OSA-VCH 1006 Passive Hydrogen Maser

Passive Hydrogen Maser Frequency and Time Standard

Telecommunication networks require highly accurate clocks for the effective transmission of digital signals. One of the primary objectives of telecommunication networks is to guarantee, at the connection between different networks, a slip rate of less than one slip in 72 days. Meeting these stringent specifications requires the implementation of a Primary Reference Clock (PRC) that generates signals with an accuracy better than 1E-11, at all times.

Generally, this is achieved using Cesium or Hydrogen Maser clock technology, often combined with GPS receivers as backup sources.

Unlike off-air receivers, Maser clocks are autonomous, self-contained primary references immune from external influences.

A well maintained synchronisation backbone minimises network errors, thus increases network efficiency, resulting in a higher quality of service and a greater use of capacity.

Passive Frequency and Time Standard
OSA-VCH 1006 PH is the number one alternative to a high performance reference when better stability and competitive accuracy are needed.

OSA-VCH 1006 can be used as an integral part in automated measurement systems. The working and monitoring parameters of the instrument are accessible for read and write operations through the internal interface RS-232.

Main applications are:

- Telecommunication systems
- Reference for test equipment

Highlights

- Extremely stable frequency reference based on Hydrogen atom transition.
- Ultimate G.811/Stratum 1 compliant PRS for SDH/SONET synchronisation.
- Alternative technology to cesium reference sources.
- Lifetime is not constraint to 10-12 years like with cesium oscillators but 20 years.
- Low cost hydrogen refurbishment.
- 2.048/5/10/100 MHz and 1 PPS standard outputs.
- Digital control and monitoring of all operations on LCD display RS-232C.
- 10 minutes batteries backup.
- 3 years warranty on Physics package.
- Expected lifetime: 20 years.

OSA VCH-1006
Passive Hydrogen Maser

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The leading partner for your synchronisation needs

OSCILLOQUARTZ
SWATCH GROUP ELECTRONIC SYSTEMS

Technical specifications OSA-VCH 1006

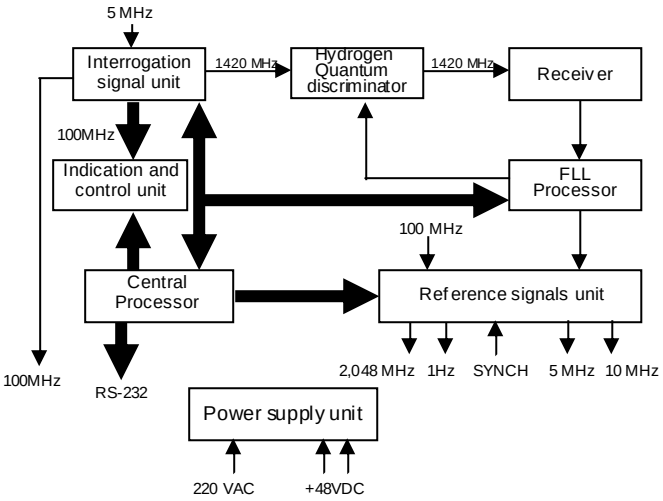
Principle of operation

Hydrogen Maser principle of operation is based on quartz oscillator frequency locked to the frequency line of hydrogen atom emission of the discriminator (see bellow). The influence of the discriminator RF-cavity frequency fluctuation on emission line is eliminated by RF-cavity frequency adjustment to quartz oscillator frequency. As discriminator energy level emitted by hydrogen atoms is less than the sum of loss energy, FM excitation signal is introduced into the discriminator cavity to provide spectral line indication and frequency adjustment, controlled by the FLL processor.

The interrogation signal with the frequency of 1420.405 MHz is separated directly in the discriminator cavity. Due to the interaction of the FM interrogation signal with atom line and resonator cavity, signal is converted into AM signal.

The FLL processor produces signals to control the frequency of oscillator, which is tuned locked to the frequency of the hydrogen atoms spectrum line.

In case of failure of external power supply, internal batteries will maintain normal operation for a period of at least 10 minutes.



Characteristics

Internal reference :

- Type: Passive Hydrogen Frequency and Time Standard
- Initial Frequency accuracy ①: $\pm 2 \times 10^{-12}$ (changed ±2°C within range 5°C to 40°C) $\pm 1 \times 10^{-12}$ (22°C ± 2°C)

①Expressed as a fractional frequency; without frequency drift

- Frequency corrector: Resolution : 1×10^{-14} Range : 1×10^{-10}
- Frequency stability:

1 sec.:	2×10^{-12}
10 sec.:	6×10^{-13}
100 sec.:	2×10^{-13}
3600 sec.:	6×10^{-14}
1 day:	2×10^{-14}

- Long term stability: $\pm 6 \times 10^{-14}$/month for first 18months of continuous operation
- Magnetic sensitiveness: < 2×10^{-14} (1/Oersted)
- Temperature coefficient: < 5×10^{-15} (1/°C)
- Frequency reproducibility: 1×10^{-13}

Output signals :

- 5 MHz / 10 MHz / 100 MHz, 1 Vrms ± 0.2V, 50Ω
- 2.048 MHz pulse, 2,5V_{pp}, 75Ω (range 1,5—2,8 V_{pp})
- 1 PPS, positive polarity TTL level, 50Ω

Environment :

- Operational Temperature: +5°C to +40°C
- Storage Temperature: 0°C to +50°C
- Humidity: < 80% (max. 35°)
- EMC: Meets EN50081-1, EN50082-1
- Safety: MeetsEN61010-1(1993/A2, 1995)
- Expected lifetime: 10-20 years

Electrical / Mechanical :

- Voltage : 220 VAC (100-240) / 50-60 Hz and 2x48VDC (36-72V)
- Power consumption : Max 80W
- Internal batteries : For 10 min. working time
- Dimension : 200x470x513 (HxWxD)
- Weight : 31 kg

Phase noise (at 5 Hz output) dB/Hz) :

- 10 Hz : - 125
- 100 Hz : - 135
- 1000 Hz : - 150

Control Monitoring and Warm up :

- Digital control and monitoring of all operating parameters on LCD display
- RS-232 Interface
- Warm up time : 8 hours

Version 02/March 06/MAJA

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