NOVATECH
INSTRUMENTS, INC.

DISCIPLINED RUBIDIUM FREQUENCY STANDARD
Model 1425A

The Model 1425A Rubidium Frequency Standard provides simultaneous sinewave outputs of 10MHz and 5MHz, along with one or two optional 400MHz synthesized outputs. Containing an Atomic Resonance Rubidium Oscillator, the 1425A provides long term stability of better than $\pm5\times10^{-11}$ per month and short term stability of $<1\times10^{-11}$ in 10 seconds. The 1425A is ideal for use as a master oscillator in laboratories and ground stations, as well as for test and calibration applications. The synthesized outputs, which are internally locked to the Rubidium Oscillator, can be used to generate any frequency up to 400MHz with a resolution of 1Hz. Either front panel controls and display or RS232 serial commands can be used to set the frequencies. When used with the GPS1, the 1425A will auto discipline and calibrate.

Specifications:

FREQUENCY STABILITY

Short Term:	$\tau=1s$	$<3\times10^{-11}$
	$\tau=10s$	$<1\times10^{-11}$
	$\tau=100s$	$<3\times10^{-12}$

Aging:	Monthly	$<\pm5\times10^{-11}$ after 1 month
	Yearly	$<\pm5\times10^{-10}$ after 3 months
Holdover (24 Hours, $\pm2^oC$)		$<\pm1\times10^{-11}$ ($<\pm1\mu s$ after $>10x$ 1pps tracking time constant)
Temperature:	+5 to +45^oC	$<\pm1\times10^{-10}$
Line Voltage:	$\pm10\%$	$<\pm5\times10^{-12}$

FREQUENCY ACCURACY

At shipment: $<=\pm5\times10^{-11}$ at 20^oC.

Retrace: $<=\pm5\times10^{-11}$ from last frequency after 1hr ON and 24hrs OFF (constant environment).

FIXED SINEWAVE OUTPUTS
2-10MHz and 2-5MHz, $1V_{RMS} \pm0.25V_{RMS}$ into 50Ω.

SYNTHESIZED SINEWAVE OUTPUTS (option)
Programmable from 200kHz to 400MHz in 1Hz steps. Amplitude: $1V_{pp}$ at 25MHz into 50Ω.
Phase Noise: <-120dBc, 10kHz offset, 10MHz out.
Harmonics: <-45dBc, spurious: <-55dBc.

SPECTRAL PURITY (10MHz outputs)
Harmonic <-25dBc, Spurious, Non-Harmonic, Sub-Harmonic: <-45dBc.

ACCESSORY
GPS1: Matching GPS smart antenna system. Allows auto-adaptive 1pps disciplining and automatic self-calibration.

PHASE NOISE (Typical, 10MHz output, 50Ω load)

Frequency Offset	dBc
1Hz	-70
10Hz	-90
100Hz	-120
1kHz	-140
10kHz	-140

1pps IN and OUT
1pps IN, DC-coupled, accepts TTL. 1pps OUT TTL, 133μs negative pulse width.

ENVIRONMENTAL
Temperature: +0^oC to +50^oC operating.
Humidity: 80% to 31^oC, decreasing linearly to 50% at 40^oC.

SIZE
1U, 19 inch rack.

CONNECTORS
BNCs on rear panel for sine outputs. BNCs on rear panel for 1pps I/O. DE9s on rear panel for synthesizer RS232.

LINE POWER
120/240VAC $\pm10\%$, 50/60Hz. 30VA (50VA max during warm up <20minutes).

FRONT PANEL INDICATORS
POWER OK: Green: AC power is applied and on.
RUBIDIUM LOCK: Green: Oscillator is locked. Red: Warm-up.
1PPS LOCK: Green: Locked to and tracking a 1pps input. Off: 1pps not locked. LCD and controls for synthesized outputs.

21-Oct-2005

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 1425A) to provide a stable 1pps to the 1425A Disciplined Rubidium Standards. 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 (typi-cally ±50ns). The 1pps LOCK LED on the 1425A is illu-minated green when a stable 1pps is available and being tracked. Complete with cables, power supply and interface module.

Synthesized Output Serial Commands

Serial Command	Function
Fx XXX.XXXXXX	Set Frequency in MHz to nearest 1Hz. Decimal point required. x=a or b, depending upon frequency being set. Using "F" without an "a" or "b" will set both synthesized channels to the same frequency.
Qe	Query the non-volatile memory (EEPROM) storage. See manual for details of returned information.
Qr	Query the volatile (RAM) memory storage. These are the values currently out-put by the 1425A and will only equal the values from "Qe" if no changes have been made in the settings. See manual for details of returned information.
C	Same as "Reset All" command. Restores factory defaults and clears EEPROM valid flag.
S	Saves current state into EEPROM and sets valid flag. State used as default upon next power up or reset. Use the "Reset All" or "C" command to return to factory default values. Automatically sets EEPROM valid flag and overrides the legacy "P" command.
E x	x=D for Echo **D**isable, x=E for Echo **E**nable
P x	x=D, power up with default settings; x=S, power up with Saved Settings
Reset	This command resets the 1425A. EEPROM data is preserved and, if valid, is used upon restart. This is the same as cycling power.
Reset All	This command clears the EEPROM valid flag and restores all factory default values.

ORDERING INFORMATION:

Base Model
1425A   10MHz, 5MHz, 1MHz, or 100kHz. Auxiliary outputs can be set to one of these.
1425A/01   Adds one synthesizer. Customer to specify configuration.
1425A/02   Adds two synthesizers. Customer to specify configuration.
GPS1   Smart GPS antenna system.

Configurations are designated by adding a two-character dashed suffix to the Base Model. For example, a special version of the 1425A/01 might be designated the 1425A/01-AA. These suffices are uniquely assigned per configu-ration and depend upon customer requested outputs.