

Attitude Determination Receiver Testing

The CAST-5000 produces a single coherent wavefront of GPS RF signals to provide repeatable testing in the laboratory environment or anechoic chamber. The system generates four independent, coherent simulations that reference a single point. With an intercard carrier phase error of less than one centimeter, the CAST-5000 is extremely accurate.

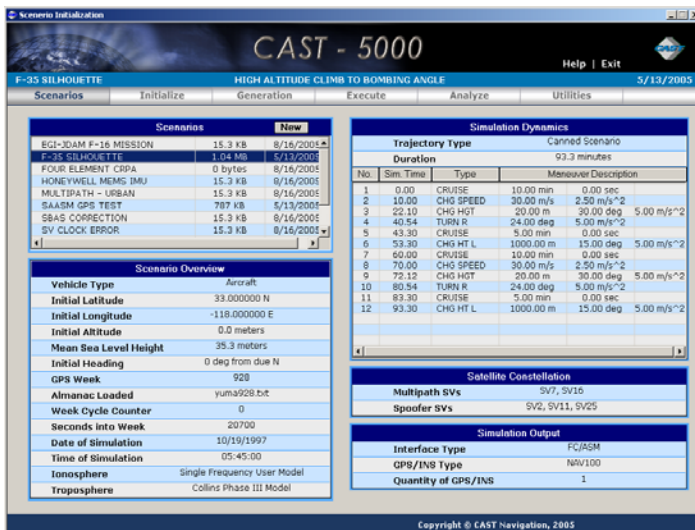
The system generates a wavefront of GPS when its GPS RF generator cards are operated in a ganged configuration. Each generator card provides a set of GPS satellites coherent with the overall configuration. Up to four RF generator cards may be utilized together to ensure phase coherence among the bank of signal simulator cards.

The CAST-5000 is the only Controlled Reception Pattern Antenna (CRPA) tester that allows a full end-to-end test of the antenna system. The CRPA antenna, antenna electronics and the GPS receiver can be tested as a unit with or without radiating signals.



System Features

- Generates Single Coherent Wavefront of GPS
- 6-DOF Motion Generation Capability
- Complete SV Constellation Editing
- Post Mission Processing via ICD-GPS-150/153
- Differential/Relative Navigation
- Antenna Pattern Modeling
- Waypoint Navigation
- RAIM Events
- Multipath Modeling
- Spoofers Simulation
- Satellite Clock Errors
- External Trajectory Input
- External Ephemeris and Almanac
- Several Iono and Tropo Models
- Modifiable Navigation Message
- Modeled Selective Availability
- Time-tagged Satellite Events
- Selectable Host Vehicle Parameters



The CAST-5000 System Interface

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 OCXO
- Frequency Stability 3×10^{-8} per day

Standard Configuration

- GPS Satellites Generated 12 L1 and L2
- Size (H x W x D) 31" x 24" x 32"
- Weight (approximate) 250 lbs
- Power Required 110/220 VAC
50/60 Hz, 600 W
- Operating System Windows, Lynx

System Options

- Up to 7 Element CRPA Testing
- Up to 8 Interference Generators
- 6-DOF Real-Time Interface
- Y-Code
- SAASM
- 1553 / 1394
- External Precision Oscillator
- Precision Guided Munitions Testing
- Terrain Obscuration (TOP)
- TOP with Enhanced 3-D Visualization
- SBAS Simulation
- M-Code

System Upgrade Path

- CAST-3000 for EGI Integration
- CAST EMT3500-3 for EGI Diagnostics
- CAST-4000 for Inertial Modeling

CRPA Testing Application

The configuration below illustrates a system that simulates a wavefront of GPS from twelve satellites for a four-element CRPA. This application utilizes jammers for L1 and L2 as well as twelve satellites for each element of the CRPA antenna.

