

NOVATECH INSTRUMENTS, INC.

Model 2960AX

Disciplined Quartz Frequency Standard



The Model 2960AX Disciplined Quartz Frequency Standard provides two sinewave outputs of 10MHz and one of 5MHz. 1pps (pulse per second) IN and OUT signals are available on the rear panel. The 2960AX features an auto-adaptive 1pps disciplining algorithm allowing Rubidium performance when used with long-term stable 1pps sources such as those derived from GPS (Global Positioning System). When not disciplined to 1pps, the 2960AX provides holdover of $\pm 10\mu\text{s}$ for 24 hours and a daily stability of $\pm 2 \times 10^{-10}$. When combined with the GPS1 smart antenna system, the 2960AX provides a complete low-cost turn-key frequency standard for ground stations or the calibration laboratory.

Specifications:

FREQUENCY STABILITY (typ)

Short Term: $\tau = 1\text{s to } 100\text{s}$ $< \pm 2 \times 10^{-11}$
Aging: Daily $< \pm 1 \times 10^{-10}$ after 3 months
Holdover (24 Hours, $\pm 2^\circ\text{C}$): $< \pm 10\mu\text{s}$ after $> 10\text{x}$ 1pps time constant learning phase
Temperature: $+5$ to $+45^\circ\text{C}$ $< \pm 5 \times 10^{-10}$
Line Voltage: $\pm 10\%$ $< \pm 5 \times 10^{-11}$

FREQUENCY ACCURACY (typ)

Tracking 1pps: $\leq \pm 5 \times 10^{-11}$ after 24 hours in constant environment (using Model GPS1).
Retrace: $\leq \pm 1 \times 10^{-8}$ from last frequency after 1 hour ON and 24 hours OFF (constant environment).
Warm up: $\leq \pm 5 \times 10^{-8}$ of final frequency after 20 min.

FIXED SINE OUTPUTS

Two 10MHz and one 5MHz, $1V_{\text{RMS}} \pm 0.25V_{\text{RMS}}$ into 50Ω

SPECTRAL PURITY (10MHz outputs)

Harmonic: $< -25\text{dBc}$.
Spurious, Non-Harmonic, Sub-Harmonic: $< -45\text{dBc}$.

PHASE NOISE (Typical, 10MHz output)

Frequency Offset	dBc
1Hz	-85
10Hz	-115
100Hz	-130
1kHz	-140
10kHz	-145

1pps IN and OUT

1pps IN: DC-coupled, accepts TTL/CMOS levels. 1pps OUT: TTL level, $100\mu\text{s}$ positive going pulse width.

ENVIRONMENTAL

Temperature: $+5^\circ\text{C}$ to $+45^\circ\text{C}$ operating.
Humidity: 80% to 31°C , decreasing linearly to 50% at 40°C .

SIZE

6.4cm H, 18.5cm W, 24.1cm L, excluding bail and feet.

CONNECTORS

BNCs on front panel for sine outputs. BNCs on rear panel for 1pps I/O.

LINE POWER

120/240VAC $\pm 10\%$, 50/60Hz. 25VA (35VA max during warm up < 20 minutes).

FRONT PANEL INDICATORS

POWER OK: AC power is applied.
OVEN OK: Crystal Oven on.
1PPS LOCK: Locked to and tracking a 1pps input.

ACCESSORY

GPS1: Matching GPS smart antenna system.

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The Model GPS1 is a complete Smart GPS Antenna which requires no user intervention or setup beyond installation with a clear view of the sky (up to 120 meters from the 2960AX) to provide a stable 1pps (pulse per second) to the 2960AX Disciplined Quartz Standard. The GPS1 automatically self-surveys and switches to an over-determined timing mode. The internal GPS receiver is equipped with TRAIM, so the GPS1 qualifies its received signals, discarding data from noisy or non-functional satellites ensuring a stable 1pps output (typically $\pm 50\text{ns}$). The 1pps LOCK LED on the 2960AX is illuminated green when a stable 1pps is available and being tracked. Complete with cables, power supply and interface module.

Model GPS1 Smart Antenna

