

Dear **C Wonnacott**

QUARTZLOCK NEWSLETTER ~ Autumn 2010

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### 1. **Get More from Your Master Reference**

The need to have synchronised frequency references at every workstation has moved on from being something that is an expensive luxury to a must have for all, however this does not mean that expensive reference oscillators have to be purchased and installed for each workstation. Quartzlock's A5000 distribution amplifier enables twelve separate workstations to be connected to the same master reference ensuring that each workstation is synchronised to the master reference and each other. Therefore measurements and measurement errors are consistent throughout your facility.

### 2. **Rubidium Frequency Standard**

The rubidium frequency standard, like its more expensive cousin, the hydrogen maser, may be operated either as a passive or as an active device. The passive rubidium frequency standard has proved the most useful, as it may be reduced to the smallest size whilst retaining excellent frequency stability. The applications for such a device abound in the communication, space and navigation fields.

The rubidium frequency standard may be thought of as consisting of a cell containing the rubidium in its vapour state, placed into a microwave cavity resonant at the hyperfine frequency of the ground state. Optical pumping ensures state selection. The cell contains a buffer gas primarily to inhibit wall relaxation and Doppler broadening. The Rubidium frequency standard essentially consists of a voltage controlled crystal oscillator, which is locked to a highly stable atomic transition in the ground state of the  $Rb^{87}$  atom.

There are several reasons why Rubidium has an important role to play as a frequency standard. Perhaps most significantly is its accuracy and stability. Moreover the stability of a Rubidium frequency standard over short time-scales "100s of seconds" betters that of Caesium (Caesium's are more stable over longer time periods, in the regions of hours to years). After 100s the frequency stability of the best performing Quartzlock Rubidium is  $5 \times 10^{-12}$  and phase noise of the Quartzlock Rubidium is -110 dBc/Hz @ 1Hz from the carrier.

Due to its small size, low weight and environmental tolerance the Rubidium frequency standard is ideal for mobile applications. Indeed, Rubidium atomic clocks are being used in the GPS satellites. This is in part due to the extended life of the Rubidium physics package. The Rubidium is also extremely quick to reach operational performance, within 5mins reaching  $5 \times 10^{-10}$ .

### 3. **Newsletter sign up**

We'd like to send you occasional email newsletters with items of interest to the time and frequency community, press releases and new product information. To request the newsletter [please sign up here](#). We will not send more than 1 newsletter a month on average.

Kind regards

Quartzlock

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