Noise & Vibration
Test and Measurement Solutions
for Automotive Industries

www.oros.com
They trust OROS

John ARISTON, 32
Noise and Vibration technician,
Road test validation division.

For in-vehicle tests, I really appreciate flexibility and portability of the OROS analyzers.

1- Improve Efficiency
2- Minimize Testing Costs
3- Improve Quality

Laboratory
- Component specification
- Engine and motor R&D
- Subsystems NVH
- Sound power
- Continuously Variable Transmission (CVT)
- Vehicles structure

In-Vehicle Test
- Prototype
- Component in-vehicle integration
- Cabin noise
- Interior NVH

Production Test
- Test bench maintenance
- Components end of line
- Quality check
- Test bench integration with NVDrive
- Balancing

Acoustic and Vibration Test
- Portable and rugged systems for in-vehicle tests
- PC free operation: full signal recording for office processing and archiving
- Real-time results for direct live monitoring
- Get all data through conditioners and CAN Bus
- Flexible Connection
- Mobile Analyzer, Wi-Fi
- Distributed Configuration
- Remote Access
- Large Channel Count Systems
- Accurate
- DSP-based
- 24 Bit – 40 kHz – 140 dB
- ± 0.02 dB / ±0.02°

Optimize costs and quality
- Automate production test process
- Versatile tool box for all noise and vibration troubleshooting and diagnostics applications

Be fast and flexible
- Portable and rugged systems for in-vehicle tests
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- Real-time results for direct live monitoring
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TEAMS

SOFTWARE R&D, Acceptance, Diagnostics

Data Acquisition
- Recorder
- Time Domain Analysis

Rotating Analysis
- Synchronous Order Analysis
- Constant Band Tracking
- Reciprocating Machines Diagnostics: Engine
- Torque & Twist
- Balancing

Structural Dynamics
- FRF
- ODS (Operating Deflection Shape)
- Modal analysis

Noise Analysis
- Octave Analysis
- Sound Intensity
- Sound Power
- Sound Quality
- Air Holography
- Transfer Path Analysis
- EV HEV

TEAMWORK INSTRUMENTS from 2 to 32 channels, distributed up to 1000+

Made For the Field
- Portable
- Rugged
- Real-Time
- Multi-Channel

Multioperations
- PC Free Recorder
- Online & Post Analysis
- Multianalysis
- Handling Any Transducers

Flexible Connection
- Mobile Analyzer, Wi-Fi
- Distributed Configuration
- Remote Access
- Large Channel Count Systems

A Dedicated Team
- Dynamic and responsive Services department
- Worldwide hotline
- Global Accredited Maintenance Centers

SERVICES Anywhere Close to You

Training
- Initial
- Advanced
- Webinar

Coaching
- Software customization
- Assistance in your measurement

Testing
- Expertise in diagnostics
- Troubleshooting
- Tools for automation

Maintenance and Contracts
- Premium contracts
- Software updates
- Hardware upgrades
- Calibration

OROS Solutions
Boost your Efficiency

Based on a range of modular instruments, from 2 to 32 channels, the Teamwork technology enables to cascade or distribute the analyzers to measure up to 1000 channels. Instruments, conditioners and software licenses are exchangeable and flexible. Data are also easy to share thanks to the native technology.

In-Vehicule Test
- Prototype
- Component in-vehicle integration
- Cabin noise
- Interior NVH

Made for Your Demanding World

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- Component specification
- Engine and motor R&D
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Vehicles, Engines and Components NVH

Rotating Analysis

**Gear Analysis**
- Frequency analysis (FFT) for high frequency vibrations
- Cepstrum, kurtosis and harmonic markers
- Constant Band Tracking tracks order energy by bands in run-up/down

**Hybrid Transmission / CVT**
- Synchronous order tracking, phase reference and cross-phase tracking
- Virtual tachometers calculation for belt speed determination

Engines Analysis

- Identification of injection delay or valves faults
- Time signal, overall levels, cylinders phase alignment as well as angle-frequency representation
- Timing analysis with angular sampling

Torsional Analysis

- Frequency to voltage converter transforming a pulse train signal into a varying rotating speed value
- Instantaneous angular velocity profile versus time
- Synchronous Order Analysis (SOA) module to get order tracking profiles

Balancing

- Balance crankshafts quickly and accurately
- High speed balancing for turbochargers

Structural Dynamics

**Damping & Isolation**
- Cross spectrum, transfer functions, damping
- Bump tests
- Swept sine

**Modal & Experimental Analysis**
- Structural characteristics determination
- Shaker or impact hammer excitations
- ODS (Operating Deflection Shape), OMA (Operational Modal Analysis), EMA (Experimental Modal Analysis)

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On-Site Measurements & Applied Trainings

Experts from OROS come on-site for applied trainings. They will help you using your OROS system. They can provide assistance in your measurement. They are also able to recommend optimization in your measurement process depending on your application and field requirements.

Noise Analysis

**Sound Power**
- Sound pressure level acquisition (ISO 3744)
- Sound intensity: discrete points (ISO 9614-1) or through surface scanning (ISO 9614-2)

**Source Localization & Sound Mapping**
- Standard 1/3 octave analysis
- Sound intensity acquisition at discrete points with colored noise map and acoustic isolines
- Nearfield Acoustic Holography (NAH)

**Sound Quality**
- Psychoacoustic parameters evaluation
- Sound design with filtered playback of signals
- Jury testing

**Transfer Path Analysis**
- Experimental approach to determine the frequency transfer relationship between sources, attached structures and the passenger.
- Sources and panel contributions evaluation and ranking
- Airborne and structure-borne separation

**EV/HEV**
- Electric markers e-NVH excitations are spot right away (PWM, slotting...)
- Spatiogram a unique tool to quickly quantify the contribution of different e-NVH excitation wavenumbers to vibrations
- Sound design: listen and playback the motor noise separating and designing the various sources

**Data Acquisition**

**In-Vehicle Recording**
- Portable, rugged and easy recording system with a CAN Bus interface
- PC free recording

**Fatigue Test**
- Static, dynamic stress, fatigue
- Strain gauges, plug and play signal conditioning
OROS is a global manufacturer and solution provider of noise and vibration measurement systems.

OROS masters the latest technology of data acquisition, digital signal processing as well as user interface software.

OROS instruments are used in the major sectors of industry and research, for industrial acoustics, structural dynamics and rotating machinery applications. Hardware and software are totally designed in-house.

OROS instruments are renowned as being designed for the field but powerful enough for any lab.

Ordering Information

Find out more on the OROS offer in the range brochure.
Downloadable on www.oros.com

Specifications

<table>
<thead>
<tr>
<th>Rotating Analysis</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ORNV-SOA</td>
<td>Synchronous Order Analysis plug-in</td>
</tr>
<tr>
<td>ORNV-CBT</td>
<td>Real-time constant band tracking add-on</td>
</tr>
<tr>
<td>ORNV-FFTDiag</td>
<td>Real-time diagnostic tool set (Envelope, Cepstrum, Pk-Pk, Crest factor, shaft view) add-on</td>
</tr>
<tr>
<td>ORNV-IVC</td>
<td>Integrated Instantaneous angular Velocity converter plug-in, allows on-line and offline torsional analysis</td>
</tr>
<tr>
<td>ORNVS-ENGDO</td>
<td>EngineDiag, Reciprocating Machines Diagnostics Software Module</td>
</tr>
<tr>
<td>ORNVS-BAL</td>
<td>Balancing Solution</td>
</tr>
</tbody>
</table>

Structural Dynamics

| ORNV-FFT                                  | Real-time FFT plug-in |
| ORNVS-MOD-QOS                             | Operating Deflection Shape |
| ORNVS-MOD-MIMO                            | MIMO Modal Analysis |

Data Acquisition

| ORNV-REC                                  | Recorder |
| ORNV-TDA                                  | Real-time time domain analysis plug-in |
| OR36/8-CAN                                | CAN Bus hardware interface and software components for OR36/OR38 |
| OR36/8-PXD-8                              | 8 Strain gauges bridge conditioner XPod |
| OR36/8-XPD-D                              | 8 ch. PT100 and thermocouple conditioner for OR36 & OR38 |
| OR36/8-XPD-V                              | 3 Display analog and digital vumeter monitoring XPod |

Noise Analysis

| ORNV-OCT                                  | Real-time filter based 1/n octave plug-in |
| ORNV-Si                                   | Sound Intensity |
| ORNV-SP                                   | Sound Power |
| ORNV-SQ                                   | Sound Quality Lite: psycho-acoustics and filtered playback |
| ORNVS-QOP                                 | Sound Quality Plus |
| ORNVS-HP-PCK-D                            | Air Holography |
| ORNVS-TPA                                 | Transfer Path Analysis |

Analyzers: examples of configurations

Above software options may be added to these configurations

OR10-DAQ-8 Mobile DAQ 8 ch.
OR34-FREQ-4 OR34-4 ch. FFT analyzer
OR35-FREQ-10 OR35-10 ch. FFT analyzer
OR36-FREQ-16 OR36-16 ch. FFT analyzer
ORMP-FREQ-16 Mobi-Pack 16 ch. FFT analyzer
OR38-FREQ-32 OR38-32 ch. FFT analyzer

Specifications

<table>
<thead>
<tr>
<th>Channels count</th>
<th>2 to 1000+ channels</th>
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</table>

Inputs

<table>
<thead>
<tr>
<th>Sampling</th>
<th>2 kS/s to 102.4 kS/s - 24 bits delta sigma ADC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>Phase ±0.02° - amplitude ±0.02 dB - Dynamic &gt; 160 dB</td>
</tr>
<tr>
<td>Conditioning</td>
<td>AC/DC/CF/TEDS up to ±40 V</td>
</tr>
<tr>
<td>Auxiliaries</td>
<td>DC to 40 kHz - ±10 V range - 24 bits DACs -THD &lt; 0.002%</td>
</tr>
<tr>
<td>Ext. synch (Trigger / Tach)</td>
<td>64 x over sampled - Resolution &lt; 160 ns (0.06° @ 1 kHz) - up to 40 V</td>
</tr>
<tr>
<td>DC channels*</td>
<td>Sampling 10 Hz - 50 Hz/60 Hz rejection - reproducibility &lt;1 mV</td>
</tr>
<tr>
<td>CAN Bus</td>
<td>CAN 2.0A &amp; 2.0B - 125 kb/s to 500 Mb/s</td>
</tr>
<tr>
<td>System</td>
<td>Hard disk 64 to 512 GB SSD</td>
</tr>
<tr>
<td>Internal battery</td>
<td>up to 3h</td>
</tr>
<tr>
<td>Link to PC</td>
<td>1 Gb/s Ethernet</td>
</tr>
<tr>
<td>Weight</td>
<td>from 1.4 kg/3 lb to 10 kg/22 lb</td>
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