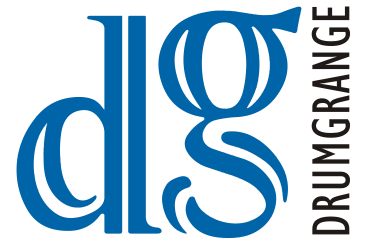


# Precise Time and Frequency Equipment



Drumgrange has specialist, broad based expertise in time standards technology and offers both Caesium and Rubidium Precise Time and Frequency Equipment (PTFE). The Caesium based system has an integral 4th generation GPS receiver module, which disciplines a secondary Rubidium; the Rubidium based system uses dual redundant Rubidiums

Both PTFEs utilise the US Naval Observatory maintained Co-ordinated Universal Time (UTC), obtained via the NAVSTAR Global Positioning System (GPS). In the temporary absence of GPS satellite received time, the Drumgrange PTFE will maintain precise time to an accuracy of:

- Caesium: less than  $50\mu\text{sec}$  after 90 days without GPS
- Rubidium: less than  $250\mu\text{sec}$  after 45 days without GPS

Drumgrange's rubidium based PTFE is currently in service with the Royal Navy as Outfit FSF and is fitted to some twenty-five operational ships. Outfit FSF has been selected for the new Royal Navy Type 45 Destroyer.

## OPTIONS

- Custom interface and output signal requirements implemented (frequency outputs, time messages, fibre optic interfaces) via Interface Modules, as required, including customised distribution.
- Alternative levels of redundancy available (with marginal decrease in reliability).
- Back-up battery (available in separate shelf unit providing more than one hour at full load).



## RUBIDIUM

- Dual redundant internal Rubidium frequency source.
- Highly stable phase-lock-loop control circuit for each Rb oscillator.
- GPS interface in accordance with ICD-GPS-060.
- Supports the NATO PTTI interface in accordance with STANAG 4430.
- High reliability due to self-arbitration and redundancy.

## CAESIUM

- Caesium tube primary oscillator.
- Rubidium secondary oscillator.
- Highly stable phase-lock-loop control circuit for the secondary rubidium source.
- Integral GPS receiver module.
- Highly accurate and stable precise time and frequency in the temporary absence of GPS satellite information.
- Automatic and instantaneous switching to internal source should GPS be lost or degraded.
- Supports the NATO PTTI interface in accordance with STANAG 4430.
- High reliability due to self-arbitration and redundancy.

# Precise Time & Frequency Equipment

Technical Specifications	Caesium	Rubidium
Frequency Accuracy:	$3 \times 10^{-12}$	$5 \times 10^{-11}$
Frequency Stability (short term):	better than $5 \times 10^{-12}$ per day	better than $2.5 \times 10^{-12}$ per day
Frequency Stability (long term):	better than $8 \times 10^{-14}$	-
Ageing:	-	$5 \times 10^{-11}$ /month
Time Accuracy (GPS accessible):	within 100ns	within 100ns
Time Accuracy (GPS lost):	less than $50\mu\text{s}$ after 90 days	less than $250\mu\text{s}$ after 45 days
<hr/>		
Electrical Power Source:	115V AC 60Hz / 240V AC 50Hz	
Electrical Consumption:	250W	
Back-up Batteries:	optional	
<hr/>		
Physical Characteristics		
	Weight: 23kg	Weight: 50kg**
	Height: (5U) 222mm	Height: (8U) 355mm**
	Width: (19") 482mm	Width: (19") 482mm
	Depth: 460mm	Depth: 460mm
	** 50kg & 8U including integral battery modules	

*“We design, develop and manufacture innovative products and are also experts at integrating existing technology to create successful, cost effective solutions.”*



Registered Office: Chertsey, Surrey Registered in England No. 1460044  
© Drumgrange Ltd 2007

**Drumgrange Limited**  
Unit A, The Forum  
Hanworth Lane  
Chertsey  
Surrey KT16 9JX  
Tel: +44 (0) 1932 581100  
Fax: +44 (0) 1932 569646  
Email: [info@drumgrange.co.uk](mailto:info@drumgrange.co.uk)  
Internet: [www.drumgrange.co.uk](http://www.drumgrange.co.uk)

**Drumgrange Limited**  
3-7 South Way  
Southwell Business Park  
Southwell, Portland  
Dorset DT5 2NJ  
Tel: +44 (0) 1305 862100  
Fax: +44 (0) 1305 862101  
Email: [info@drumgrange.com](mailto:info@drumgrange.com)  
Internet: [www.drumgrange.co.uk](http://www.drumgrange.co.uk)



Approved to BS EN ISO 9001: 2000 and TickIT