

Noise & Vibration

Test and Measurement Solutions

for Aerospace Industries



OROS Solutions

Enhance your Efficiency

INSTRUMENTS

Flexible Connection

- > Mobile Analyzer
- > Distributed Configuration
- > Remote Access
- > Large Channel Count Systems

Multioperations

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

Made For the Field

- > Portable
- > Rugged
- > Real-Time
- > Multi-Channel

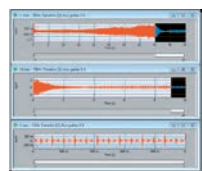
Accurate

- > DSP-based
- > 24 Bit – 40 kHz – 140 dB
- > ± 40 V input range
- > ± 0.02 dB / $\pm 0.02^\circ$



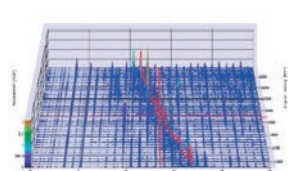
SOFTWARE R&D, Acceptance, Diagnostics

Data Acquisition



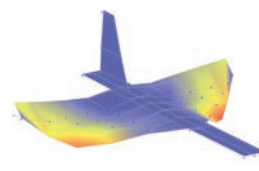
- > Recorder
- > Time Domain Analysis

Rotating Analysis



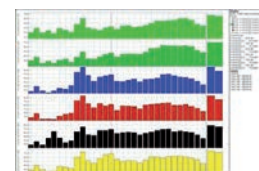
- > Synchronous Order Analysis
- > Shaft torsion
- > Balancing

Structural Dynamics



- > FFT
- > Modal analysis

Noise Analysis



- > Sound Power
- > 1/3rd octave
- > Sound Intensity

SERVICES Anywhere Close to You



Training

- > Initial
- > Advanced
- > Webinar



Renting

- > Instruments
- > Software modules

Coaching

- > Software customization
- > Assistance in your measurement
- > Expertise in diagnostics



A Dedicated Team

- > Dynamic and responsive Services department
- > Worldwide hotline
- > Global Accredited Maintenance Centers (worldwide coverage)



Maintenance and Contracts

- > Premium contracts
- > Software updates
- > Hardware upgrades
- > Calibration

Matching your Challenging Tests

Portable, Flexible and Accurate Instruments for your Environment

Laboratory measurement & analyses

- > Prototype validation
- > Sub-systems tests
- > Fatigue tests



More acquisition and analyses

- > Structural dynamics, rotating analysis and acoustics measurement from the same box
- > Cascadable, up to 500+ channels
- > Universal inputs ranging from ICP and float to strain gauges and thermocouples

In-flight data acquisition

- > Aircraft/airport qualification
- > Helicopter/fighter retrofit
- > Cabin Noise
- > Engine tests

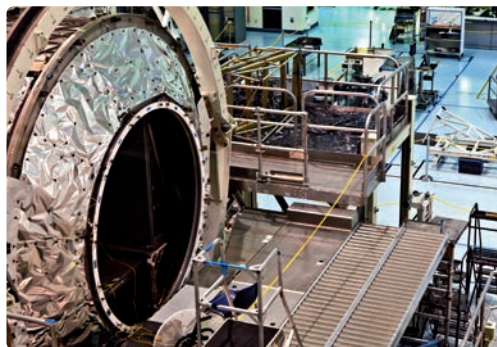


Get accurate and secured data whatever the conditions

- > Light, rugged and real-time instruments
- > Simultaneous recording, monitoring and analyses
- > PC free operations with on board front-panel
- > Removable hard drive (SSD)
- > Wireless capable, battery powered
- > Shock, vibration and temperature reinforced
- > IRIG, GPS
- > Distributed up to 128 channels

Test center & Transportation

- > Satellite & parts tests
- > Rockets & jet engine test cells
- > Satellite & antenna transportation survey



Rack, stand alone or distributed

- > Large channel count solution up to 500+ channels
- > Thermocouples/RTDs and strain gauges integrated conditioners
- > ICP, 200V polarized, float/AC/DC/TEDS inputs
- > Stand alone long duration recording with auto power management
- > Easy integration with our complete control/command tool kit (NVDrive)
- > Wide range of export formats (Mat, ASAM, UFF, Txt, SDF, Wav...)



They trust OROS

- > "My team's job is to provide reliable and accurate data from various aircraft and conditions. The OROS Teamwork instruments serve our tests and analysis needs perfectly. Their exchangeable conditioners & disks, cascable units and flexible software licensing make our every day job simpler and faster."

Adam IRVINE, 39

Vibration Program Manager, Rotor & Fixed Wing / In-flight Test Center.

Noise and Vibration Tests for you



Rotating Analysis



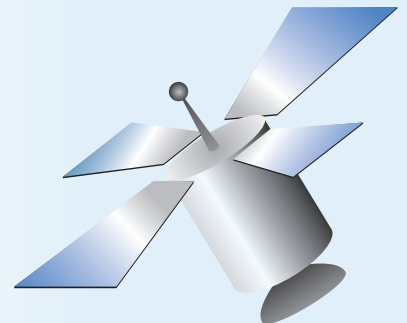
Jet & Rocket Engines Test

Propulsion safety is critical for the aero industry. **The OROS analyzers record raw data** and display the information you need for proper jet engine test. Thanks to the **Synchronous Order Analysis**, they compute the orders of jet engines during hours of tests required by the **propulsion tests centers** or flight/taxi tests. The **integrated conditioners** offer a wide range of transducer interface (ICP, Float, ± 40 V, Strain gauges, Thermocouples, PT100, Oversampled tachs). With the data and control/command tool kit (NVDrive[®]) the analyzer is **easy to integrate in the test benches**.



Helicopter Transmissions

Multi-shaft order analysis provides **synchronous order extraction** from the rotor and the turbine. Vibrations related to **gears** are extracted with the **FFT-Diagnostics tool**. **Absolute and relative torsional motions** are acquired and analyzed with the **integrated high speed torsional inputs**.

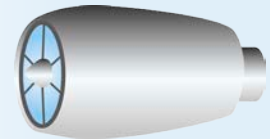


Data Acquisition



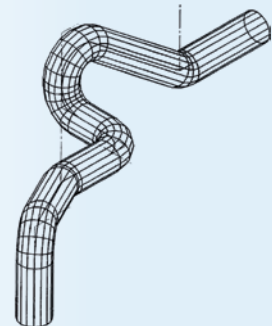
In-Flight Recording

The different components installed in a aircraft are tested in-flight to validate their integration. It requires a **portable, rugged and easy recording system**. **PC free recording** is especially very useful for the toughest conditions (direct recording, distributed systems)



Fatigue Test

The XPod plug and play bridge conditioner measures dynamic **strain** and temperatures for life duration analysis of critical parts such as the **aircraft body, engine blades or wings fixtures**. The **removable conditioner** can remain connected to the strain/thermocouples, reducing cabling time.



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.



ur Aerospace Applications

Aircraft - Helicopter

- > Fighter
- > Commercial
- > Rescue
- > Simulator

Satellite - Defense

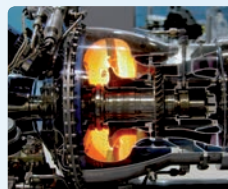
- > Drone
- > Radar / Antenna
- > Spacecraft
- > Rocket

Aero Engines

- > Jet
- > Turbines
- > Turbo propellers

Sub-systems

- > Air conditioning
- > Coupling parts
- > Transmission
- > Power Generation



Structural Dynamics



Modal Analysis

Modal Analysis is one of the key steps when testing **component prototypes**: it determines their structural characteristics and so, defines how they react to operating excitations. **Shaker or impact hammer** excitations can be used to capture the experimental datasets: the final stage is the actual **OROS Modal analysis**.



Structures Test

Spacecraft structures are checked with the large **channel distributed systems** (VibeMaster). It measures simultaneously **up to 500+ channels** for one shot tests. From **shaker or loudspeaker** excitation the **FFT, 1/n Octave and swept-sine** offer real-time monitoring and provide immediate results and raw data making the test conclusions faster.



Noise Analysis



Cabin Noise

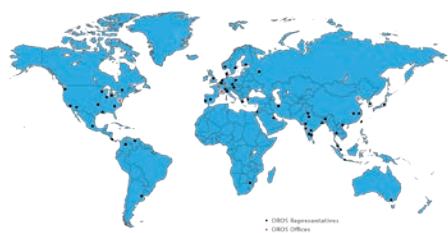
Distributed systems allow recording **hundreds of microphones** located in aircraft passenger cabin, like identifying HVAC noises. Thanks to the swappable Mobi-Disks, the next test can be launched immediately. **The real-time acoustic computation** (Leq, **1/n Octave**) monitors the measurements quality, while the **recorder** provides secured data. Locations with restricted area can be controlled wireless.



Jet Engine Sound Power

The OROS Sound Power software module simultaneously acquires up to **21 microphone's locations signals**, reducing dramatically the measurement time of aircraft and helicopter **jet engines**. With a **Class 1 type results**, it fulfills acoustics **test benches requirements**. OROS Sound Power offers a **repeatable and standards compliant** solution for testing noise emitted by aircraft sub-systems such as air conditioning, fans and electric motors.

Ordering Information



OROS is a global manufacturer and solution provider of noise and vibration measurement systems.

OROS designs and manufactures noise and vibration signal analyzers, dedicated solutions and offers related services. It 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.

Now approaching 30-years in business, OROS instruments are renowned as being designed for the field but powerful enough for any lab.



Find out more on the OROS offer in the Range brochure.

Downloadable on www.oros.com

Instruments

Examples of configurations

OR35-FREQ-8	8 ch 20 kHz real-time frequency analyzer, universal inputs
OR36-FREQ-16	16 ch 20 kHz real-time frequency analyzer, universal inputs
OR38-FREQ-32	32 ch 20 kHz real-time frequency analyzer, universal inputs
ORMP-REC-16	Mobi-Pack™-16 Ch. 40 kHz recorder, 60 GB removable HDD
OR38-REC-24	40 kHz recorder, 60 GB removable HDD, PC or PC free operations

Inputs Conditioners

OR36/8-XPOD-B	8 ch. strain gauge bridge conditioner for OR36 & OR38
OR36/8-XPOD-T	8 ch. PT100 and thermocouple conditioner for OR36 & OR38
OR36/8-XPOD-V	3 Display analog and digital vumeter monitoring XPod

Data Acquisition

ORNV-TDA	Time Domain analysis plug-in
ORNV-FFT	Real-Time FFT analysis plug-in

Rotating Analysis Software Modules

ORNV-SOA	Real-time synchronous order analysis plug-in
ORNV-IVC	Instantaneous angular velocity converter for torsion acquisition
ORNVS-BAL	Single Dual Plane Balancing module
ORNVS-BAL-MP	Multiplane Balancing module

Structural Dynamics Software Modules

ORNVS-MOD330	ODS + EMA SIMO
ORNVS-MOD350	ODS + EMA SIMO + EMA MIMO
ORNVS-MOD380	ODS + EMA SIMO + EMA MIMO + OMA

Noise Analysis Software Modules

ORNV-OCT	real-time filter based 1/n Octave analysis plug-in
ORNV-SI	Sound Intensity

Specifications

Channels count	2 to hundreds of channels
Universal Inputs	
Sampling	2 kS/s to 102.4 kS/s - 24 bits synchronous sampling
Accuracy	Phase $\pm 0.02^\circ$ - amplitude ± 0.02 dB - Dynamic > 140 dB
Conditioning	AC/DC/ICP/Float/TEDS, ± 100 mV to ± 40 V
Parametric channels	10 S/s - 50 Hz/60 Hz rejection - reproducibility < 1 mV
Optional conditioners	Thermocouples, PT100, Wheatstone bridge (strain, force and pressure)
Analysis	
Spectral (FFT)	25601 lines, FRFs, time or spectral averaging
Acoustics (OCT)	1 to 1/24th octave, filter based, A,C, etc weighting, fast/slow/impulse
Time fomain (TDA)	300 ms to 110 hours time view, DC/RMS/Pk/Pk-Crest-factor/kurtosis
Sync Order (SOA)	1/32 to 1 order res., up to order 800, Phase/amplitude, 8 tracked order/ch
System	
Hard disk	128 to 512 GB SSD
Internal battery	up to 2h
Link to PC	1 Gb/s Ethernet
Weight	from 1.4 kg/3 lb to 10 kg/22 lb