# Multichannel GPS/WAAS Signal Simulator
## (GPSS-C/A-002-04)

The GPS Signal Generator from CRS, Inc. provides live RF signals at navigational frequencies ($L_1$ and $L_2$) suitable for Hardware in the Loop (HWIL) signal generation.

This self-contained unit simulates high-fidelity C/A code signal for up to 12 satellites at any time. It generates GPS $L_1$ C/A code, the new L2C, and WAAS signals and can test and help simulate GPS systems. The signal generator is available in both rack-mountable and tabletop configurations.

Almost unlimited user motions can be specified. A user friendly GUI allows various complex motions with high dynamics and with up to 20,000 g to be specified. It allows a variety of environmental and receiver antenna models.

The signal generator utilizes the software-based architecture hallmark of CRS's other simulators and receivers. It provides unprecedented accuracy and flexibility, and offers vertical and horizontal upgrades.

Numerous models associated with satellite, environment, and platform are available. These models are available as options and are simlar to those found in the broader range of CRS's simulators.

The flexibility is reflected in the supplied software that allows an operative interactive mode or fully integrated mode using the supplied menu based software. It supports synchronization to other systems.

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*Advancing Technology*

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# GPS/WAAS Signal Generator

- Performance
  - Flexible Software-based Design
    - 12 to 24 independent channels
    - GPS – $L_1$, $L_2$
    - SBAS – support at $L_1$, WAAS, EGNOS
- High Accuracy
  - Code: < 1 cm
  - Differential Phase: < 1 mm
- Complex Scenarios
  - High Dynamics – suitable for EKV, satellite, projectiles, aircrafts (200 km/s; 20,000 g)
  - Arbitrary motion (6 DOF)
  - Independent controls over all aspects of antennas and platforms
- Comprehensive Models
  - Constellation
    - Full Control; definition and modeling
    - Navigation message bits, HOW, TLM, and sub-frame error data.
  - Waveforms
    - Full controls (independent) over waveform errors, nav bits
    - Clock errors
  - Environment
    - Ionosphere/Troposphere/Scintillation
  - Antenna
    - Gain and Phase (3-D), Real-time, Lever Arms
  - Multipath
    - Dynamic
  - Terrain Obscuration
    - Dynamic
  - Platform
    - Body Models
    - Platform Motion Models
- Operation and Control
  - Manual
    - Menu-based
    - Script file based
    - Interactive (Real-time)
  - HWIL
    - Real-Time execution (2 ms latency)
  - Remote Control
    - External control via Ethernet

- Real-time Display
  - Satellite Constellation
  - Ground Trajectory
  - User motion parameters (6 DOF)
  - Individual Antennas
- Other Facilities
  - Comprehensive Logging
  - Remote Control via Ethernet
  - Mission Planning Mode
  - Digital Output
  - 1 PPS in/out
  - 10 MHz / 10.23 MHz operation

## SIGNAL DYNAMICS

- **Velocity**: ± 200,000 m/s
- **Acceleration**: ± 200,000 m/s$^2$
- **Jerk**: ± 5,000 m/s$^3$

## RF OUTPUT

- -130 dBm at 50 ohms
- **Dynamic Range:** 80 dB
- **Level Resolution**: 0.1 dB
- **Level Accuracy**: ± 0.1 dB RSS
- **Spurious (max)**: < -30 dBc
- **Harmonics (max)**: < -35 dBc
- **Phase Noise (max)**: < 0.02 Rad RMS
- **VSWR**: 1.5:1

## CLOCK

- **Internal**: $1 \times 10^{-9}$/day
- **External Input**: 10 MHz

## WAVEFORM

- GPS C/A code with data at 50 bps

## OPTIONAL

- Galileo civilian codes
- Glonass $L_1$ and $L_2$
- Upgradable to $L_5$

## THE MOST ADVANCED NAVIGATION SIMULATION

- *Comprehensive*
- *Accurate*
- *Flexible*

- *Versatile*
- *User Friendly*
- *Modular*