EndRun TECHNOLOGIES

"Smarter Timing Solutions"

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. Utilizing a Global Positioning System (GPS) receiver with advanced timing algorithms, the Meridian TimeBase can support operation on dynamic platforms or static platforms with single satellite visibility. Proprietary, adaptive 3rd order frequency control and TRAIM algorithms maximize the stability and reliability of the 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.

FEATURES

- Modular, Plug-and-Play Design, Accepts a Variety of Field-Installable Options
- Timing Accuracy: < 10 Nanoseconds RMS to GPS Time
- Frequency Accuracy: $< 1 \times 10^{-13}$
- 1 PPS Output
- IRIG-B Timecode Output
- Vibrant Vacuum-Fluorescent Display with User-Friendly Keypad and Display-Embedded Help Messages
- Network Port with NTP, SNMP, SSH, Telnet, FTP, Enterprise MIB
- High-Reliability, Solid-State, Fanless Design
- Timing Receiver Autonomous Integrity Monitoring (TRAIM)
- Static or Dynamic Modes of Operation
- Flash Memory for Free Field Upgrades
- Up to 24 Output Signals

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 Time). 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 high-bandwidth Network Time Protocol (NTP) operation as a standard feature in a Time and Frequency Reference. The Meridian TimeBase 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 also be managed via the ethernet port or a local console on the RS-232 serial port.
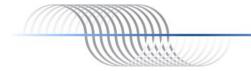
Secure Network Interface

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, TELNET, FTP, and SNTP. 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 Telnet, Time and Daytime. In addition, access via SSH, SNMP and Telnet 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 for more information.

Meridian Precision GPS TimeBase
Specifications

GPS RECEIVER:
– L1 Band - 1575.42 MHz.
– 8 Channels, C/A Code.

ANTENNA:
– TNC jack on rear panel panel, $Z_{in} = 50\,\Omega$.
– Integral +35 dB gain LNA with bandpass filter for out-of-band interference rejection.
– Operation over -40° to +85°C temperature extremes.
– Mounting via 18" long, ¾" PVC pipe with clamps.
– 50' low-loss RG-59 download cable is standard.
  Other lengths are optional, up to 1000' with preamplifiers.

LOCAL OSCILLATOR:
– TCXO: 2.5×10^{-6} over -20° to 70° C,
                              < 10 ms holdover at 24 hours, 5° C max delta.
– MS-OCXO (option): 4×10^{-9} over 0° to 70° C,
                              < 100 us holdover at 24 hours, 5° C max delta.
– HS-OCXO (option): 1×10^{-9} over 0° to 70° C,
                              < 10 us holdover at 24 hours, 5° C max delta.
– Rubidium (option): 1×10^{-9} over -20° to 70° C,
                              < 10 us holdover at 24 hours, 5° C max delta.
- HS-Rubidium (option): 1×10^{-10} over -20° to 70° C,
                              < 1 us holdover at 24 hours, 5° C max delta.

TIME TO LOCK:
– < 5 minutes, typical (TCXO). < 10 minutes, typical (OCXO/Rb).

1 PPS TIMING CHARACTERISTICS:
– 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, $\sigma_y(\tau) < 1\times10^{-13}$ @ $\tau=10^5$ secs.
– Accuracy: < 10 nanoseconds RMS to GPS Time 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.
– 4Parameters 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 sync accuracy to ½ - 2 ms, typical.

NTP CLIENT SOFTWARE:
– Please refer to www.endruntechnologies.com/ntp-client.htm.

SUPPORTED 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.
– TIME and DAYTIME server.
– TELNET client/server.
– FTP and DHCP clients.
– SYSLOG.
– IPv4 and IPv4/IPv6 Hybrid.

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° to +50° C.
– Humidity: 0 to 95%, non-condensing.

COMPLIANCE:
– CE, FCC.

OPTIONS:
Please refer to the Meridian Options datasheet for more information on these options.
– Medium-Stability OCXO, High-Stability OCXO, Rubidium, High-Stability Rubidium.
– 5 & 10 MHz Low-Phase-Noise Frequency 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, including 1.544 MPPS and 2.048 MPPS).
– Sysplex Timer Once-Per-Second Serial Output.
– Buffer Module to Provide Additional Outputs.
– 12, 24, 48, 125 VDC Inputs.
Other options are available. Call us with your requirements.