

PRECISE TIME & FREQUENCY FOR TELECOMS, BROADCAST, METROLOGY & CALIBRATION

E-17 & 90...300fs

FREQUENCY STANDARDS · DISTRIBUTION · MEASUREMENT



A5-12
Distribution Amplifier



A8-B GPS
Frequency & Time Standard

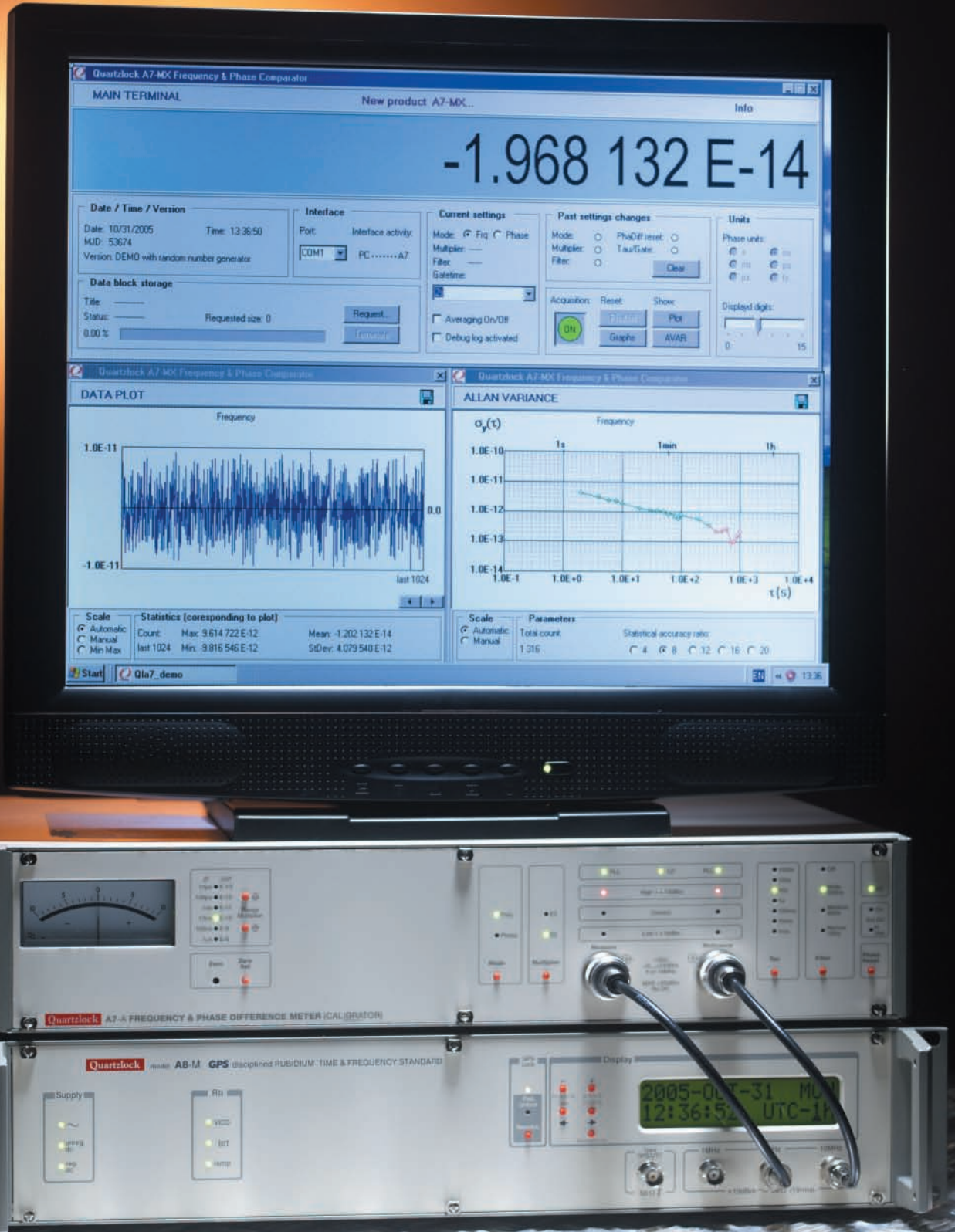


A10-B Rubidium
Frequency Standard

A1006 / A3001 / A5006 / A8001
New 1U economy line



Oscillators
Rubidium & Quartz



PRODUCT GUIDE

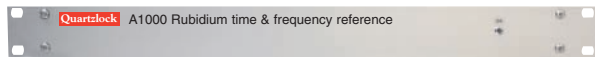
A7-MX Frequency and Phase Comparator
A8-MX GPS-BVA Time & Frequency Reference



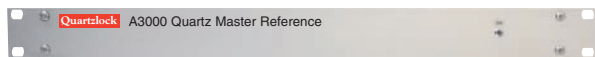
Quartzlock The Company

A world-class Hydrogen maser based standards lab ensures product excellence & quality, maintains our international reputation for technology & customer service. A strong commitment to R & D and innovative solutions to measurement problems keep Quartzlock ahead. Since 1959 we have established ourselves as world leading manufacturers of time and frequency standards, distribution and measurement instrumentation.

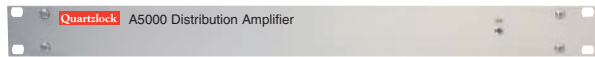
A new 2007 economy '1U' line



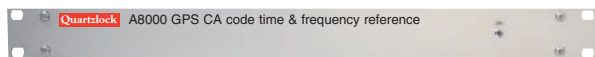
A1000 Rubidium instrument
2006 LPRO specification Rb is used.



A3000 Quartz Master Reference
Any A3 oven controlled quartz oscillator may be fitted to meet lowest phase noise & high stability specs.



A5000 Distribution Amplifier
A very low cost solution for telecomms applications.

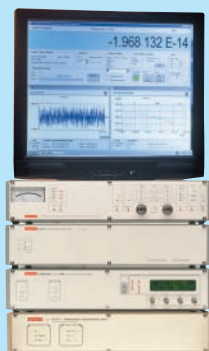


A8000 GPS CA code time & freq. ref.
Probably the lowest cost GPS T&F reference/calibrator available.

New economy LPRO Rb oscillator & A8-X GPS CA code time & freq. engine

Frequency Standard Measurement & Distribution System

- A5, A6, A7-MX & A8-MX A8-TT/CV.
- A8** ■ $1 \times 10^{-14}/\text{day}$
- A1** ■ $\sigma_y(2, \tau)$ stability 8×10^{-14} $20^{-1} \dots 20^1$. Passive Maser performance
- A7** ■ 1×10^{-15} resolution (100 seconds) measurement
- A5**
 - 12, 24 or 32 outputs.
 - 130dB isolation
 - $<10\text{ps}/^\circ\text{C}$
- A6** ■ 1MHz 5MHz 10MHz



Galileo Test Solution



A8-MX

New GPS-BVA time & frequency reference has near Passive H Maser spec.

From 0.1 30s & @ 1 day the A8-MX GPS-BVA is superior to the Passive H Maser. From 0.1 3s & @ 1 day A8-MX is comparable to the Active H Maser.

A8-MX GPS BVA



The new Quartzlock carrier phase tracking GPS with BVA technology combine to make this performance available.

- No Cesium wear-out physics package.
- 1 MHz, 5MHz, 10MHz sinewave & squarewave + 1pps outputs (10.23MHz & 2.048MHz/Mb options).
- Low cost of ownership.

BBU



APPLICATIONS

- National time & frequency standard.
- Defence — Fast missile tracking.
- GPS Monitoring. ■ Production test.
- Calibration. ■ TV TX reference.
- Stratum 1 SDH network synchronisation
- Galileo Test Solution

Typical Allan Variance Frequency Stability Comparison

τ	HYDROGEN MASERS		CEASIUM		Quartzlock GPS-GNS	
	AHM	PHM	HIGH PERF	STD	GPS-Rb	GPS-BVA
1s	3×10^{-13}	8×10^{-13}	5×10^{-12}	12×10^{-11}	1×10^{-11}	8×10^{-14}
10s	3×10^{-14}	2×10^{-13}	2.3×10^{-11}	8.5×10^{-12}	2×10^{-12}	8×10^{-14}
100s	1×10^{-14}	7×10^{-14}	8.5×10^{-13}	2.7×10^{-12}	6×10^{-13}	2×10^{-13}
1000s	5×10^{-15}	3×10^{-14}	2.7×10^{-13}	8.5×10^{-13}	2×10^{-13}	5×10^{-13}
1day	7×10^{-16}	4×10^{-15}	4×10^{-14}	2×10^{-13}	8×10^{-14}	4×10^{-14}
1year	1×10^{-12}	1.5×10^{-12}			5×10^{-14}	5×10^{-14}
Cost Guide	€130k	€43k	€47k	€38k	€12k	€25...30k

A replacement for rubidium oscillators in wired and wireless telecom sync.

Superb Frequency Stability + 1×10^{-10} over temp	$5 \times 10^{-11} / -30+70^{\circ}\text{C}$ option
Low Aging	$2 \times 10^{-10} / \text{day}, 2 \times 10^{-9} / \text{year}$
Short Term Stability	$5 \times 10^{-12} 0.1 \dots 10\text{s}$
Phase noise -	100dBc/1Hz - 150dBc/10kHz
Lowest Power 1.25W(a)	5V or 12V
Fastest Warm Time in Class	5min
HCMS/TTL or Sine Wave output	
Standard Frequencies:	10 MHz, 12.8 MHz
Small Size "Europack"	36.1 x 27.2 x 19mm



A3 Bench Instrument & Rack 19" Quartz Frequency Standard

(5 models)

A3 instruments consist of a specified Oven Controlled Quartz Oscillator (OCXO) with distribution amplifiers, frequency converters & BBU as required.



A3-B

A3 Oven Controlled Quartz Oscillators

Features

- Stability to $1 \times 10^{-12} / \text{second}$
- Phase Noise to -165 dBc/Hz @ 10kHz
- Warm Time from 15 seconds
- Power from 150mW
- Size from 27x36x12 SO8

Astra A&B A3 2001	Dubhe A3 3005	EOS A3 2008	Altair A3 2007	Cosmo A3 2000
10 MHz	100 MHz	10 MHz	10 MHz	10 MHz
SC cut resonator	BT cut resonator	SC cut resonator	SC cut resonator	SC cut resonator
1E-10 / day	5E-09 / day	5E-10 / day	1E-10 / day	E-10 / day
1E-08 / month	5E-08 / month	5E-08 / month	1E-08 / month	E-08 / month
5E-08 / year	1E-07 / year	1E-07 / year	3E-08 / year	E-08 / year
Phase Noise	Phase Noise	Phase Noise	Phase Noise	Phase Noise
1Hz - 100dBc/Hz	60dBc/Hz	90dBc/Hz	110dBc/Hz	100dBc/Hz
10Hz - 130dBc/Hz	90dBc/Hz	130dBc/Hz	135dBc/Hz	125dBc/Hz
100Hz - 150dBc/Hz	120dBc/Hz	145dBc/Hz	150dBc/Hz	150dBc/Hz
1kHz - 155dBc/Hz	150dBc/Hz	155dBc/Hz	160dBc/Hz	155dBc/Hz
10kHz - 158dBc/Hz	155dBc/Hz	160dBc/Hz	165dBc/Hz	157dBc/Hz
+/- 5E-08	+/- 1E-08	+/- 1E-08	+/- 3E-08	+/- 3E-08
-60...+70°C	-60...+70°C	-60...+70°C	-60...+70°C	-60...+70°C
5E-12/sec	5E-11/sec	5E-11/sec	1E-12/sec	2E-12/sec
500mV	300mV	500mV	500mV	~500mV
output into 50Ω	output into 50Ω	output into 50Ω	output into 50Ω	output into 50Ω
<3min warm	<3min warm	15s warm	<3min warm	<30s warm
@ 25°C to 1E-7	@ 25°C to 1E-7	@ 25°C to 1E-7	@ 25°C to 1E-7	@ 25°C to 1E-7
12V ±10%	12V ±10%	12V ±10%	12V ±10%	12V ±10%
<250mW @ 25°C	<250mW @ 25°C	<250mW @ 25°C	<250mW @ 25°C	<250mW @ 25°C
50x40x23mm B(Euro)	54x34x25 mm	150mW option 36x27x12.5 mm	33x33x16 mm	50x40x23 mm
53x33x24mm A		Euro SO8		Euro

Features of both A3-B and A3-R

- 13 outputs (1, 5 & 10MHz sine and square waves on front panel, 1pps on front panel and 6 x 1, 5 or 10 MHz on back panel-user configurable)
- 1 PPS sync lock input to adjust 1PPS to external reference pulse
- Output Power level +12dBm
- BBU XLR Input
- Mil Spec Versions

A3-B

- Bench top instrument
- 12 V DC External Power Supply (90...240Vac adaptor supplied)

A3-R (EI or TI options)

- 19" 1U Rack Mount instrument (internal PSU)



A3-RT



BBU

Performance of 'standard' OCXO

A3-2001

- STS 5E-12 @ $\tau = 1\text{s}$
- SC cut OCXO @ 10 MHz
- Ageing 1E-10/day, 1E-8/month & 5E-8/year
- Phase Noise -130 dBc/Hz @ 10 Hz & -158 dBc/Hz @ 10kHz
- Thermal Stability +/- 5E-8 over -60°C...+70°C

Optional OCXO's

- Low Phase Noise -165dBc@10kHz A3-2007
- 100MHz BT cut A3-3005
- Fast Warm Time 15 seconds A3-2008
- Low power 150mW A3-2008
- Excellent STS 1 x $10^{-12} / \text{s}$ A3-2007
- Tempco 5 x $10^{-13} / \text{C}$ A3-2009

For more information go to: quartzlock.com/A3

Hydrogen Maser, GPS-BVA, GPS-Rb, Cesium & Rb Compatible Instruments

For use with all types of frequency source

Lower noise and cost from 2006 with sma option

A5 Distribution Amplifiers

(4 models)

Quartzlock distribution amplifiers are intended for use when multiple outputs from a single frequency standard are required, in engineering labs, national standards labs, research and development, calibration labs and production. Vital for distribution of signals from precision frequency standards like Hydrogen Masers, Cesium oscillators, GPS disciplined Oscillators, Rubidium Oscillators and Quartz Crystal Oscillators.

Quartzlock distribution amplifiers feature high isolation between inputs and outputs, low harmonic distortion, low phase noise and exceptional temperature stability.

The Quartzlock range is adaptable & offers the user the possibility of obtaining up to 48 outputs from between 1 to 4 RF sine wave reference signals.

- 1.... 100MHz frequency input range (sine)
- Phase Noise -130 dBc/Hz @ 1 Hz and -160 dBc/Hz @ >100Hz
- Isolation to 120 dB
- Temperature Stability <10ps/°C

- Hydrogen Maser Compatible Performance

- STS 1E-13/τ @ 1s

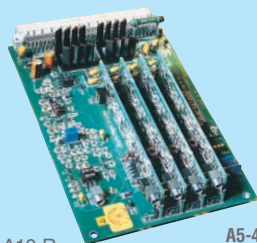
- Low Harmonic Distortion and High input/input output/output and input/output isolation.

- Bipolar junction amplifier design gives low 1/f AM and PM noise

For more information go to quartzlock.com/A5

A5-4 EUROCARD

- 1 input and 4 outputs
- Standard 100mm*160mm size
- DIN4162 64 way class A/C connector
- May fit as option in A3-R, A8-M, A8-MX, A8-RT, A10-R, A10-RT (standard in A7-MX)



A5-4



A5-32

- 1 input on front panel and 12 outputs on back panel (BNC)
- Output power 13 dBm into 50Ω (adjustable to 17 dBm max.)
- High power output option



A5-12



A5-12 Rear



BBU



A5-24



A5-24 Rear



- Primary and Secondary inputs on back panel
- 24 outputs (BNC) on back panel (12 output option)
- User afforded either 1 input with 24 outputs or 2 inputs with 12 outputs / each input. Specify upon order

A5-PSQ

- 1 input and 12 output
- 1pps to 20 MHz Square Wave
- Made to order
- SMA connector option all A5 & A6 models



BBU

A6 Frequency Convertor

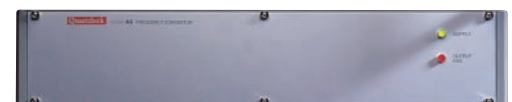
Frequency Convertor

- Provides 100kHz, 1MHz, 5MHz, 10MHz, (2048kHz & 13MHz options) from Maser 5MHz input or 10MHz from Rb.
- Customer frequencies may be specified
- Sinewave > -50dBc all harmonics & spurious.
- 1pps & 1Hz outputs. ■ 1pps sync input.

For more information go to quartzlock.com/A6



BBU



A6

Very High Resolution

A7-MX

v.6

Frequency and Phase Comparator/Calibrator

(with internal time interval counter)

The A7-MX is a fully specified instrument with control via the front panel whilst the TIC is remotely controlled through a PC, this automates data acquisition & enables storage of large quantities of raw phase data. With industry specific Stable 32 Frequency Stability Analysis Software, the user is able to analyse the data in the most appropriate way. (Quartzlock AVAR soft incl.)



A7-MX Frequency, Phase & Phase Noise Measurement System



The A7-MX is a completely new design using phase locked multipliers as opposed to the harmonic multipliers used in previous Quartzlock phase/frequency comparators. Several new features have been added. The frequency input range is much wider, enabling measurements on VCXOs and OCXOs. Two resolutions are provided, with multiplication factors of 10^3 and 10^5 . This optimises measurement on very stable sources such as Rubidium and Caesium oscillators and Hydrogen Masers, as well as lower stability sources. A variable bandwidth IF filter has been added. This essentially sets the measuring bandwidth and allows sources with considerable phase noise to be filtered. This has particular advantages in frequency mode where the apparent jitter of a real time frequency readout can be reduced. A Rubidium frequency standard can be adjusted using 100ms sampling time to an accuracy of 1 in 10^{12} . The phasemeter may be set to sample at the maximum rate of 1ms, with averaging to generate samples at the requested lower sampling rate. This digital averaging provides lower noise with some sources.



A7-MX

- World's best single-shot rms resolution of 50fs permits frequency offset's of E-13 (or greater) ($\tau=1s$ to be measured instantaneously) τ selectable 1ms....2,000s (15fs with 10Hz filter)
- Lowest noise floor available in a production measurement system (5E-14 @ 1s and 3E-17 @ 10,000s). Enables full characterisation of Active Hydrogen Masers at all averaging times
- Measurements may be made of either the frequency or phase of the input 5 or 10 MHz signal.
- Most other comparators have continuous input drift. A7 does not suffer from this major problem
- Specified spurri output levels



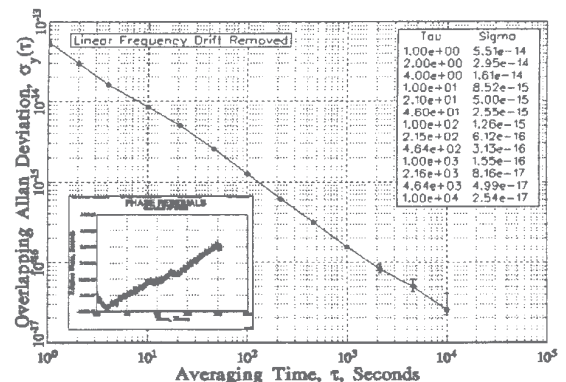
- Stable 32 Frequency Stability Analysis Software option enables calculation of Allan, Modified Allan, Time, and Hadamard Variances.
 - Telecoms users have access to MTIE and TIErms statistics
 - Easy to follow documentation provided enables world class measurement system to be quickly operational
- Solutions**
- National standards and calibration laboratories for detecting differences between Hydrogen Maser, Ceasium Beam, Rubidium & GPS Frequency Standards
 - Research into latest Ceasium & CPT Rubidium Maser, cryogenic hydrogen maser and trapped ion standard performance.
 - Short-term characterisation of ultra-stable OCXO's for Satellites and Telecoms
 - Production Test & characterisation of Ceasium, Rubidium and Quartz frequency standards
 - Ageing function (to > 2 years)

Options (non-essential for operation)

- Distribution Amp to provide 4 reference outputs
- High Performance Rubidium Oscillator makes the A7-MX a complete standard measurement and distribution system
- Multi channel version
- (4 kHz)1MHz....65MHz input option
- Without analogue meter

For more information: www.quartzlock.com/A7

Stable 32 plot of A7 noise floor



*Inbuilt microphase - stepper to adjust in 1ns steps the 1pps o/p
(Calibrate ionospheric & cable delays to achieve local UTC)*

GPS Time & Frequency Standards

Unique Carrier Phase Tracking

The Quartzlock A8 series are unique within their price range because they perform extremely high-resolution carrier phase measurements for each satellite being tracked.

The A8 series can operate with 1 satellite only. This enables the extraction of stable and accurate frequency information from the complex signal format.

A8 has a frequency resolution, which is better than the C/A code tracking - used in all normal equipment- by a factor of 10,000.

The resolution of the A8-M is so high that the frequency of the local oscillator can be measured to 1×10^{-11} in less than 1s.

This allows ultra precise tracking of the reference. *A typical output stability in 10s measurement time is 1×10^{-12} .*

Applications: Time sync of H Masers to UTC (local). The calibration of counters, timers, radio test equipment and all quartz based instrumentation within standards laboratories, time transfer, OEM, the referencing of radio transmitter frequency including quasi-sync systems, the synchronisation of telecom systems including Stratum I and II GSM, PCN base station commissioning and reference unit, time scale correction to UTC, Digital Audio Broadcasting (DAB), Digital TV & GSM 2000

Scientific research not possible with ca code gps - a specific advantage of the A8 series.

A8-B GPS Frequency & Time Standard

BENCH



- Available with XO or OCXO Local Oscillator
- Sine and square wave outputs at 1, 5 and 10 MHz and square wave at 100 kHz (option)
- 1pps output synchronised to UTC/GPS
- Serial data output in NMEA 0183 format for remote monitoring
- STS (varies according to LO) 2E-11 @ 1s, 8E-11 @ 1000s & 1E-12 @ 1day for standard version
- Time Accuracy <35ns wrt UTC
- 5 ns between A8's typ.

A8-M GPS Frequency & Time Standard

METROLOGY

& A8-MX



- Displays date, time, position 2m, micro phase stepper adjust, sats in view vs available, status and validity monitors.
- 1, 5 & 10 MHz sine wave via front panel (option rear)
- 1, 5 & 10 MHz square outputs via rear panel
- Optional A5-4 distribution card (4 outputs)
- Optional E1, T1 & 13 MHz outputs also A8-RT
- 1pps synchronised to UTC/GPS



- Serial data output in NMEA 0183 for monitoring.
- Cesium compatible stability at fraction of price with no costly wear-out physics package

A8-M

- STS 2E-11@1s, 2E-13 @ 1000s & 1E-13 @ 1 day.
- Time accuracy <5ns between two 'identical' co-located receivers. <20ns absolute

A8-MX

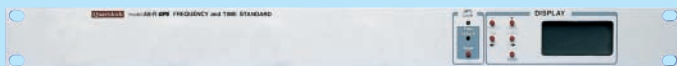
- *Superior performance to passive H maser*
- 8E-14 / 2....20s & E-14 / 1 day

■ 1u rackmount large quantity TELECOM option
For more information: www.quartzlock.com/A8

A8-MX & A8-M

- sma output option
- microphase stepper (1ns steps) ± 500ms range
- quad Helix antenna eliminates multi-path timing errors
- no drift
- 5E -14 accuracy

A8-RT GPS Frequency Standard



- Available in standard OCXO, low cost XO and rubidium versions
- 1, 5 and 10 MHz sine & square wave, 1pps outputs + alarms on rear panel.
- 1pps synchronised to UTC/GPS
- Optional A5-4 distribution card (4 outputs) See p3.
- Serial data output in NMEA 0183 format for remote monitoring
- STS (varies according to LO) 3E-11 @ 1s, 6E-13 @ 1000s & 2E-13 @ 1 day for Rubidium

STOP PRESS...

Rugged milspecs - all models

Rubidium Frequency Standards

A Rubidium frequency standard owes its outstanding accuracy and superb stability to a unique frequency control mechanism. The resonant transition frequency of the Rb87 atom (6,834,682,614 Hz) is used as a reference against which an OCXO output is compared. A detector is used to lock the OCXO output ensuring medium and long-term stability.

Advantages of Rubidium as a Frequency Standard

- High accuracy
- Small size
- Low weight
- Lower power consumption
- Environmentally tolerant
- Ideal for mobile applications
- No antenna - strategically independent

Applications

- Frequency calibration
- Telecom network synchronisation
- Cellular base station
- HDTV broadcasting
- Satellite navigation and GPS receivers
- Radio transmitters
- Radio navigation
- Ground and satellite communications
- Secure communication and spread spectrum
- Instrumentation

For more information: quartzlock.com/A10

A10

Rubidium Oscillators

A10 - FRS Milspec



- 400cc
- Size 51mm x 76mm x 102mm (2" x 3" x 4")
- Mixed 'D' connector with RF coaxial connector
- Options: Low Cost, Standard, High Performance
- STS of standard is 3E-11/τ=1s
- Freq. Offset upon shipment <5E-11
- Drift of standard is 4E-11 per month
- 24V DC power required (15V upon request)
- Phase noise -145dBc/Hz @ 10 kHz offset

Low Profile Rubidium Oscillators

**2006 DESIGN
3 YEAR WARRANTY**



**RS232 VERSION
AVAILABLE**

A10-LPRO Low Cost wired/wireless telecoms & HDTV TX applications

- Form, Fit and Function LPRO Industry Standard
- 450cc low profile unit ■ 38mm x 94mm x 127mm
- Standard 'D' connector for power with RF signal output through adjacent SMA female
- Options: low cost, standard & high performance
- STS of standard LPRO is 3E-11/τ=1s
- Freq. Offset upon shipment <5E-11
- Drift of standard LPRO is 4E-11 per month
- 24V DC (15V option)
- SSB phase noise of standard is -145dBc/Hz @ 10 kHz offset

**TELECOM
& SATCOM**

A10 - LPRO/HPRO 'A' Class version

- SSB phase noise -155 dBc/Hz @ 10 kHz (-160dBc/Hz (LN version))
- 5x10-12 @ 1s
- 5x10-13 @ 1 day
- High temperature options
 - 60°C & 70°C

A10-B

Bench Instrument Rubidium Standard



- 1, 5 & 10 MHz sine and square wave via front panel (power level +12dBm - adjustable)
- 1pps output and 1pps input for synchronisation to external 1pps
- 6 x any of 1, 5 or 10 MHz sinewave via back panel (user configurable)
- Powered by ext. PSU (supplied)
- Bench top instrument
- GPS sync with A8-B makes world's smallest primary reference clock
- 14 outputs
- CPT Rb option
- sma connector option

Rubidium Frequency Standards

A10-M Rackmount Rubidium Standard



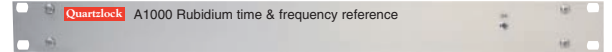
- 1 core +8dBm 10 MHz output via back panel
- GPS disciplining interface as standard
- 19" 1U Telecoms unit with E1 or T1 outputs, see **A1000**
- Optional 13MHz outputs
- Standard Spec
- Optional frequency & 4...12 outputs
- Available with 2006 LPRO or HPRO Rb
- Nato stock no
- Milspec
- sma output option
- CPT option
- Rackmount & bench trim options A5, A6,A7,A8 & A10.

TELECOM & SATCOM

B BBU

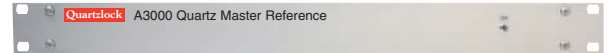


A new 2007 economy '1U' line



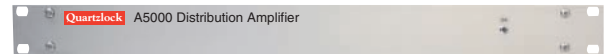
A1000 Rubidium instrument

Low phase noise • low drift • high stability



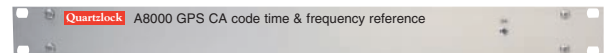
A3000 Quartz Master Reference

10MHz • -165 dBc/Hz phase noise • $1 \times 10^{-12}/s$



A5000 Distribution Amplifier

Up to 24 outputs from 1 or 2 inputs



A8000 GPS CA code time & freq. ref.

Superior performance, Quartzlock's H maser based lab used in production test

New economy LPRO Rb oscillator & A8-X GPS CA code time & freq. engine

B BBU

Optional on A3 A5 A6 A7 A8 & A10 instruments

Seamless switching to and from an external battery backup unit in the event of a.c supply glitch or failure.

STABILITY RESULTS COMPARISON TABLE (Typical Results)

Standard	Time and Frequency Standards							Passive distribution, conversion and measurement instruments		
	PHM	A3 2000	A3 2009	A8-M	A8-MX	A8-B / A8-RT	A10-B / A10-R	A5 Series	A6	A7- MX
Measurement Time τ sec	Passive Hydrogen Maser	OCXO	DOCXO	(Metrology) GPS disciplined Rubidium	(Metrology) GPS disciplined BVA	(Bench) (Rack) (Telecoms) GPS with standard	(Bench) (Rack) Rubidium Frequency Standard	Distribution Amplifiers	Frequency Converter	Frequency and Phase Comparator
1	6×10^{-13}	3×10^{-12}	5×10^{-12}	1.4×10^{-11}	8×10^{-14}	3.0×10^{-11}	2.4×10^{-11}	7.0×10^{-14}	4.0×10^{-13}	3×10^{-14}
10	1.5×10^{-13}	3×10^{-12}	5×10^{-12}	2.4×10^{-12}	8×10^{-14}	6.7×10^{-12}	8.1×10^{-12}	2.5×10^{-14}	1.0×10^{-13}	4×10^{-15}
100	5×10^{-14}	1×10^{-11}	-30 + 70C	5.6×10^{-13}	2×10^{-13}	2.4×10^{-11}	2.5×10^{-12}	9.0×10^{-15}	2.5×10^{-14}	2×10^{-16}
1000	2×10^{-14}	8×10^{-11}		1.7×10^{-13}	5×10^{-13}	7.0×10^{-11}	8.6×10^{-13}	2.0×10^{-15}	5.0×10^{-15}	1×10^{-16}
10000	1×10^{-14}		$5 \times 10^{-13} / C$	8.5×10^{-14}	4×10^{-14}	5.0×10^{-12}	3.0×10^{-13}			7×10^{-17}

Quartzlock

Quartzlock is a registered Trademark

Head Office:

Gothic, Plymouth Road, Totnes, Devon TQ9 5LH, England
 Fax +44 (0)1803 867 962 Tel +44 (0)1803 862 062

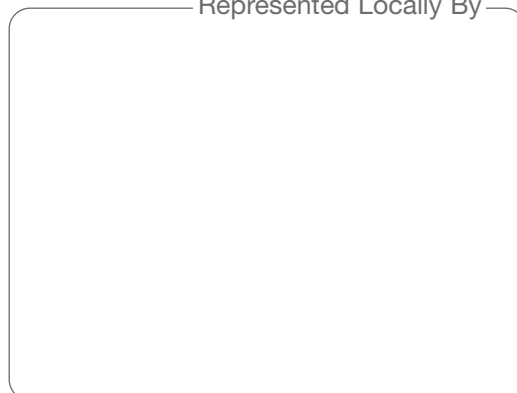
China, Europe & US calibration, sales, service & repair centres

Web: quartzlock.com e-mail: sales@quartzlock.com

Quartzlock USA Frequency Standards & Services
 P.O. BOX 9941 Colorado Springs CO. 80932 USA

• Specification subject to change without notice
 • This issue replaces all previous issues
 • This specification does not form part of any contract
 • ISO 9001 • CE mark where applicable • © Copyright Dartington Text 2006
 • Doc No: PG Issue 8 (October 2006)

Represented Locally By



Quartzlock
 The most stable Frequency Standards available
 GPS • Galileo & L1 Track RX
 Rubidium Atomic Standard
 GNS-BVA
ISO 9000
 NIST Traceable Standard
 NPL Referenced
 5x dti Smart Awards