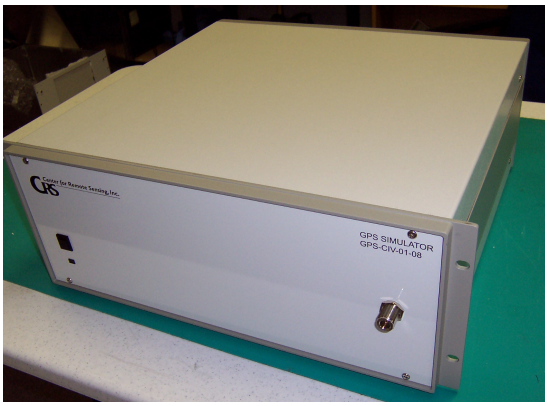
CENTER FOR REMOTE SENSING, INC.

Multichannel GPS Signal Simulator

(GPSS-C/A-003-10)



Multichannel GPS Signal Generator provides real time RF signals for up to 12 GPS satellites at L1 frequency. It represents all the signal properties as these received at the simulated receiver antenna, with high fidelity. Functionally, signal generator is somewhat similar to Multichannel GPS/WAAS signal simulator (GPSS-C/A-002-04). Instead of using Windows® GUI interface SigSim, used in all of our standard simulators, the Multichannel GPS Signal Generator accepts all its input parameters through hardware interface RS-232. The parameters involve satellite almanac/ephemeris and start time. These parameters can be set-up prior to simulation and the simulator will start the simulation synchronized with 1 PPS (available from external source) immediately after receiving the start command through RS-232. This allows synchronization of the simulator time with the external 1 PPS.

The receiver positions are dynamically provided from external sources through RS-232. The update rate is around 10 Hz. The signal generator provides updates at the same rate and generates RF signals that represent the receiver positions and dynamics.

SPECIFICATIONS

- 12 GPS satellites L1 C/A, nominal -130 dBm
- Ability to start the simulation synchronous with GPS time
  - Receive 1 PPS signal from reference GPS receiver
  - Receive Time of next PPS over RS-232 Port
- Ability to simulate current GPS constellation
  - Receive Almanac/Ephemeris Yuma file over RS-232 Port
- Ability to Simulate real-time user position
  - Receiver user position over RS-232 Port
  - 10 Hz
- Onboard stable oscillator (<1 part in 10^8/day)
  - Ability for 10 MHz, selectable by switch
- Output power dynamic range within +/- 20 dB of nominal
  - Fixed for a simulation; specified along with Almanac/Ephemeris
- Dimension: 13x13x5 inches; AC power

OPERATIONAL SEQUENCE

- Apply 1 PPS signal to simulator
- Apply 10 MHz (if configured for external osc.)
- Apply Power to simulator
- Set power level for simulation
- Simulator Initializes
- Send Setup Information over RS-232
  - Navigation Data
  - Initial User Position
- Send Start Time message over RS-232
  - At least 300 ms prior to next PPS
- Send 10 Hz Position updates over RS-232

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Advancing Technology

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GPS Signal Generator

INTERFACES

- 1 PPS
  - 3V CMOS signals (TTL-compatible)
    - Option 1: low-going 100 ms pulse (non-active at 3V), with its falling edge coincident with the GPS One Second
    - Option 2: high-going 100 ms pulse (non-active at 0V), with its rising edge coincident with the GPS One Second
- RS-232 Time Message: GPS time
- RS-232 Position Message: x, y, z
- Navigation Message
  - YUMA formatted File

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:** ± 20 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 X 10^{-9}/day
- **External Input**: 10 MHz

WAVEFORM

- GPS C/A code with data at 50 bps

POWER

- 110 VAC

THE MOST ADVANCED NAVIGATION SIMULATION

- *Comprehensive*
- *Accurate*
- *Flexible*
- *Versatile*
- *User Friendly*
- *Modular*