



# CAST-5000

GPS Wavefront Generator



## CRPA and Attitude Determination Receiver Testing

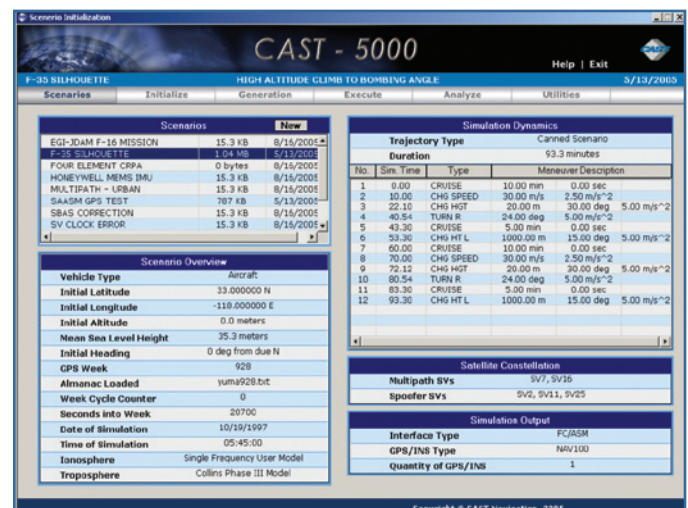
The CAST-5000 produces a single coherent wavefront of GPS RF signals to provide repeatable testing in the laboratory environment or anechoic chamber. The basic system generates four independent, coherent simulations that reference a single point. With an intercard carrier phase error of less than one 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. Several RF generator cards may be utilized together, ensuring phase coherence among the bank of signal generator 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
- Spoofer 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  $\pm 150,000 \text{ m/s}^2$
- Jerk  $\pm 150,000 \text{ m/s}^3$

#### 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  $\pm 30 \text{ dB}$
- Resolution 0.1 dB

#### L1/L2 Differential Delay

- Range  $\pm 0.3 \text{ m}$
- Resolution < 1 mm

#### Signal Accuracy

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

#### Signal Quality

- Spurious < -45 dBc
- Harmonics < -50 dBc
- Reference Oscillator 100 MHz OCXO
- Frequency Stability  $3 \times 10^{-8}$  per day

### CRPA Testing Application

The configuration to the right (fig. 1.0) 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.

### System Configuration

- GPS Satellites Generated 12 to 84 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
- L2C
- L5

### System Upgrade Path

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

