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Symmetricom

XL-AK

Low-cost GPS Synchronized Time & Frequency Receiver

KEY FEATURES

- Less Than 40 Nanoseconds rms Accuracy to UTC
- 1 PPS Output
- IRIG B Time Code Output
- Less Than 1 x 10^{-12} Frequency Accuracy
- User-Configurable Outputs

The economical rack-mount XL-AK GPS receiver provides ultra-precise time and frequency. This configurable instrument provides timing outputs to within 40 nanoseconds rms of UTC/USNO and frequency outputs accurate to less than $1x10^{-12}$, even when tracking satellites with Selective Availability (SA) implemented. User-configurable outputs provide significant flexibility in configuring the XL-AK as a central source for IRIG time codes or output pulses.

The XL-AK is a popular and affordable GPS receiver for general timing as well as specific power utility and range timing applications. The unit is well suited for precise time and frequency outputs to sequence-of-event recorders (SERs), fault locators, and voltage phase angle systems, as well as frequency and time measurement. The time code output lends itself well for range time distribution and data acquisition applications.

Standard outputs include a 1 PPS, analog IRIG B time code and serial I/O time strings. Using the keypad or RS-232 port, users have control over a variety of time formats, configurations, and output options, including GPS and oscillator status and controls. For applications requiring increased oscillator stability, the XL-AK can be upgraded to higher performance oscillators.

The five user configurable rear panel BNC connectors offer the utmost in value and flexibility. Each output can be configured with either an analog or digital driver. Each driver array has the following input signals available to it:

- IRIG B, E and H (DC level shift)
- IRIG B (amplitude modulated)
- Programmable pulse
- 1 PPS, 1 kPPS, 10 kPPS, 100 kPPS, 1 MPPS, 10 MPPS



XL-AK Low-cost GPS Synchronized Time & Frequency Receiver

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XL-AK Specifications

RECEIVER/GENERAL

- Timing accuracy UTC/USNO: <40 ns rms (150 ns peak), with Selective Availability (SA) and tracking 8 satellites*
- Position accuracy: Latitude, longitude, and altitude within 10 meters referenced to WGS84, after completion of 24-hour position averaging.
- Receiver input: 1575 MHz L1 C/A code
- Tracking: Eight parallel channels
- Acquisition time: Warm start (has ephemeris data and position): typically less than 2 minutes. Cold start typically less than 20 minutes.
- Internal oscillator
  - Accuracy: $1x10^{-12}$ when tracking satellites
  - Stability: $1x10^{-9}$ at 1 second; $3x10^{-10}$ at 100 seconds; $1x10^{-12}$ at one day
  - Stability when not tracking satellites: $2x10^{-6}$ over 0° C to +50° C
- Antenna: L1 GPS, 40 dB gain. RG-59/U cable, 50' (15 m) supplied; maximum cable length 150' (46 m). For longer cable runs, see Options.

FIXED INPUTS/OUTPUTS

- 1 PPS output: TTL into 50Ω, rising edge on time. 20 microsecond pulse width. Rear-panel BNC.
- IRIG B output: 1 kHz amplitude modulated carrier. 3 Vpp high, into 600Ω. Rear panel BNC.
- Serial I/O: Bidirectional port at RS-232 levels; full user-selectable protocol up to 19200 baud.

MECHANICAL ENVIRONMENTAL

- Receiver
  - Size: 1.75" x 17" x 10.38" (4.4 cm x 43.2 cm x 26.4 cm)
  - Power: 95–260 Vac, 47–440 Hz, <15 watts
  - Operating temperature: 0° C to +50° C
  - Storage temperature: -40° C to +85° C
  - Humidity: To 95%, noncondensing
- Antenna
  - Size: 3" Dia. x 3" H (7.62 cm x 7.62 cm)
  - Weight: 0.55 lb. (0.25 kg)
  - Operating temperature: -40° C to +70° C
  - Storage temperature: -55° C to +85° C
  - Humidity: 100%, condensing
  - Certification: UL, FCC, CE, C-UL
- Alphanumeric display: View initialization parameters, time of year, and front panel alarm/status messages on the 2-line, 32-character LCD.
- Keypad: 0–9; up, down, left, and right arrows; CLR, FUNC/ENTR, TIME, STATUS, POSITION

USER-CONFIGURABLE OUTPUTS

Five BNC output connectors are user-configurable to be either analog or digital drivers. Select from the 12 driver inputs for each of the 5 outputs.

- Analog driver output
  - Amplitude: Approximately 1 Vrms into 50Ω
- Digital driver output
  - Amplitude: Approximately 2.5 Vdc into 50Ω (open circuit 0–5 Vdc)
- Driver inputs
  - Pulse rate: 1 PPS, 1 kPPS, 10 kPPS, 100 kPPS, 1 MPP, 10 MPPS. Positive edge on time, 50% duty cycle.
  - DC shift time codes: IRIG B 001, IRIG E 001, IRIG H 001
  - Analog IRIG B: IRIG B Modulating a 1 kHz carrier
  - Programmable pulse: A user-programmable rate from 500 Hz to any desired period having integer millisecond half periods. Programming done using serial communications port or keypad.
  - Alarm: User programmable for various major and minor alarm functions such as timing error during loss of lock or antenna faults. Program through serial communications port or keypad.

OPTIONS

- Oscillator upgrades
- Frequency output: 1, 5, or 10 MHz
- External oscillator control: 16-bit DAC control of user-supplied external oscillator. Frequency offset data supplied via serial I/O port.
- Frequency measurement: Resolution to parts in 10^{14}
- Time interval/event timing (30 ns resolution)
- Differential GPS mode (RTCM-104): 3 to 5 meter positioning
- RS-422 communication Interface instead of RS-232
- IRIG E modulating a 1 kHz carrier
- IRIG H modulating a 1 kHz carrier
- GPS antenna down/up converter for RG-58 cable runs from 150' (46 m) to 1500' (457 m)
- Fiber optic antenna link (up to 2 km)
- Power supply: 12 Vdc, 24 Vdc, -48 Vdc, 125 Vdc

* 100 ns peak without Selective Availability (SA) implemented

Symmetricom

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