TO-16

Tracking Oscillator

pendulum

- **Ultra-low phase noise outputs**
- **Four outputs phase locked to reference input**
- **Autosensing frequency input 5 or 10 MHz for application flexibility**
- **5 or 10 MHz outputs can give input frequency doubling or halving**
- **Good holdover performance if input signals source fails**
- **Built in test and remote control and monitoring**

The Pendulum TO-16 is a Precision Tracking Oscillator for 5 or 10 MHz, aimed for scientific or metrology applications. The TO-16 is able to effectively produce an output signal that combines the long-term stability of an external reference, such a Cs clock, with the low phase noise of the local oscillator. It makes the TO-16 an indispensable piece of equipment when working on critical situations.

TO-16 Overview

The TO-16 is a high quality Frequency Reference source that faithfully tracks the frequency accuracy of its reference input. By using a unique conditioning algorithm, the TO-16 senses the input frequency it is supplied and adjusts the frequency of its own ovenised, low phase noise oscillator to maintain frequency and phase coherence.

Thus the product can be used to restore the quality of a frequency signal degraded by transmission over long and noisy lines, or to improve the intrinsic noise level of a signal coming from a Rubidium atomic oscillator. The TO-16 could also be used as a frequency translator between 5MHz and 10 MHz, ensuring high signal quality, phase lock and constant tracking.

Low-Noise and High Stability

Due to its highly stable internal oscillator, the TO-16 has excellent hold over capabilities if the input signal is lost for any reason.

All four sinewave outputs will be maintained with minimal drift until the reference signal is restored. As with all aspects of the TO-16 operation, this is detected automatically and frequency conditioning restarted. Initial product start up and recovery from power failures requires no operator intervention or assistance.

Frequency Doubling or Halfing

A useful feature of the TO-16 is that it can be used to perform frequency conversion operations within a system. This means that a standard TO-16 unit will produce outputs at 10 MHz regardless of whether the synchronizing reference is 5MHz or 10 MHz.

When fitted with the relevant option, the TO-16 will produce 5MHz outputs regardless of whether the synchronizing reference is 5MHz or 10 MHz. Unlike synthesized outputs, these frequency converted signals from the TO-16 come directly from the on board low phase noise oscillator and so are not subject to the noise and spurious signals often associated with synthesized outputs.

Flexible Remote Control and Monitoring

In addition to front panel indications of status, the TO-16 has a fully featured RS232 bi-directional interface to permit remote Control and Monitoring. This may be by direct serial port connection, or by use of Pendulum Ethernet interface, via a remote web browser. Built in test in the TO-16 ensures that all critical unit parameters are kept under constant observation and that exceptions are rapidly reported.

USA | 95 Methodist Hill Drive | Rochester, NY 14623 | +1.585.321.5800 | sales@spectracomcorp.com
FRANCE | 3 Avenue du Canada | 91974 Les Ulis, Cedex | +33 (0)1 64 53 39 80 | sales@spectracom.fr
UK | 6A Beechwood | Chineham Park | Basingstoke, Hants, RG24 8WA | +44 (0)1256 303630 | info@spectracom.co.uk
SWEDEN | Box 20020 | 161 02 Bromma, Sweden | +46 8 598 510 00 | info@pendulum.se

General Specifications

Temperature range

Operating: +5°C to +45°C
Storage: -40°C to +71°C

Mechanical

Cabinet: 1U x 19 inches – rack mount
Width x Height x Depth:
483 x 44 x 350 mm (19 x 1.7 x 13.8 in)
Weight (approx): 3.8 kg (8.4 lb)

Power Supply

115/230 V nominal. Switch selectable.
Tolerance ±10% (45 to 66 Hz)
DC Input Connector:
DIN7 (as diagram 3719-6345)
Type: Power supply backup
Level: +18 V to 32 V

Oscillator

Phase Noise

	OCXO 5MHz	OCXO 10 MHz
Offset from carrier:	dBc/Hz	dBc/Hz
1Hz	-105	-103
10 Hz	-135	-130
100 Hz	-143	-138
1kHz	-147	-145
10 kHz	-150	-148
Harmonics	<-40 dBc (typ.)	<-35 dBc (typ.)
Spurious	<70 dBc (typ.)	<-65 dBc (typ.)

Frequency Uncertainty

Locked to reference source	
Freq. offset (24 h averaging)	$<5 \cdot 10^{-12}$
Freq. offset (long-term averaging)	$<1 \cdot 10^{-12}$
Freq. stability (ADEV)	$<5 \cdot 10^{-11}$ @1000 s
Free run mode	
Aging (after 30 days operation)	$<1 \cdot 10^{-10}$/day
Short term stability (ADEV)	$<3 \cdot 10^{-12}$ @10 s
Stabilty vs. Temperature 25°C ±10°C typ.	$<2 \cdot 10^{-10}$

Inputs and Outputs

Standard Output

5MHz x 4 or 10 MHz x 4 (depending on the Oscillator fitted):
Connector: BNC
Output level: +10 dBm (0.7 Vrms) in 50 Ω
Alarm Contact:
Connector: BNC
Output level: Contact
Type: Normally Closed

Standard Input

Frequency Reference:
Connector: BNC
Frequency: 5MHz or 10 MHz auto-sensing
Input signal: Min:+4dBm (0,35 Vrms)
Typ:+13 dBm (1Vrms in 50 Ω) sinewave
Max: +19 dBm (2Vrms)
Status Reference:
Connector: DB9 male

Communications Port

RS232:
Connector: 9 way 'D' Socket (DB9)
Mode: 9600/8/1/N, Non adjustable
Command set: Refer to manual

Ordering Information

Basic Model

TO-16: Tracking oscillator, 10 MHz or 5MHz, alarm output, RS232
Included with shipment:
Mains cable
User manual on CD
18 months warranty

Built in options

Option 17/05: 5MHz output reference frequency in place of 10 MHz

Other options

Option 95/03: Extended warranty from 18 months to 3 years
Option 95/05: Extended warranty from 18 months to 5 years

Optional accessories

Option 18/10: RS232 to Ethernet converter plus digital input/output

October 18, 2010 - 4031 600 16101 rev. 05