

TIMETRACE II

GPS Common View Measurement System

Timetrace II is an exceptionally accurate time and frequency comparison system 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 enables calibration of clocks and frequency sources without resort to the use of travelling clocks.



Features

- **Very high accuracy Time & Frequency Transfer**
- **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**
- **Built-in computer with touchscreen for configuration, monitoring and datalog**

Timetrace II uses the Global Positioning System (GPS) common-view technique to achieve highly accurate time and frequency comparisons. By carrying out simultaneous observations of GPS signals, measurements of the clock times of the same satellites are made against the local clocks at the user's site and the reference site.

Through the technique of inter-comparison of the same event time at the two sites, any deviation of the satellite timing is 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 the measurement method and data formats.

Timetrace II uses a multi-channel GPS receiver capable of simultaneously tracking up to 12 satellites to offer high performance and

reliability at an accessible cost. The unit processes data and produces files in accordance with BIPM directives.

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

Our original Timetrace was the result of collaboration with the National Physical Laboratory (NPL) in the UK. TimeTrace II incorporates a new 12 channel receiver and embedded datalogger with updated software from Time & Frequency Solutions.. The NPL recommends Timetrace in conjunction with their GSPS Common View Time & Frequency Service. [See Specification for accuracy]

TIMETRACE II SPECIFICATIONS

Signal Inputs

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

User 1pps signal. For connection of the user's 1pps signal from the laboratory clock to be compared. Signal level 0 to 5V into high impedance or 50Ω load. Connection via 50Ω BNC Socket.

Signal Output

Outputs user 1pps input or 1pps derived from 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 the user's 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 may arrive 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

Mechanical: 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 GPS Common View Time & Frequency Transfer Service with Timetrace II

Clock Time Accuracy

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

20 ns uncertainty relative to UTC (1σ)

Clock Frequency Accuracy

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

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

As we are always seeking to improve our products, the information in this document only provides general indications of product capability, suitability and performance, none of which shall form any part of any contract.

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UNRIVALED EXPERTISE & TECHNOLOGIES FOR A DEMANDING WORLD