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## Guided Munitions Testing/JDAM

**C**AST Navigation recently demonstrated the capability to perform dynamic ground testing of GPS/INS guided munitions including the Joint Direct Attack Munition (JDAM) and Extended Range Guided Munition (ERGM).

The CAST system provides coordinated GPS and inertial data to the weapon's navigation systems simultaneously with the launch platform's navigation system. This permits testing of the entire weapon system interface. The initialization data and the transfer alignment data are communicated from the launch platform to the weapon and the weapon's navigation parameters are collected while both the weapon and the aircraft are executing the same simulated motion.



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**CAST equipment is supporting ground dynamics testing for the JDAM-equipped F-16.**

### ◆ CAST SOLVES THE JDAM INTEGRATION VALIDATION PROBLEM

A GPS/INS guidance package for a smart bomb has very specific requirements as to the initialization data it must receive prior to weapon release. The basics are target location, current position, almanac/ephemeris data, and time. JDAM incorporates a Kalman filter as part of its guidance algorithms and so it also requires transfer alignment data pre-release. CAST has added a feature to its system to drive inertial dynamics into JDAM emulators. These dynamics are coordinated and coherent with the dynamics provided to the aircraft navigation system. Therefore a simulated flight scenario can be flown where both the aircraft navigation system and the JDAM emulator react as if they are in precisely the same motion. The transfer alignment algorithm in the JDAM is thoroughly exercised and provides assurance that the proper data is being sent to the JDAM months before the relevant software and hardware ever reach a flight test aircraft.



Additionally, the GPS portion of CAST simulation can confirm the almanac and ephemeris were properly loaded into the JDAM after simulated release by observing that the JDAM GPS receiver quickly locks on the simulated satellites. It also verifies that these same GPS signals are driving the aircraft navigation system and the acquired satellites were the source of the almanac and ephemeris sent to the JDAM by the aircraft.

## ◆ THE CAST SYSTEM RESULTS IN REAL SAVINGS



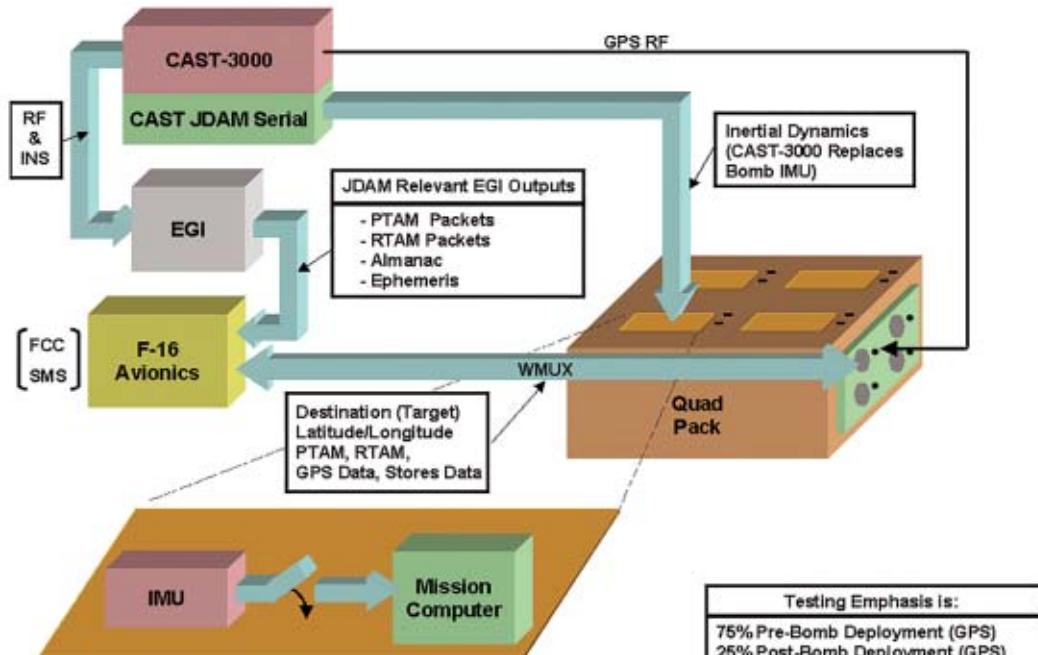
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The reduction in flight test requirements could add up to significant cost savings in the weapon's life cycle.

The amount of savings that can be realized using the CAST system can reach hundreds of thousands and perhaps millions of dollars. This bold claim is based on the fundamental reality that guided munitions have software of their own and some estimates put the expected update rate for the JDAM OFP in the 12 to 18 month timeframe. Every time there is a munition OFP change retest of how the munition responds to the interfaces, the initialization data and the transfer alignment data from each launch platform would be prudent. Some flight testing will be necessary, but on

each of these occasions less flight testing will be necessary if ground dynamic testing is available. The accumulation of periodic reduction in flight test requirements could add up to millions of dollars in cost savings over the weapon's life cycle.

## ◆ JDAM DYNAMIC SIMULATION SUPPORT



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