Boeing Anti-Jam GPS System Demonstrating Outstanding Performance in Testing

A new anti-jam Global Positioning System (GPS) developed by Boeing has successfully defeated jammed environments in two successive drop tests, allowing the test vehicles to strike well within their designated target areas.

The drop tests were performed at the White Sands Missile Range in New Mexico using modified Joint Direct Attack Munitions (JDAMs) as test vehicles. The tests are being conducted as part of the U.S. Air Force's Anti-Jam GPS Technology Flight Test (AGTFT) program.

"From launch and GPS-acquisition through descent and impact, these drop tests have been an outstanding success," said Jerry Brennan, AGTFT program manager in the Boeing Phantom Works. "Our anti-jam system is performing just the way it was designed and predicted to perform."

The objective of the AGTFT program is to develop and demonstrate a low cost solution to the potential jamming vulnerability of GPS-aided, inertially guided tactical weapon systems. Candidates for the new system include JDAM and the Conventional Air-Launched Cruise Missile (CALCM).

The Boeing solution, developed in the Phantom Works, consists of a Harris Corp. anti-jam electronics module integrated with a closely coupled GPS/INS (inertial navigation system) guidance unit and an anti-jam GPS antenna, both produced by Boeing. The GPS receiver is provided by Collins and the inertial measurement unit by Honeywell.

"In developing this system, we were able to leverage our experience from the Air Force's Tactical High Anti-Jam GPS Guidance (THAGG) and Tactical GPS Anti-Jam Technology (TGAT) programs, as well as from the JDAM program," Brennan said. "This experience allowed us to efficiently produce a low cost system that defeats high jamming environments and maintains high weapon accuracy."

In the most recent test, the AGTFT test vehicle was dropped into a high-power GPS-jammer environment from 44,000 feet and achieved direct military code GPS acquisition within 8 seconds. While descending through wind shears of up to 110 mph, the test vehicle continued to track GPS satellites in the jammed environment and ultimately struck within 6 meters of the target.

In an earlier test, the AGTFT test vehicle was dropped from 44,000 feet into a low-power GPS-jammer environment and achieved direct military code GPS acquisition within 12 seconds. The test vehicle descended in the jammed environment through wind shears of up to 105 mph, continuously tracking GPS satellites and striking within 3 meters of the target.

"The accuracy achieved in this testing is as much a tribute to the effectiveness of the JDAM guidance unit as it is to our new anti-jam subsystem," Brennan said. The drop test altitude was the highest from which a JDAM has been launched.

The four-phase AGTFT program was awarded to the former McDonnell Douglas (now Boeing) in August 1995. Anti-jam (AJ) subsystem hardware testing was conducted during Phase I; AJ subsystem integration into eight flight test vehicles was performed in Phase II; and system level AJ ground testing of a flight test vehicle occurred in Phase III. Six more drop tests are scheduled through May to complete Phase IV.

The Air Force Research Laboratory (AFRL) Munitions Directorate at Eglin Air Force Base, Fla., leads the AGTFT program, valued at approximately $6 million. The technology used to create and verify the GPS jamming environments for these tests was developed under the direction of AFRL at Eglin over the past six years.

"The success demonstrated by these flight tests is the culmination of many years of hard work," said James Moore, AGTFT program manager for the government. "We feel these tests demonstrate an anti-jam capability that can be applied to many different weapon systems."

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