



REF-V01 is a synthesizer of reference signals. Its main application is related to generation of high-stability sample frequencies, i.e. the 2.048 MHz or 16.384 MHz (Telecom applications) or 5 MHz and 10 MHz (Broadcasting applications). The sample frequencies generated by REF-V01 are extremely stable both for time and temperature. The device internally contains a high stability thermoregulated oscillator (OCXO), with minimum frequency drift.

REF-V01 also implements two systems used to tune the internal oscillator; in order to obtain, through sophisticated algorithms the frequency references with stability like  $1e-12$ . The first system uses synchronization signals coming from the satellite system NAVSTAR Global Positioning System (GPS) and this is usable worldwide and in all weather condition. The second system uses another sample signal coming from, i.e., an apparatus generically defined as "Central Clock". This signal might be, i.e., a sine wave with 2.048 MHz frequency, result of the re-generation of an SDH datastream.

REF-V01 is completely automatic in both system management to tune the internal oscillator. In particular, the user is free to decide to use one in back-up of the other. Concerning the control of stability of the internal oscillator based on GPS receiver, signaling provided by the NAVSTAR navigation system are used. This system was planned by USA Department of Defense and is used to obtain the geographical coordinates of a earth reference. With algorithms is possible generate a high precision synchronization signal usable as time sample.

REF-V01 automatically proceed to the management and control of the GPS satellite receiver, in particularly by checking and verifying that the conditions to regenerate the clock signal are observed. The management of the alarms in case of failure is completely automated. In the case in which the regeneration of the synchronism signal is affected by a mean square error of more than 50ns, the GPS system is excluded with consequent generation of an alarm.

The second system used by the REF-V01 for the control of the stability of the internal oscillator uses an external sample of frequency. This frequency may be chosen among the most famous, i.e. 16.66 kHz, 2.048 MHz, 5 MHz, 10 MHz. The signal defined External can be both a sine wave and a square wave form with TTL levels.

The use of an external frequency reference may be useful in cases when there is the need to satisfy the lack of a GPS reference (failure, maintenance by the operator,...). The stability obtained by using the external reference is closely related to the signal used as sample. Is not to be excluded that in some and particular circumstances the External reference signal can be less stable than the signal generated by REF-V01 in Free-Run mode (without reference).

REF-V01 keeps track of the value of absolute and relative deviation of the internal oscillator frequency in function of time, allowing the operator to evaluate, through a software, the trends of the corrections of the equipment both related to the GPS reference and the External reference. If the External reference signal is unstable, the user may evaluate the time-related amount.

The management of REF-V01 can be done in two ways: first, through the front panel display and keyboard, the second by means of a software package operating on a PC. The use of the keyboard and the front display allows easy installation without the aid of the PC and without therefore having to renounce to a whole series of alerts and information that the apparatus can provide.

**Synthesizer Section: (#A, #B)**

Available frequencies: 16,66 KHz (Periodic) 1MHz to 5 MHz, 10MHz (standard version)  
Spectral Purity: -55 dBc maximum output power. (harmonic), -75 dBc maximum output power. (not harmonic)  
Phase noise: TBD  
Output Power: from -2 dBm to +16 dBm on 50 ohms, digitally tunable.  
Stability: 1E10-12 daily average OCXO locked to GPS in SA  
OCXO Standard: 2E10-10 daily average OCXO free run, OCXO SC: 2E10-11 daily average OCXO free run  
Connector: 2 x BNC (each RF output)

**Time reference**

Signal: 1 PPS, 100  $\mu$ s Duty, Rising Edge.  
Output: 8 independent.  
Output level: TTL 5 Vpp, Square wave.  
Output impedance: 50  $\Omega$ .  
Output Connectors: BNC.

**GPS section**

Receiver: 12 Channels L1 1575.42 MHz.  
Tracking: correlation over 12 satellites.  
PPS precision: < 50 ns on SA.  
Antenna connector: TNC.  
Capture time: < 4 min.

**External section: (optional)**

Frequencies allowed: 16.66 KHz, 2.048 MHz, 5 MHz, 10 MHz.  
Bandwidth: 10 KHz / 10 MHz  
Input level: 1 Vrms on 50  $\Omega$   
Impedance: 50  $\Omega$   
Connector: BNC

**Signaling**

Serial connection: RS-232 Connector DB9 Male  $\pm$  15 kV (ESD).  
Signaling: 4 dry contact over Weidmuller connector step 3.5 mm.

**Supply**

Network: 95 Vac – 240 Vac, Plug IEC320 integrated, filter EMI/RFI.  
Battery: 2 independent power suppliers.

**Size**

Width: 1 Unity 19".  
Depth: 300 mm connectors excluded.  
Weight: 1.5 Kg.