GPS10RB - 10 MHz, GPS Disciplined, Rubidium Frequency and Time Standard

Key Features

- Completely self-contained unit. No extra computer needed. Full information available via LCD display.
- Rubidium Oscillator locked to GPS satellite signal. Allan Variance stability to parts in 10^{-13}.
- Free run mode. Rubidium still gives an accurate output without a GPS satellite signal (Stratum 1: 72 hr)
- Two 1 pps time outputs. Typical error < 20 ns compared to UTC. Jitter < 300 ps.
- Ultra Low Phase Noise, e.g. -148 dBc/Hz at 1 kHz offset.
- Multiple 10 MHz Frequency Outputs.
- Optional 1 µHz to 80 MHz DDS Output. Generate any frequency from 0 to 80 MHz in 1 µHz steps.
- Optional single frequency output. Single frequency is fixed and can be anywhere from 0 to 10 GHz.
- Optional alarm relay outputs. Dual changeover relay is operated in an alarm condition.
- Optional antenna amplifier. Place GPS antenna up to 350 m (1150 feet) away from GPS10RB.
- Optional Time Code Outputs (IRIG-B, IRIG-E and ESE-TC90)
- Optional redundancy. Operate two units in a redundancy set-up for added security with automatic switchover. Five 10 MHz outputs as standard. More outputs can be added if required.
- RS232 interface. Full control and interrogation of the GPS10RB via RS232.
- Standard 19" Rack Mount Case
- High quality design.

General Description

The GPS10RB is a 10 MHz, GPS disciplined, rubidium frequency standard. It combines the short-term stability of an atomic rubidium oscillator with the long-term stability and traceability of the Global Positioning Service (GPS) set of satellites. The GPS10RB achieves short and long-term frequency stability (Allan variance) of parts in 10^{-13}.

Options for the GPS10R include an antenna amplifier enabling the antenna to be placed up to 350 meters from the GPS10RB, a 0 to 80 MHz DDS output, alarm relay outputs and redundancy. The redundancy option consists of two GPS10RB's operating in parallel with automatic switchover in the event that one unit fails.

The phase noise of the GPS10RB is one of the lowest in the industry, at any price! Phase noise is often overlooked, but is one of the most important specifications of a frequency reference.

Rubidium for the price of an OXCO Oscillator

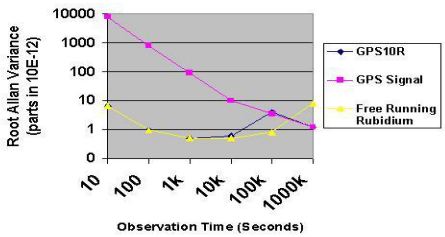
The GPS10RB incorporates an atomic rubidium oscillator as the main frequency reference, but is priced comparable to crystal-based units. The advantage of rubidium is better stability, especially if the GPS signal is lost. A rubidium oscillator has a drift rate that is typically 30 times better than the best quartz oscillators available today.

Keyboard Control and LCD Display

A 16-way keyboard is used to interface to three microprocessors that control the GPS10RB. The LCD displays over 40 different menus. These menus show all the relevant information including time, position (longitude, latitude and height), number of satellite tracked, health of each satellite and the status of the rubidium oscillator.

Allan Variance Plot of the GPS10RB and the GPS signal

The diagram to the right shows the Allan variance of a typical GPS signal (pink), the Allan variance of the GPS10RB's rubidium oscillator when free running (not locked to the GPS signal) (yellow) and the actual output of the GPS10RB when locked to the GPS signal (blue). As can be seen, the GPS10RB combines the short-term stability of the rubidium oscillator with the long-term stability of the GPS signal to achieve short and long term stability of its frequency output signal.



Multiple Frequency Outputs

The GPS10RB has many different output options. These outputs are:

- Five buffered 10 MHz sinewave outputs. Each output is fully isolated from each other. The amplitude of each output is adjustable from 0 dBm to +13 dBm. Harmonic distortion is better than -70 dBc.
- One square wave output. The frequency of the square wave can be set to 10, 5, 2, 1, 0.1 MHz and 1 pps.
- Dual one pulse per second outputs. These 1 pps outputs are either derived from the GPS receiver, or from the rubidium receiver. The leading edge of these outputs is synchronized to UTC time (< 20 ns error, < 300 ps jitter)
- A slave 10 MHz output is available to connect more distribution amplifiers, such as the PTS50 or DA series to the GPS10RB. Thus, it is possible to get multiple isolated 10 MHz outputs (up to 100 outputs).
- Optional DDS Output enables the GPS10RB to produce a sinewave or squarewave output that is locked to the GPS10RB. The frequency range of this output is 1 µHz to 80 MHz settable in 1 µHz steps. This option can be used to generate the popular 2048 kHz and 13 MHz frequencies etc.
- Optional high frequency outputs can be specified at the time of ordering. These fixed high frequency outputs can be any one frequency, up to 10 GHz and are phase locked to the main frequency reference.
- Optional Time Code Output. This option generates the industry standard IRIG-B, IRIG-E and ESE-TC90) time code formats.

Optional Redundancy

Option 08 adds redundancy. With this option, two GPS10RB's can be configured into a redundancy set-up with five main 10 MHz outputs (more outputs optionally available). Normally one unit will supply the 10 MHz outputs (locked to the GPS satellite). In the event of failure of this unit, the 10 MHz outputs will be automatically switched to the second GPS10RB unit.

Precision Test Systems			
Head Office - UK	**South Africa**	**USA**	**Represented locally by:**
Precision Test Systems LTD 40 Holkham Avenue, South Woodham Ferrers Essex, CM3 7AU, England Tel: +44 (0) 845 052 0920 Fax: +44 (0) 870 135 4973 Email: uksales@ptsyst.com Web: www.ptsyst.com	Precision Test Systems cc 183 Edison Crescent Hennops Park X7 Pretoria South Africa Tel: +27 (0) 12 653 5848 Email: sasales@ptsyst.com Web: www.ptsyst.com	Precision Test Systems Suite # 981 14781 Memorial Dr. Houston, TX 77079 Tel: 1 888 876 4804 Fax: 1 413 410 1112 Email: usasales@ptsyst.com Web: www.ptsyst.com	