NOVATECH
INSTRUMENTS, INC.

Model 2975AX

Disciplined Quartz Frequency Standard

The Model 2975AX Disciplined Quartz Frequency Standard provides sinewave outputs of 10MHz and 5MHz, along with a 20MHz synthesized output in a small bench-top case. 1pps IN and OUT signals are available on the rear panel. Featuring an auto-adaptive 1pps disciplining algorithm, these models can be disciplined to long-term stable 1pps sources such as GPS. When not tracking 1pps, they provide holdover of better than ±10µs for 24 hours and a daily stability of $\pm 1 \times 10^{-10}$. The synthesized output, internally locked to the Quartz Oscillator, generates any frequency from 100Hz to 20MHz with a resolution of 1µHz. Front panel controls and display allow setting of the synthesized output, with the second line of the display indicating 1pps tracking status.

Specifications:

FREQUENCY STABILITY (10MHz output)

Short Term:	τ =1s to 100s	$<\pm 2 \times 10^{-11}$
Aging:	Daily	$<\pm 1 \times 10^{-10}$ after 3 months

Holdover (24 Hours, ±2°C):<±10µs after >10x 1pps time constant learning phase.

Temperature:	+5 to +45°C	$<\pm 5 \times 10^{-10}$
Line Voltage:	±10%	$<\pm 5 \times 10^{-11}$

FREQUENCY ACCURACY

Tracking 1pps:$<=\pm 5 \times 10^{-11}$ after 24 hours in constant environment (using Model GPS1).

Retrace: $<=\pm 2 \times 10^{-8}$ from last frequency after 1 hour ON and 24 hours OFF (constant environment).

Warm up: $<=\pm 5 \times 10^{-8}$ of final frequency after 20 min.

FIXED SINE OUTPUTS

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

SYNTHESIZED SINE OUTPUT

Programmable from 100Hz to 20MHz in 1µHz steps using either the front panel controls or the rear panel RS232 port. Amplitude: $1V_{RMS} \pm 0.25V_{RMS}$ at 5MHz into 50Ω.

PHASE NOISE (Typical, 10MHz output)

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

SPECTRAL PURITY (10MHz output)

Harmonic: <-25dBc.
Spurious, Non-Harmonic, Sub-Harmonic: <-45dBc.

1pps IN and OUT

1pps IN: DC-coupled, accepts TTL/CMOS levels. 1pps OUT: TTL level, 100µs positive going pulse width.

ENVIRONMENTAL

Temperature: +5°C to +45°C operating.

Humidity: 80% to 31°C, decreasing 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 ±10%, 50/60Hz. 25VA (35VA max during warm up <20minutes).

FRONT PANEL DISPLAY

Two Line by 16 character back lighted LCD. Shows output frequency of synthesized output and 1pps tracking status.

ACCESSORY

GPS1: Matching GPS smart antenna system.

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Model 2960AX Disciplined Quartz Standard

Also Available

The Model 2960AX is similar the 2975AX, but does not have the front panel display and has three fixed-frequency outputs of 10MHz, 10MHz and 5MHz. The 2960AX is the best choice when a synthesized output is not required. The 2960AX shares other specifications in common with the 2975AX. Similar products with Rubidium Oscillators are available for applications which demand higher accuracy and superior holdover.

Model GPS1 Smart Antenna

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 instrument) to provide a stable 1pps to the 2975AX 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 ±50ns). The 1pps LOCK LED on the 2960AX is illuminated green when a stable 1pps is available and being tracked. The 2975AX displays “Tracking 1pps” when tracking a stable 1pps signal. Complete with cables, power supply and interface module.

2975AX Synthesizer Serial Commands

Serial Command	Function
`F xx.xxxxxxxxxxx`	Set Frequency in MHz to nearest 1µHz. Decimal point required.
`E x`	Serial Echo Control. x=D for Echo **D**isable, x=E for Echo **E**nable. Default is Enabled.
`S`	Save current state into EEPROM and sets valid flag. State saved is used as default upon next power up or reset.
`R`	Reset. This command resets the synthesizer. EEPROM data is preserved and, if valid, it is used upon restart.
`C`	Clear. This command clears the EEPROM valid flag and restores all factory default values (5MHz output).
`Qr`	Query the volatile (RAM) memory storage. These are the values currently output by the synthesizer. These will equal the stored values in the EEPROM after an `'R'` or power up only if no changes have been made in the settings.
`Qe`	Query the non-volatile memory (EEPROM) storage.