

Complete GPS/INS Integration Testing

The CAST-3000 fully supports integration testing of GPS/INS navigation systems where the inertial sensor and GPS receiver are either tightly or ultra-tightly coupled. The CAST-3000 produces GPS RF signals coincident with simulated IMU sensor data that provide dynamic testing in the laboratory environment for military and government applications.

CAST has worked closely with Honeywell and Northrop Grumman over the past decade in the development of the CAST-3000. The proprietary laboratory test interfaces to their inertial navigation products are incorporated with high performance fighter aircraft and munition dynamics.

The CAST-3000 simulates dynamics for both the GPS and INS portions of EGI systems in a coordinated and coherent way so that the GPS and INS navigation solutions do not diverge and the blended solution is precisely what it would be in the real world. This is only accomplished by simulating both the GPS and INS inputs.

The military and government labs that the CAST-3000 supports have very strict requirements for dynamic ground testing of navigation systems prior to flight testing. The simulator must explore performance of both GPS and INS aspects of the EGI for modeling IMU drift rates in GPS jamming environments.

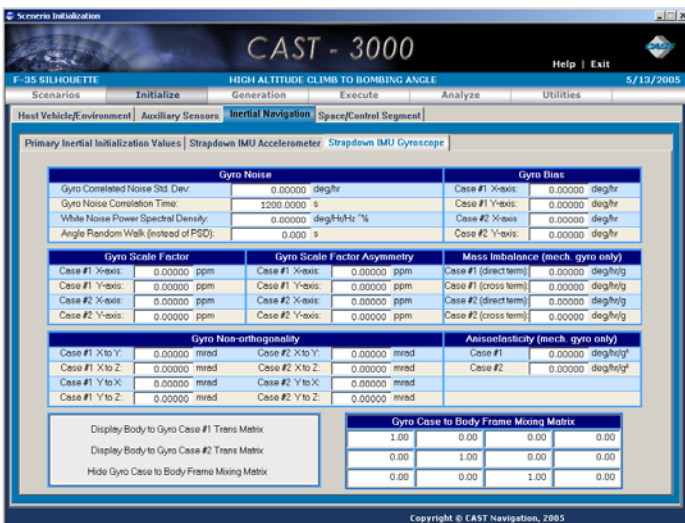
NORTHROP GRUMMAN
Electronic Systems

Honeywell



System Features

- Provides strapdown IMU measurement data synchronized with GPS RF data to the navigation system under test.
- Contains a mature avionic sensor simulation Barometric Altimeter model.
- Includes high rate inertial measurements with very high degree of fidelity to support testing of high performance coupled systems.
- Simulates sensors to provide the necessary fully coordinated, dynamic vertical channel aiding needed to maintain Kalman filter stability of the navigation system.
- Includes years of development and refinement of the precise GPS/INS synchronization capability needed for simulation of aircraft dynamics.
- Provides a dynamic, precisely coordinated simulation of numerous navigation signals to a tightly coupled or ultra-tightly coupled GPS/INS navigation system.
- Includes a complete 6-DOF motion generation capability.



The CAST-3000 Strapdown IMU Interface

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System Specifications

Output Frequency

- GPS L1 1575.42 MHz
- GPS L2 1227.60 MHz

Maximum Dynamics

- Velocity > 60,000 m/s
- Acceleration $\pm 150,000$ m/s²
- Jerk $\pm 150,000$ m/s³

Signal Level

- GPS L1 C/A Code -160 dBW
- GPS L1 P Code -163 dBW
- GPS L2 P Code -166 dBW

Signal Level Control

- Range ± 30 dB
- Resolution 0.1 dB

L1/L2 Differential Delay

- Range ± 0.3 m
- Resolution < 1 mm

Signal Accuracy

- Pseudorange 1 mm
- Pseudorange Rate 1.5 mm/s
- Delta Pseudorange 1.5 mm
- Interchannel Bias < 1 mm
- Uncontrolled Bias < 1 mm
- Bias Repeatability (initial) < 1 mm
- Bias Stability (operational) < 1 mm

Signal Quality

- Spurious < -30 dBc
- Harmonics < -35 dBc
- Reference Oscillator 100 MHz OCOX
- Frequency Stability 3×10^{-8} per day

System Configuration

- GPS Satellites Generated 12 L1 and L2
- Size (H x W x D) 55" x 24" x 32"
- Weight (approximate) 300 lbs
- Power Required 110/220 VAC
50/60 Hz, 1500 W
- Operating System Windows, Lynx RTOS

System Options

- Multiple EGI Configuration Testing
- Up to 8 Interference Generators
- Precision Guided Munitions Testing
- 1553 / 1394 Missionization
- External Precision Oscillator
- 6-DOF Real-Time Interface
- Y-Code
- SAASM
- GPS and INS OFF Loading
- Terrain Obscuration (TOP)
- TOP with Enhanced 3-D Visualization
- JDAM IMU Interface
- M-Code
- SBAS Simulation

System Upgrades

- CAST EMT3500-3 for EGI Diagnostics
- CAST-4000 for Inertial Error Modeling
- CAST-5000 for CRPA System Testing

