Timetrace II
GPS Common View Measurement System

Timetrace II is an exceptionally accurate time and frequency standard which, when used in conjunction with a similar device in a National Standards Laboratory, brings the accuracy and traceability of your National Time standard into your laboratory. Timetrace II can then be used to calibrate clocks and frequency sources in real time without having to resort to using travelling clocks.

Features

- Ultra-high accuracy Time & Frequency Transfer Standard
- Implements BIPM directives and generates CGGTTS format files
- Utilises Global Positioning System (GPS) data in common-view mode
- Provides global traceability when linked to your National Standards Laboratory
- Enhanced version of our standard Timetrace, developed in conjunction with the UK's National Physical Laboratory

See also Timetrace, our standard common view sysstem

Key Benefits

Timetrace uses the Global Positioning System (GPS) common-view technique to achieve these highly accurate measurements. By carrying out simultaneous observations of GPS signals, measurements of the clock times of the same satellites are made against the local clocks at each site.

Through the technique of inter-comparison of the same event time at the two sites, any deviation of the satellite timing is completely removed. The GPS common-view technique has been used for time and frequency transfer between National Metrology Institutes for many years. The Bureau International des Poids et Mesures (BIPM) has published a series of Technical Directives that standardise this measurement method and data formats.

Timetrace is the result of a collaboration with the National Physical Laboratory (NPL) in the UK to develop a GPS common-view measurement system that follows BIPM directives and generates the recognised CGGTTS format files developed at the BIPM.

Timetrace uses a GPS multi-channel receiver capable of simultaneously tracking up to 8 satellites to offer high performance and reliability at an accessible cost. It is used in conjunction with a PC that runs the 'GPSCView' software, which performs the data processing as defined by the BIPM directives.

GPSCView is installed on the PC together with a small text file containing the BIPM Schedule allowing the start times of satellite track observation to be calculated. GPSCView automatically decrements each track start time in the schedule by four minutes each day to account for GPS sidereal orbits.

The user is strongly advised to work with their National Metrology Institute and make direct comparisons with a national time standard which has a published performance. For special applications, a user can also make comparisons between clocks located at their own sites. Additionally, Timetrace may also be used to make stand-alone GPS time measurements against GPS Time with an uncertainty of 30ns (1σ).

Timetrace II Specifications

Signal Inputs

IUser 5/10MHz Frequency Standard. For recommended connection of user's 5MHz or 10MHz laboratory standard. Signal input 1V rms nominal into a 50Ω load. Connection via 50Ω BNC Socket.

Signal Outputs

User 1pps signal - derived from either User 1pps input or User 5/10MHz Frequency Standard Input. Signal level 0 to 5V from 50Ω source. Rise time <10ns Connection via 50Ω BNC Socket..

Measurement Selection

Measurement can be performed using either User 1pps input signal or internally generated 1pps from User 5/10MHz Frequency Standard input (if frequency comparison only is required).

Internal Time Interval Measurement

10 picosecond resolution dual interpolators with built-in self calibration. Positive and negative time difference measurement (either 1pps reference or 1pps measured mayarrive first).

Touchscreen Interface

Timetrace II includes a touch screen interface for configuration, monitoring and datalogging (all of which can be accessed via the web interface). The software runs as an application under Windows CE for the construction of the CGGTTS format files required to process the GPS Common View Data.

File access is provided by either USB port or remotely via Ethernet by file transfer protocol (FTP).

Comprehensive status indication is provided from the PC screen including measurement signal status and GPS Receiver performance.

Power

120/230V AC +6% -10% 48-62Hz Load 30VA

Mechnical

19 inch rack mounting 3U high 402mm deep.

Environmental

(Operation & Storage)
Temperature: 0°C to +40°C
Humidity: Up to 95% RH (non-condensing)
EMC: CE Compliant

NPL Time & Frequency Transfer Service with Timetrace II

Clock Time

10 ns uncertainty relative to UTC(NPL) (1σ)
20 ns uncertainty relative to UTC (1σ)

Clock Frequency

5×10^{-14} fractional frequency uncertainty relative to UTC(NPL) (1σ, averaged over 1 day)
5×10^{-14} fractional frequency uncertainty relative to UTC (1σ, averaged over 1 day)

Clock Stability

σ(y), Mod σ(y) and σ(x) (with confidence intervals) will be computed weekly for averaging time (σ) between 1000 s and 100000 s.