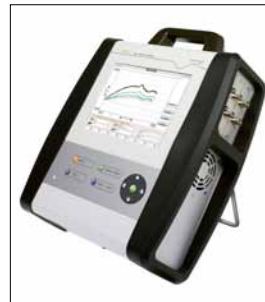# STA-61
Sync Tester/Analyzer

pendulum

New product!
Available Q1, 2011.
Preliminary data!

- **Synchronization test platform for Next Generation Networks (NGN)**
- **Modular multi-input measurements: 2, 4 or 6 channels simultaneously**
- **Comparison with standard masks**
- **Very accurate built-in Rubidium reference**
- **Portable and cost-effective**
- **User-friendly**
- **Large color LCD touch screen**

The Pendulum STA-61 marks a new generation of instruments allowing the user to test and analyze sync in various types of networks. Where traditional instruments on the market are designed specifically for SDH/SONET or are dedicated SyncE or PTP testers, the STA-61 can do it all. This is a Sync Tester/ Analyzer developed for Next Generation Networks (NGN), incorporating both traditional SDH/SONET core networks and IP-based backhaul networks.

Portable and Cost-Effective
Lightweight, with a handle and a size that fits as carry-on luggage on aircrafts, the STA-61 is designed to make it easy to bring wherever you want to use it. Place the sync tester/analyzer on a work-bench or use the stand for comfortable viewing when the instrument is placed on the ground. All these functions packed together in an instrument that is still much less than half the price of traditional testers on the market, makes STA-61 the most cost-effective solution.

Truly User-Friendly
Equipped with a large color LCD touch screen, showing TIE, TDEV or MTIE results in real-time during measurement, and combined with intuitive menus, this sync tester/analyzer is a truly user-friendly unit. All it takes to get the measuring started is a simple 3 step operation:

1) Connect your signal to test
2) Press SIGNAL CHECK to identify signal type
3) Press START

Within a few minutes anyone could learn how to operate the STA-61. No time or cost needs to be spent on training and the risk for operator mistakes is eliminated.

Always Accurate
An optional, integrated GPS-receiver enables continuous calibration/adjustment of the STA-61 oscillator between measurements. Unlike existing sync testers/analyzers there is no need to send the STA-61 away for calibration. You can simply do it right where you are, eliminating calibration down-time.

Modular and Future Proof
Sequential testing is no longer necessary if you want to measure wander on several access points in a station, the STA-61 can measure on up to 6 different test points simultaneously.

Thanks to the modular input design in a generic measurement platform, it is easy to expand the STA-61 with more modules in the future. From start you will be able to measure on all standard telecom clocks, the 125 MHz SyncE reference clock as well as the typical 1-pps physical output from a termination PTP slave, to test frequency sync variations. Future modules will be able to measure directly in the SyncE and PTP traffic. For PTP it will be possible to quantify also the time sync variations.

The modular design makes STA-61 future proof, buy your new sync tester/analyzer today and expand it with more input modules when you need it.

Signal Types
Predefined
1 pps (disciplined PTP slave clocks);
1.544 MHz (T1 clock); 1.544 Mbit/s (T1 data); 2.048 MHz (E1 clock); 2.048 Mbit/s (E1 data); 10 MHz (Freq. reference); 125 MHz (SyncE); 155 MHz (STM-1 clock); 34 Mbit/s (E3); 155 Mbit/s (STM-1 electrical)

Clock Signal Types
User defined signal types from 0.5 Hz to 155 MHz in 1Hz steps. Note: The signal under test must be a symmetrical clock-type signal

Measurement modes
Common mode: Signal measured against the selected reference (internal or external)
Differential: Relative Wander (TIE, MTIE and TDEV) between two clocks or data signals.

Test Modes (MTIE and TDEV Masks)
Masks can be applied for MTIE and TDEV graphs.
Draft: No mask
PRC/SSU/SEC: Masks for G811/G812/G813-clocks (ETS 300 462-3)
Networks: According to G.823/G.824
SyncE: According to G.8261
ANSI-standard: DS1 and OC-N masks
User-defined: Defined by the user

Time Interval Error (TIE)
Reference Clock: Built-in Rubidium reference or ext. reference input
Sample rate: up to 100 Sa/s depending on number of parallel measurements
Update Rate: approx. once/second
Internal data storage: up to 5M TIE values
Start/Stop: via START/STOP key.
Warm-up Time: Selectable delay before measurement starts, to allow instrument warm-up.
Signal Check Parameters: Signal type (Clock, Data or Unknown); Frequency (for clock signals); Pulse width (for data signals); Voltage peak-peak (min. 120 mVp-p)

Graph Display
Display Modes: TIE, MTIE, TDEV, ADEV, MADEV, FDEV, RTIE, MRTIE
Number of graphs:
Up to 6 graphs of the same type can be over-laid on screen. Color coded.
Masks on screen: Up to 8 MTIE and TDEV masks according to selected test mode
Display: Color TFT, 8.4", 800x600 pixels

User Interface
Info: A built in context sensitive help function gives guidance for all manual settings.
Write Protection: Saved set-up or TIE-value array can be protected against accidental over-writing.

Input Modules
E1/T1/1PPS input module
Number of channels: 2 per module

Connector: BNC
Frequency: 1PPS/2s to 155 MHz
Impedance: 75 Ω, VSWR <2:1 or 1M Ω
Voltage Range: ±5.00 V
Sensitivity: 60 mVpp
Signal Type: Symmetrical pulse (Clock signal)
Unsymmetrical repetitive pulse (Clock signal)
HDB3-coded data (Data signal)
AMI B8ZS, B3ZS (Data signal)

External References
Frequency Reference Input (standard)
Input Frequency: 10 MHz, 5MHz or 1MHz
Voltage Range: 0.1 Vrms to 5 Vrms
Impedance: approx. 50 Ω

External 1PPS Timing Input (option)
Voltage Range: TTL in 50 Ω
Input logic levels:
low level ≤0.8 V; high level ≥2.0 V

Outputs References
Reference Frequency Output (standard)
Ref. Frequency: 10 MHz sine-wave
Output Levels: 1Vrms in 50 Ω

E1/T1 Output module (option)
Connector: *Clock:* BNC; *Data:* RJ45 Ref.
Frequency: 1.544/2.048 MHz
Output Level:
Acc. to G703:10; ±1.2 V ±10% in 75 Ω

Interfaces
USB Device port
Connector: Std USB type B
USB version: 2.0

USB Host port
Connector: Std USB type A
Max supply current: 400 mA
USB version: 2.0

Ethernet
Communication Port: RJ45
Protocol: 10/100Base-T
Other: DHCP, Embedded Webserver

WanderView SW
Operating System:
Windows 2000/XP/Vista/Windows 7
Data Transfer: TIE-values (real-time or stored values); Stored measurements; Instrument id
Calculate Functions:
MTIE, RTIE, MRTIE, TDEV, ADEV, MADEV, FDEV
Custom Mask Editor:
User defined MTIE+TDEV mask

Calibration
Principle: Closed Case Calibration with automatic adjustment of the Rubidium timebase.
Calibration Reference: Built-in GPS-receiver option; External Reference; Cs-oscillator or GPS-controlled Rubidium 10 MHz or 1-pps

Calibration Ref. Frequency: 10 MHz
Calibration Uncertainty:
$<2 \times 10^{-12}$ + Cal. Ref. Freq. Uncertainty

Internal Time Base Stability (hold-over)
Stability Versus Temperature:
20° to 26°C: $<1 \times 10^{-11}$ (typ.)
0° to 50°C: $<1 \times 10^{-10}$
Ageing Rate per:
24h: $<2 \times 10^{-12}$ (typ.); *Month:* $<5 \times 10^{-11}$
Warm-up Stability: 12 min to $<1 \times 10^{-9}$

General Specifications
Environmental Data
Temperature: *Operating:* 0°C to 50°C
Storage: -20°C to 70°C
Safety: EN 61010-1:2001, CAT II, Pollution degree 2, Measuring category I, CE CSA C22.2 No 61010-1-04, CSA approval nr 191125
EMC: EN61326 (1997) + A1 (1998), CE

Power Supply
Line Voltage: 100 to 240 Vrms ±10%, 47 Hz to 440 Hz, <60 W

Mechanical Data
The cabinet is suitable for field use, and can be operated on a bench (lying down) or on a floor (standing up). The cabinet is shock resistant, using bumpers.
Dimensions (w x h x d):
320 x 388 x 126 mm (12.6" x 15.3" x 5")
Weight: Net <5 kg (11 lb); Shipping <7 kg (15 lb)

Ordering Information
STA-61 Sync Tester/Analyzer Multi-channel synchronization tester/analyzer. Needs one or more input module options (Option 610).

Included with Instrument
Line power cord; Two 120 Ω-to-75 Ω balun transformers (BNC mounted); USB cable; Operators Manual on CD; Calibration Certificate

Built-in options
Option 610: E1/T1/1-pps input module
Option 620: External 1-pps reference input [1]
Option 625: E1/T1 clock reference output [1]
Option 635: GPS-receiver option for continuous disciplining of internal oscillator [1]

Optional Accessories
Option 27/61: Heavy Duty Hard Transport Case
Option 31/01:
SyncE-tap for 1310 nm, Single mode, LC
Option 31/02:
SyncE-tap for 850 nm, Multi-mode, LC
Option 31/09: 19" rack to hold 1, 2 or 3 SyncE-taps (opt 31/01 or opt 31/02)

[1] Contact Spectracom for availability.