, Operation JOINT ENDEAVOR (OJE) supporting the forces in Bosnia. While assessment in an operational context was valuable, it presented critical limitations to the scope of the evaluation. The system demonstrated only limited capability in support of target attack and battle management because of the nature of the air tasking. The E-8C did not meet its overall suitability requirements during the deployment and was evaluated as unsuitable to support a high operational tempo conflict. Because of these shortfalls and unresolved issues in MOT&E, OSD directed an E-8C FOT&E.

The CGS IOT&E was a series of three tests over two years, ending in March 2000. The tests revealed operational shortfalls in CGS effectiveness and suitability. Operators were unable to report on targets to intelligence or fire support nodes in a timely, accurate, and complete manner, and were unable to discern stationary targets from their background in the Synthetic Aperture Radar (SAR) mode. The benefit of including other sensor feeds in the CGS was not shown. The CGS was not suitable for tactical employment because it was incapable of on-the-move operations without power from the 10-kilowatt generator in its trailer, which was determined to be unsafe.

TEST & EVALUATION ACTIVITY

Activity in FY01 focused on planning for the FOT&E of the CGS. The Army intends to rely heavily on modeling and simulation to address many unresolved operational issues. It has explored the use of the Tactical Aerospace Command and Control Simulation Facility (TACCSF) at Kirtland AFB as the venue for conducting much of the FOT&E. In 2001, the CGS participated in the TACCSF's quarterly Desert Pivot exercise to assess the feasibility of conducting the FOT&E during this exercise.

The MP-RTIP program produced a test strategy outlining the risk reduction to support Milestone B. The plan consists of limited developmental tests of low-level hardware components with performance of those components input into a sequence of models and simulations.

The MP-RTIP program is currently drafting a sensor test plan and a Wide Area Surveillance (WAS) platform TEMP. Additionally, the Global Hawk program office is incorporating MP-RTIP into its TEMP. Finally, AFOTEC has drafted an Early Operational Assessment (EOA) plan using the contractor's developmental test results and modeling and simulation to support the Milestone B decision. The MP-CDL program focused on defining its requirements.

TEST & EVALUATION ASSESSMENT

In the JSTARS E-8 Test and Evaluation Report, DOT&E assessed the E-8C as operationally effective in operations other than war, but the system was evaluated as unsuitable to support a high operational tempo conflict. The radar picture provides information on large-scale movements of ground targets over a corps-sized area of interest. The commanders supported by JSTARS felt that it gave them a higher level of situational awareness than without JSTARS.

The CRP OT&E demonstrated that the computer upgrade did not degrade the performance of the E-8C or adversely affect its ability to perform its mission. The new radar processor of the Block 20 was far more reliable and the Block 20 E-8 had a higher effective time on station than the Block 10 aircraft.

The CGS was adequately tested to support the full-rate production decision. Testing and field operations show that the CGS provides a useful military capability and is effective for battle management and surveillance of large moving target sets (20 to 30 vehicles). The CGS cannot be considered operationally effective in the accomplishment of target attack missions and surveillance of company-sized target sets (8 to 11 vehicles). The CGS is not operationally suitable for its more stressing intended missions because of issues with reliability, training, and the inability to operate on the move.

The operational tests showed that the resolution of SAR imagery from the E-8C is inadequate for CGS operators to distinguish small tactical formations of vehicles from their background. This limits the ability of the CGS to support the surveillance and targeting of small tactical formations such as Scud missile units. Tests show that the CGS did not consistently and successfully target moving vehicles. Training of the operators, non-commissioned officers, crew, and staff is inadequate to fully exploit the capabilities of the CGS.

DOT&E is concerned with the availability of the JSTARS test bed aircraft, designated T-3, for planned JSTARS upgrades and the MP-RTIP test program. The USAF is planning to use T-3 as the test bed for MP-RTIP. This will impact availability of the T-3 for E-8C Block 30 upgrade testing. Unless another aircraft is assigned to the JSTARS program, flight testing of the planned upgrades to the E-8C will be forced to use an operational aircraft. Although they have been used for testing in the past, those tests have not required extensive aircraft modifications. To test current upgrades, substantial modifications will be required which may impact real-world operations. If these Low Density/High Demand aircraft are already committed to operational taskings, then the upgrades will be delayed. Thus, there may be a requirement for another a dedicated test aircraft.

LESSONS LEARNED

There are two lessons to highlight from the JSTARS program. Lesson 1: Testing during wartime operations, in lieu of conducting dedicated OT&E, offers advantages and disadvantages that must be factored into the overall system evaluation. In OJE, JSTARS was required to interface with many agencies and systems. It was an opportunity to evaluate the system working with different users, operational and intelligence requirements, and military systems in situations not typically found in a formal OT&E. However, although JSTARS was integrated into an operationally realistic and complex environment, there were disadvantages of evaluating it during wartime operations. In OJE, evaluators were denied access to monitor some of the key military activities that JSTARS supported. This, combined with the inherent inability to put in test controls during the actual military operations, resulted in an OT&E that evaluated the JSTARS capabilities in that specific theater in that specific scenario only. Conditions and environments could not be varied and monitored, as they would have been possible

during formal OT&E, in order to answer specific questions about the system capabilities. Lesson 2: Coordination, system architecture, and procedures are often overlooked in the face of technical challenges. While there were significant technical challenges in the JSTARS program, for the most part, they were met. What plagued the operations of JSTARS equipped units was the lack of training (at both the operator and user level), inadequate Tactics, Techniques and Procedures (TPPs), interface difficulties, the lack of an architecture to integrate JSTARS with other systems, and the inability to fuse JSTARS information with other products into a useful intelligence product for commanders. This highlights that neglecting or underestimating these details can easily negate any technical advances that are made.