Jitter/Wander Test Set

in Real-Time for SDH, SONET, PDH and T-Carrier

Trend Communications
SDH and SONET network nodes must be synchronised by a master clock to guarantee faultless operation. However, due to physical and operative reasons, the quality of synchronisation might degrade and even produce errors.

Jitter causes sampling errors and slips, and wander degrades the synchronisation signal, forcing the multiplexers to introduce pointer movements that end up producing jitter.

Trend's Victoria Jitter/Wander is a hand-held tester for detailed analysis and correction of synchronisation faults in SDH, SONET, PDH and T-Carrier networks.

Victoria Jitter/Wander is the first hand-held tester in the world with all the features needed to install and maintain SDH, SONET, PDH and T-Carrier networks, including simultaneous analysis and generation of jitter and wander.

**SDH/SONET/PDH/ T-Carrier**

- Meets the O.181 for SDH test instruments
- BER analysis in payload and in overhead bytes
- G.821, G.826, M.2100, M.2101 performance
- Trail trace in J0, J1 and J3
- Error and alarm tests
- Disruption time (APS)
- Round Trip Relay (RTD)
- Tandem Connection Monitoring (TCM) and APId tests
- SDH in G.832 frame at 34 Mbit/s
- n x 64 and n x 56 kbit/s tests at E1 and DS1 rates
- Meets the O.171 and O.172 for jitter and wander test instruments
- Jitter from 0.1 Hz up, to measure according to the ETSI standards
- Jitter and wander transfer measurement, checking the defined limits
- Programmable jitter filters
- Jitter and wander tolerance measurement with editable masks, graphical results and tables
- Offset and drift measurements verify the performance of local clocks and video transport
- Jitter and wander generation by means of arbitrary modulating signals (ETSI tests for ONP)
- Evaluating TIE, MTIE, MRTIE and TDEV in real time and without an external PC
- G.783 pointer sequences to analyse combined jitter
Synchronisation of Networks

Bad synchronisation of network clocks is the main cause of errors in digital networks.

Victoria Jitter/Wander checks these clocks for stability, frequency, drift and phase transients. The tester also looks at the capacity of the clocks to filter the signal, their behaviour when changing the reference, the performance of the signals they generate, as well as any loss of external synchronisation.
**Tolerance Measurements**

All network equipment must tolerate a minimum of jitter and wander without producing errors or alarms.

With Victoria Jitter/Wander, it's easy for you to know the limits of this tolerance, just by incrementing the phase impairment until you provoke events in the device under test.

*Setup for tolerance and transfer measurements*

- **Editable masks**
- **Network device testing with signals in line with ITU-T O.150 and O.181**
- **Mapping jitter is always present in SDH and SONET networks**
- **Analysis of all the alarms, errors and pointer movements at the input**
- **Pointer jitter is a consequence of neutralising clock differences with pointer adjustments**

**Transfer Measurements**

Transfer measurements test the filtering capacity of each network element.

Victoria generates a signal with jitter or wander at the input, and compares it to the one returned by the device under test.

**Generating Pointer Sequences**

The two main causes for jitter in multiplexers are signal mapping and pointer adjustments.

With Victoria, you can simulate these effects by generating pointer movements according to Recommendation G.783.
MTIE, MRTIE and TDEV Calculation

With Victoria Jitter/Wander, you can easily calculate MTIE, MRTIE and TDEV in real time.

The TDEV shows the spectral contents of wander and finds out how its frequency components are distributed.

The MTIE is the maximum TIE measured during a period of time, evaluating the long-term stability of a clock.

The MRTIE extracts the offset that appears in measurements performed with local reference clocks.

Signal Offset and Drift

Victoria Jitter/Wander measures the offset, drift and frequency of the signal to verify clock performance and determine the type of decoder needed to recover the video signal.

Editing Arbitrary Signals

EDISA is a PC software from Trend Communications, designed to edit jitter and wander modulating signals (sinusoidal and arbitrary) and define their frequency and amplitude parameters.

With EDISA you can create files that Victoria then uses to create arbitrary phase modulation in order to study the tolerance of network elements to phase errors.
Any Interface

is possible

<table>
<thead>
<tr>
<th>Interface</th>
<th>Bit Rate</th>
<th>Elect.</th>
<th>Opt.</th>
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</thead>
<tbody>
<tr>
<td>SDH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.832</td>
<td>34 Mbit/s</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>STM-0</td>
<td>52 Mbit/s</td>
<td>x</td>
<td>x</td>
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<tr>
<td>STM-1</td>
<td>155 Mbit/s</td>
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<tr>
<td>PDH</td>
<td></td>
<td></td>
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<tr>
<td>E1</td>
<td>2 Mbit/s</td>
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<tr>
<td>E2</td>
<td>8 Mbit/s</td>
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<tr>
<td>E3</td>
<td>34 Mbit/s</td>
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<td>E4</td>
<td>140 Mbit/s</td>
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<td>SONET</td>
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<tr>
<td>STS-1/OC-1</td>
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<td>x</td>
<td>x</td>
</tr>
<tr>
<td>STS-3c/OC-3</td>
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<td>x</td>
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<td>T-Carrier</td>
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<td>DS1</td>
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<tr>
<td>DS3</td>
<td>45 Mbit/s</td>
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<td></td>
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</table>

Victoria Jitter/Wander carries out jitter and wander measurements in all the existing interfaces for SDH, SONET, PDH and T-Carrier networks, from 1.5 up to 155 Mbit/s.

You can choose between AMI, B3ZS, B8ZS, HDB3 and CMI line codings, and optical signals are of NRZ type.

Touch&Play©
Simple structure combined with touchscreen form the most natural and efficient user interface in the market.

Dumping
All the models of Victoria include a serial port for remote control, for connecting the tester to a printer or for exporting results to a PC for spreadsheets and text processing.

Functions
The Autoconfiguration detects the whole signal structure. The Fast Scan explores the alarms and errors in synchronous tributaries. The Macros perform tests with a single keypress.

Modes
Termination mode, transparent mode, mux/demux, in and out of service.

SoftLEDs©
You can monitor up to 100 events simultaneously, with 10 tricolour LEDs labelled on the screen.

Results
Victoria displays the results in real time and stores them in high resolution.

Event trace includes time graphs, histograms and titters, as well as search, identification and quantization functions.

Jitter and wander measurements are shown in tables and graphics, with masks you can easily create and edit.
To arrange a demonstration or to obtain the latest information on the Trend Aurora Tango or any of Trend’s other test equipment, contact your nearest Trend Distributor.