CAST-5000

GPS Wavefront Generator
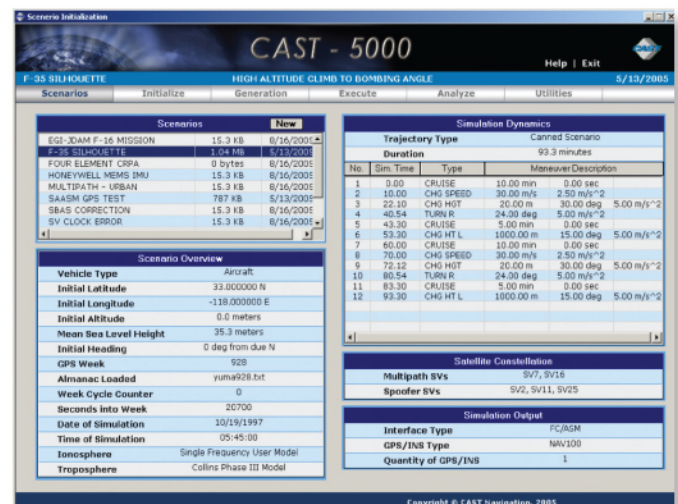
CAST

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**

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.

The CAST-5000 System Interface

CAST-5000

GPS Wavefront Generator

System Specifications

Output Frequency
- GPS L1   1575.42 MHz
- GPS L2   1227.60 MHz

Maximum Dynamics
- Velocity   > 60,000 m/s
- Acceleration   ± 150,000 m/s^2
- Jerk   ± 150,0000 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   ± 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 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   3x10-8 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
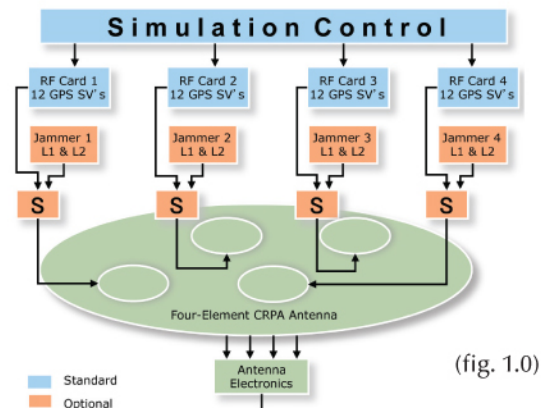- GPS Satellites Generated   12 to 84 L1 and L2
- Size (H x W x D)   31" x 24" x 32"
- Weight (approximate)   250 lbs
- Power Required   110/220 VAC 50/60 Hz, 600 W
- Operating System   Windows, Lynx

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

(fig. 1.0)

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