

### GPS Precision

- **Precision OCXO and Rubidium oscillators** for accuracy and stability
- **No down time** for calibration of internal oscillator
- **Un-interrupted operation**, even if GPS-signals are lost
- **Provides reference frequency**, timing and time code outputs
- **Ideal for rack mounting**, only 1U high
- **External 24V DC backup** for power supply redundancy



The 1804 is a Precision Time and Frequency reference using signals from the GPS satellite constellation. Applications include digital audio and TV transmitters, cellular communications, satellite ground stations, calibration laboratories and any application where accuracy and continuous availability are critical.

### 1804 Overview

Designed and manufactured under strict quality control conditions, the 1804 can be used with confidence as a frequency reference for both analog and digital TV and radio transmission, in cellular networks and for telecommunications timing. Other applications include military communication systems, satellite ground stations and calibration-laboratory systems, particularly in connection with the development and manufacture of high-technology products.

The products in the 1804-family are divided into two main groups (each available with a wide range of options):

- Quartz referenced units
- Rubidium referenced units

Quartz referenced units have become virtually an industry standard for numerous broadcast applications. In particular it has been successful for Digital Audio Broadcast (DAB) and Digital Video Broadcast (DVB) in Single Frequency Networks where the control of both frequency and timing is crucial.

A Rubidium-reference version offers exceptional accuracy for calibration-standard work or as a Master clock for satellite control centers or Telecommunications Timing. The 'stand-alone' accuracy of the reference oscillator is more than two orders-of-magnitude higher than a Quartz-referenced unit.

### Flexible Configuration

Remote management of the 1804 is provided by a bi-directional RS232 port and an easy to operate command protocol. This permits all aspects of the 1804 performance to be controlled and monitored. As an option this facility can be provided via an Ethernet network port.

Support for Network Time Synchronization can be provided by optional use of NMEA serial time output to an external NTP or SNTP Server PC.

The high degree of customization possible with the 1804 makes it ideal as the heart of a timing and frequency generation system for every application.

Designed for use on sites that may not be permanently manned, the 1804 has resilient performance from fully automatic start up to its fault tolerant features such as GPS Loss Holdover and Output Isolation. When used with other Pendulum Instruments modules, for automatic change-over and distribution, two 1804 units can form the basis of a timing system that offer fully redundant operation and automatic reconfiguration in the event of a fault.

With thousands of installations worldwide, the 1804, now in its third-generation, continues to offer an unmatched combination of accuracy, functionality and reliability.

# 1804 Technical Specifications

## Standard Outputs

### 1 x 10 MHz sine (BNC)

Output level: +10 dBm (0.7V<sub>rms</sub>) in 50 Ω

### 1 x 5 MHz (BNC)

Output level: +10 dBm (0.7V<sub>rms</sub>) in 50 Ω

### 1 x 1-pps (BNC)

Output level: Approx 0V to 2.0V in 50 Ω load

Accuracy - uncalibrated (ref UTC-USNO):

<± 300 ns

Jitter: <50 ns rms

### 1 x Alarm (BNC)

Signal coding: closed contact - normal  
open contact - alarm

### 1 x 24V DC output + Alarm (prof DIN8)

Outputs: +24V, 0V, Alarm (TTL levels)

## User Selected Timecodes

Option 15: 2 x outputs of user selected timecodes

Codes available: include IRIG-A,B, XR3, NMEA, Havequick, SMPTE

## Phase noise

Oscillator:	Standard	Option 14
	10 MHz OCXO	10 MHz Rubidium
Offset from carrier:	dBc/Hz	dBc/Hz
1 Hz	-103	-80
10 Hz	-123	-100
100 Hz	-135	-130
1 kHz	-143	-142
10 kHz	-148	-148

## Frequency uncertainty

Oscillator:	Standard	Option 14
	10 MHz OCXO	10 MHz Rubidium
<b>GPS-locked mode</b>		
Freq. offset (24h averaging)	<5·10 <sup>-11</sup>	<3·10 <sup>-12</sup>
Freq. stability ADEV (1000 s averaging)	<3·10 <sup>-10</sup>	<5·10 <sup>-12</sup>
<b>Hold-over mode</b>		
Ageing per 24h (after 30 days operation) per month	<2·10 <sup>-10</sup> n.a.	n.a. <3·10 <sup>-11</sup>
Short term stability ADEV 1 s averaging 10s averaging	<1·10 <sup>-11</sup> n.a.	n.a. <3·10 <sup>-12</sup>
Stability vs. Temperature 0 °C to 50 °C 25 °C ±10 °C typ.	<2·10 <sup>-9</sup> <±5·10 <sup>-10</sup>	<1·10 <sup>-10</sup> <±5·10 <sup>-11</sup>
Initial freq. uncertainty (after loss of GPS-lock)	<1.5·10 <sup>-10</sup>	
Max. freq. uncertainty (at end of 8h period)	<3·10 <sup>-10</sup>	

## User Programmable Digital Synthesiser (option 12)

Setting frequency 100 kHz-10 MHz

Setting resolution 0.01 Hz

Outputs 2 x 10 dBm sinewave 50 ohm (BNC)  
1 x TTL-levels in 50 ohm (BNC)  
1 x RS422 (BNO)

## Front Panel Indicators

AC power ON (amber)  
DC power ON (amber)  
Alarm (red)  
GPS Status (green)  
Control status (green)  
Antenna fault (amber)

## GPS

GPS Receiver: 8 Ch Correlation  
GPS Antenna: L1, High-Environment, double-filtered type, with +5V LNA  
Connections: N-type female

## Power Supply

100, 115 or 230V nominal, Tolerance +/-10% (45 to 66 Hz)  
ext. DC supply 18V to 32V

## RS232 Communication

Standard 1804 series command set  
Baud rate: 4800bps  
Connector: 9-pin male DB9

## Ethernet Communication

Model 1874A (add-on option): Ethernet Communication port in place of RS232 for alarm and status monitoring and control

Protocol Support ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP, FTP, DNS, HTTP, Modbus TCP, Modbus ASCII/RTU

RJ45 connector. 10Base-T/100Base-TX Full or half duplex, Auto negotiating

## General Specifications

### Environmental Data

Operating Temp: 0°C to +50°C  
Storage Temp: -40°C to +71°C  
Safety: EN 60950, CE  
EMC: EN 50081-1, EN50081-2, CE

### Dimensions and Weight

Width x Height x Depth:  
483 x 44 x 350 mm (19" x 1.75" x 13.8")  
Weight: 3.4 kg

## Ordering Information

1804: GPS Precision time and frequency standard OCXO, 10 MHz, 1-pps

### Included with shipment

Mains cable  
User manual on CD  
18 months warranty

### Built in options

Option 12: User programmable digital synthesiser  
Option 13/10: 5 x additional 10 MHz outputs  
Option 13/05: 5 x additional 5 MHz outputs  
Option 13/01: 5 x additional 1-pps outputs  
Option 15/01: 2 x outputs of IRIG-A  
Option 15/02: 2 x outputs of IRIG-B  
Option 15/03: 2 x outputs of XR3  
Option 15/04: 2 x outputs of NMEA  
Option 15/05: 2 x outputs of Havequick  
Option 15/06: 2 x outputs of SMPTE

### Oscillators

Option 14: Rubidium oscillator in place of Quartz

### Communication options

Model 1874A: RS232 to Ethernet converter + digital input/output

### Other options

Option 95/03: Extended warranty to 3 years (instead of 18 months)  
Option 95/05: Extended warranty to 5 years (instead of 18 months)

Specifications subject to change without notice

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- Experts in time & frequency calibration, measurement and analysis