



Details of the Tests

The data file in this section contains 3600 pulse per second samples, one hour. The data was logged using a time interval counter operating in the time differencing mode (output = gpspps - refpps). The counter resolution was one nanosecond. The reference PPS is sourced by a Cesium frequency standard.

The large "undulations" in the data sets are produced by the selective availability, SA, variations of the satellite clocks. The finite "line width" observed on the data sets results from the quantization of the PPS temporal location due to the PPS steering resolution of the receiver. For example, if a 10MHz clock is used to steer the PPS output, then the PPS edge can be located to an accuracy of +/- 50 nanoseconds.

GPS receivers designed for timing applications usually support an over-determined timing mode of operation. In this operational mode the GPS sensor considers its location to be static and accurate. All satellites tracked can then be averaged to produce the best time solution. Stochastic noise sources, such as SA, are reduced by the square root of the number of satellites tracked.

The data sets were normalized to zero mean using Matlab. In all cases the mean offset from UTC was negligible; the receiver delays were determined with care and eliminated. The data sets were not logged simultaneously. Simultaneity is not important when comparing timing data since most timing applications are characterized by a static GPS sensor which has a clear view of the sky. All of the data presented was collected at a common unobstructed rooftop location.

TRIMBLE THUNDERBOLT

The Thunderbolt is an 8 channel receiver packaged in an OEM board form factor. The Thunderbolt utilizes an on-board oven oscillator optimally "disciplined" by the GPS sensor. The PPS output is derived from the steered oven and the PPS location is not quantized. The precisely steered frequency, 10 MHz, is also output. The Thunderbolt supports an over-determined timing mode, and the PPS data was recorded in this mode.