

# Meridian Precision GPS TimeBase

## Top-of-the-Line Time and Frequency Standard

The Meridian GPS TimeBase is a high-performance, full-featured system that provides unparalleled precision, accuracy and reliability. The modular design allows for easy, field-installable upgrades and permits the installation of up to five option boards in a single 1U chassis. Using a Global Positioning System (GPS) receiver with advanced timing algorithms, adaptive 3<sup>rd</sup> order frequency control algorithms and Timing Receiver Autonomous Integrity Monitoring (TRAIM) maximizes the stability and reliability of the Meridian output signals. A variety of top-quality quartz and rubidium oscillators are available to handle the full range of holdover, phase noise and short-term stability requirements.



### GPS Timing and Frequency Control

The Meridian TimeBase uses the GPS transmissions to precisely synchronize itself to UTC to < 100 nanoseconds (< 10 nanoseconds RMS to GPS). The frequency of the internal oscillator is disciplined to match the frequency of the UTC timescale to parts in  $10^{14}$  level-of-accuracy over 24-hour observation intervals. The time and frequency outputs are coherent after initial GPS synchronization, and synchronization is maintained via 20-bit DAC frequency control, rather than phase stepping, to provide the ultimate in short-term stability.

### Highly-Reliable, Modular Design

A complete suite of time and frequency capabilities with an exceptionally high number and variety of outputs are provided in a 1U chassis. To achieve this level of output density in a fanless, sealed chassis, EndRun Technologies has set a new standard in power efficiency and thermal packaging. The solid-state design yields a conservative MTBF

of 25 years, and a wide range of option cards make it easy to tailor the unit to support your application. In addition, the modular, plug-and-play design allows EndRun engineers to easily develop customized options specifically for your requirements.

### Standard Features

In addition to sourcing a precision 1PPS timing reference and an IRIG-B timecode output, EndRun Technologies is the first to include Network Time Protocol (NTP) operation as a standard feature in a Time and Frequency Reference. The Meridian also incorporates a vibrant 16x280 dot-matrix vacuum-fluorescent display and a user-friendly keypad design for intuitive control and status monitoring. For added flexibility, the Meridian can be managed via the ethernet port or a local console on the RS-232 serial port and a Web Interface (HTTPS) is provided for status monitoring using your Internet browser.

### Secure Network Interface

An ethernet port is provided as a standard feature of the Meridian TimeBase, with a wide variety of network protocols including NTP, SNMP with Enterprise MIB, SSH, HTTPS, Telnet, FTP, SNTP and optional PTP/IEEE-1588. The incorporation of SNMP v3 and SSH provides the ultimate in network security and allows you to safely perform monitoring and maintenance activities. Security-conscious users can also disable any or all of the risky protocols such as HTTPS, Telnet, Time and Daytime. In addition, HTTPS, SSH, SNMP and Telnet access can be restricted to specific hosts.

### Two-Year Warranty

The Meridian TimeBase is backed by a full two-year warranty against defects in material and workmanship.

### Money-Back Guarantee

If your standard Meridian TimeBase does not meet your precision time and frequency needs for any reason, simply return it within 60 days for a full refund minus shipping fees. See [www.endruntechnologies.com/guarantee.htm](http://www.endruntechnologies.com/guarantee.htm) for details.

### FEATURES

- Modular, plug-and-play design, accepts a variety of field-installable options.
- Timing accuracy: < 10 nanoseconds RMS to GPS.
- Frequency accuracy: <  $1 \times 10^{-13}$ .
- 1 PPS output.
- IRIG-B timecode output.
- Network Time Protocol (NTP).
- Vibrant display with user-friendly keypad and display-embedded help messages.
- Network port with NTP, SNMP, SSH, Telnet, FTP, Enterprise MIB, optional PTP/IEEE-1588.
- Web Interface lets you monitor status via your Internet browser.
- High-reliability, solid-state, fanless design.
- Timing Receiver Autonomous Integrity Monitoring (TRAIM).
- Static or dynamic platforms including single-satellite mode.
- Flash memory for free field upgrades.
- Up to 24 output signals.



Web Interface (HTTPS) for Status & Alarm Monitoring

# Meridian Precision GPS TimeBase Specifications



## GPS RECEIVER:

- L1 Band - 1575.42 MHz.
- 8 Channels, C/A Code.

## ANTENNA:

- TNC jack on rear panel,  $Z_{in} = 50\Omega$ .
- Integral +35 dB gain LNA with bandpass filter for out-of-band interference rejection.
- Operation over  $-40^{\circ}$  to  $+85^{\circ}$ C temperature extremes.
- Mounting via 18" long, 3/4" PVC pipe with clamps.
- 50' low-loss RG-59 downlead cable is standard.
- Other lengths are optional, up to 1000' with preamplifiers.

## LOCAL OSCILLATOR:

See the [Oscillator Options](#) datasheet for more information.

- TCXO:  $2.5 \times 10^{-6}$  over  $-20^{\circ}$  to  $70^{\circ}$  C.
- MS-OCXO (option):  $4 \times 10^{-9}$  over  $0^{\circ}$  to  $70^{\circ}$  C.
- HS-OCXO (option):  $1 \times 10^{-9}$  over  $0^{\circ}$  to  $70^{\circ}$  C.
- US-OCXO (option):  $5 \times 10^{-10}$  over  $0^{\circ}$  to  $70^{\circ}$  C.
- Rubidium (option):  $1 \times 10^{-9}$  over  $-20^{\circ}$  to  $70^{\circ}$  C.
- HS-Rubidium (option):  $1 \times 10^{-10}$  over  $-20^{\circ}$  to  $70^{\circ}$  C.

## TIME TO LOCK:

- < 5 minutes, typical (TCXO). < 10 minutes, typical (OCXO/Rb).

## 1 PPS TIMING CHARACTERISTICS:

The following accuracy and stability specifications assume a stationary platform (not dynamic mode) and antenna installation with a full view-of-the-sky.

- 1 PPS: Positive TTL pulse into  $50\Omega$  (standard) or RS-422 levels (option).
- User-Selectable Width: 20 us, 1 ms, 100 ms, 500 ms.
- User Calibration: +/- 500 us, 1 ns resolution.
- Stability:  $TDEV < 10$  ns @  $\tau < 10^5$  secs,  $\sigma_y(\tau) < 1 \times 10^{-13}$  @  $\tau = 10^5$  secs.
- Accuracy: < 10 nanoseconds RMS to GPS when locked. < 100 ns\* to UTC when locked.
- \*Constraints in the official GPS spec prohibit claiming an accuracy to UTC better than 100 ns.

## TIMECODE CHARACTERISTICS:

- Signal: Amplitude-modulated (AM), 3:1 ratio, 1 kHz carrier.
- Drive: 1 Vrms into  $50\Omega$ .
- User-Selectable Formats: IRIG-B120 (IEEE-1344), IRIG-B122, IRIG-B123, NASA-36, or 2137.

## ALPHANUMERIC DISPLAY/KEYPAD:

- Display: Brilliant 16x280 dot-matrix vacuum-fluorescent.
- Keypad: Enter, Back, Edit, Right, Left, Up, Down, Help.

## SYSTEM STATUS INDICATORS:

- Sync LED: Green LED pulses to indicate GPS lock status.
- Network LED: Amber LED indicates network activity.
- Alarm LED: Red LED indicates a serious fault condition.

## SERIAL I/O PORT:

- RS-232 serial I/O on DB9M jack for secure, local terminal access.
- Parameters fixed at 19200 baud, 8 data bits, no parity, 1 stop bit.

## NETWORK I/O:

- Rear panel RJ-45 jack.
- AMD PC-Net Fast III 10/100Base-T ethernet.

## NTP CLIENT SYNCHRONIZATION:

- Timestamp accuracy: < 10 microseconds @ 200 NTP packets/second (200,000 clients).
- Network factors can limit LAN NTP client synchronization accuracy to 1/2 - 2 ms, typical.

## NTP CLIENT SOFTWARE:

- Please refer to [www.endruntechnologies.com/ntp-client.htm](http://www.endruntechnologies.com/ntp-client.htm).

## NETWORK PROTOCOLS:

- SNTP, NTP v2, v3, v4, MD5 authentication, and broadcast/multicast mode and autokey.
- SSH server with "secure copy" utility, SCP.
- SNMP v1, v2c, v3 with Enterprise MIB.
- HTTPS (Web Interface).
- TIME and DAYTIME server.
- TELNET client/server.
- FTP and DHCP clients.
- SYSLOG.
- IPv4 and IPv4/IPv6 Hybrid.
- Optional PTP/IEEE-1588.

## FIRMWARE UPGRADES:

- Software is field-upgradeable and provided free-of-charge

## POWER:

- 90-132 VAC/180-264 VAC, 47-63 Hz, 0.5A Max. @ 120 VAC, 0.25A Max. @ 240 VAC.
- 3-Pin IEC 320 on rear panel, 2 m. cord included.

## SIZE:

- Chassis: 1.75"H x 17"W x 10.75"D.
- Weight: < 10 pounds.
- Antenna: 2.5"H x 3.5" diameter.

## ENVIRONMENTAL:

- Temperature:  $0^{\circ}$  to  $+50^{\circ}$  C.
- Humidity: 0 to 95%, non-condensing.

## COMPLIANCE:

- CE, FCC.

## OPTIONS:

Refer to the [Meridian GPS Options](#) datasheet for more information on ALL listed options.

- Medium-Stability OCXO, High-Stability OCXO, Ultra-Stable OCXO, Rubidium, High-Stability Rubidium. See [Oscillator Options](#) datasheet.
- 5 & 10 MHz Low-Phase-Noise Frequency Outputs. See [LPN Option](#) datasheet.
- 1, 5 & 10 MHz Sine Wave Outputs.
- Alarm Output (Open Collector).
- Test-Range Timecodes (AM and DC Level Shift).
- User-Selectable Pulse Rate Outputs (1PPS, 10PPS, 100PPS, 1KPPS, 10KPPS, 100KPPS, 1MPPS, 5MPPS, 10MPPS).
- User-Selectable DDS Outputs (1 PPS - 10 MPPS @ 1 PPS resolution).
- Telecom Clock Outputs. See [Telecom Clock Option](#) datasheet.
- ASCII Once-Per-Second Output on Second Serial Port.
- Buffer Module to Provide Additional Outputs.
- 12, 24, 48, 125 VDC Inputs.
- Dual-Redundant Power Supplies.
- PTP/IEEE-1588 Grandmaster.

Other options are available. Call us with your requirements.

