ONO SOKKI

New integrated OS series with enhanced functions!

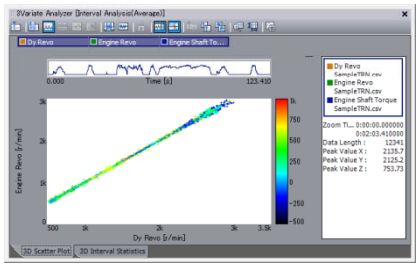
Optional functions

The OS-2000 Series features the ability to edit, process and analyze long time-series data that cannot be handled by spread sheet software. In addition to the basic standard functions provided*, we offer a variety of optional software. You can perform differential and integral calculus processing of recorded data and other complicated data processing and analysis, including reproduction and filtering of recorded sounds and analysis of fluctuating sounds.

* Please refer to the OS-2000 Series brochure for the functions provided as standard.

● OS-0251 Statistical Analysis

- Standard statistical analysis : Histogram, auto correlation, normal probability plot
- 2 variate analysis : Scatter plot and regression analysis, Lissajous, cross correlation, stereogram, interval statistics
- 3 variate analysis : 3D scatter plot, 3D interval statistics
- Frequency analysis : Peak method, maximum value method, minimum value method, amplitude method, rain flow method, extreme minimal value method



3D scatter plot

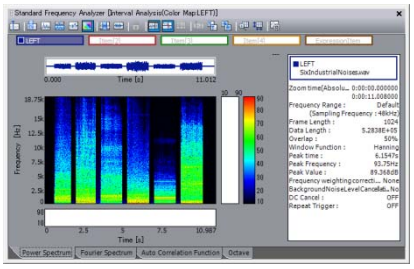
● OS-0252 FFT Analysis

Capable of standard frequency analysis and cross frequency analysis up to 32 channels. The time trend, color map function and video file (AVI) output for FFT allow progress over time to be easily checked. Various calculation functions enable power addition of 3-axis data for use in vector calculation of magnetic field evaluation measurements.

Standard frequency analysis : Power spectrum, Fourier spectrum, phase spectrum, auto correlation, bound octave analysis

Cross frequency analysis : Frequency response, inter-channel phase spectrum, cross spectrum, coherence, cross correlation, impulse response

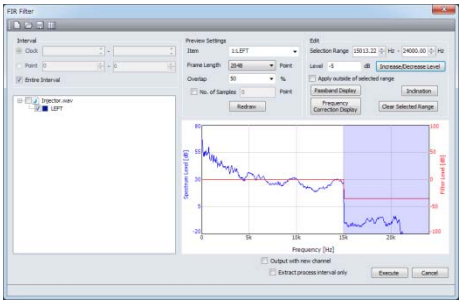
- Window function : Rectangular, Hanning, Hamming, flat-top, Blackman-Harris, exponential, force
- The number of lines : 50 to 25,600
- Frequency weighting correction : A, B, C, Custom
- Calculus : 1 differential/integral, 2 differential/integral
- Average : Arithmetic mean, peak hold
- Density : OFF/PSD/ESD



Power spectrum (color map)

● OS-0253 FIR Filter

FIR filtering : Filtering for increased/decreased levels, taper and acoustic characteristics can be performed on specified channels and ranges.

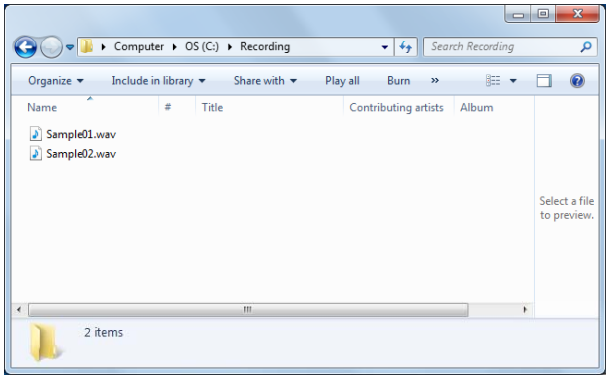


● OS-0254 Continuous Automatic Analysis

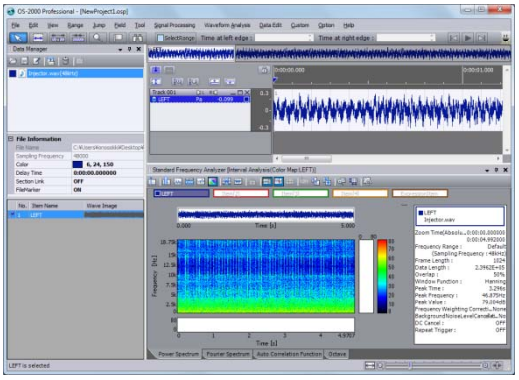
Automatically analyzes*1 multiple data files*2 and saves the resultant graphs in specified formats*3. By performing an FFT analysis or other tasks on one data file and saving the task as a template, the same process as the settings in the template can be automatically performed and the results can be saved in a graphic or text format. This function is useful when you want to analyze a large number of time-series data files in a batch.

*1: Only FFT analysis (power spectrum) and octave analysis (1/1 and 1/3) are supported.
*2: Up to 100 files can be processed at a time. Only ORF and WAV formats are supported.
*3: Graphic format (.bmp) and text format (.csv) are supported.

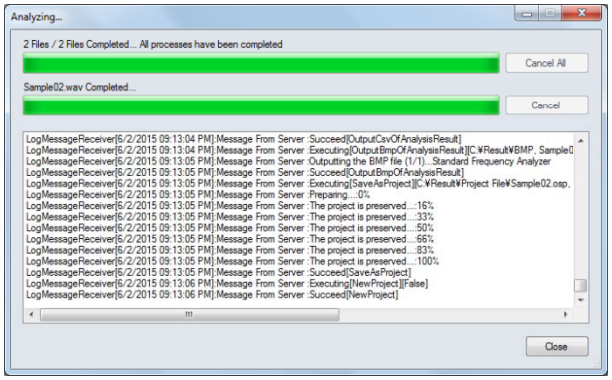
◆ Example of continuous automatic analysis



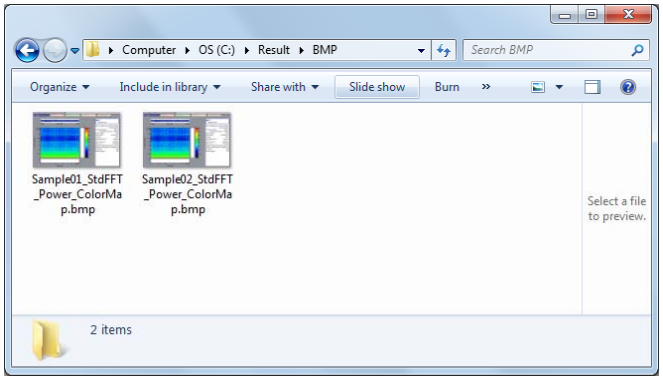
1. Check recorded files



2. Prepare template for analysis



3. Perform continuous automatic analysis



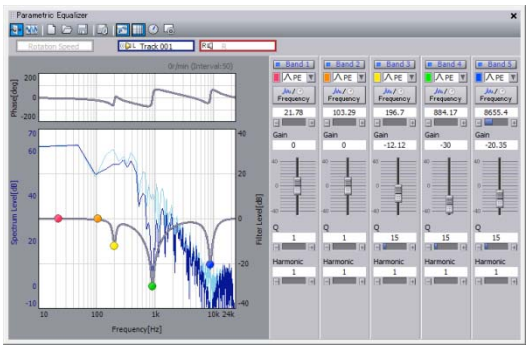
4. Confirm analysis results

● OS-0261 IIR Filter

By listening to a sound whose characteristic quantities (frequency and order components) have been increased or decreased after extracting them through various analyses, the validity of analysis results can be checked. Filter designs can be specified by frequency and order. It is also possible to listen to sounds processed with a mixture of filters (available on the parametric equalizer only).

Parametric equalizer:
The user can design up to 5 filters, and then listen to the filtered sound by replaying the recorded sound.

- Filter type : HPF, LPF, BPF, BRF (band reject filter), PE (parametric equalizer: filter for increase/decrease of specified gain)
- Harmonic filtering function : Up to 10th order of frequency components can be increased or decreased in conjunction with the fundamental frequency.



Parametric equalizer

Graphic equalizer:
Allows sound levels to be increased or decreased for every 1/3 octave. The adjusted sound can be heard in real time.

● OS-0263 Time Frequency Analysis

Time frequency analysis of the transient phenomena can be performed using short-time Fourier transform, wavelet transform and Wigner distribution.
Calculation speed of wavelet transform gets faster* when the PC you use has multi-core CPU or GPU.

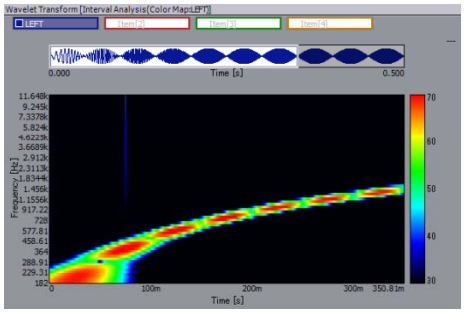
* Only in wavelet transform.

Short-time Fourier transform

Fourier transform can be executed at any point (frame length and spacing) specified by the user. This method allows the user to set the sampling time length, which is useful when observing changes in a spectrum in a very short period of time.

Wavelet transform

Wavelet transform is an analysis method that enables the simultaneous analysis of temporal fluctuation and spatial transition of sudden or unsteady sound and vibration and other complicated waveforms. This method changes the analyzing time according to the frequency. Since time and frequency are well balanced, this method is suitable for checking the overall result of analysis.



Wavelet transform

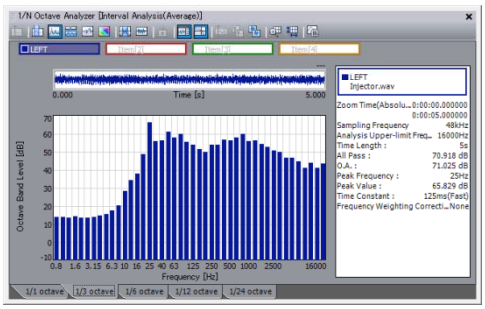
Wigner distribution

Wigner distribution offers the highest time and frequency resolutions, making it possible to capture the characteristics of transient signals more efficiently than with conventional methods. However, negative energy and cross terms appear in many cases, and interpreting them requires expertise.

● OS-0264 1/N Octave Analysis

This function enables 1/1, 1/3, 1/6, 1/12, and 1/24 octave analyses that are used in sound and vibration analysis.

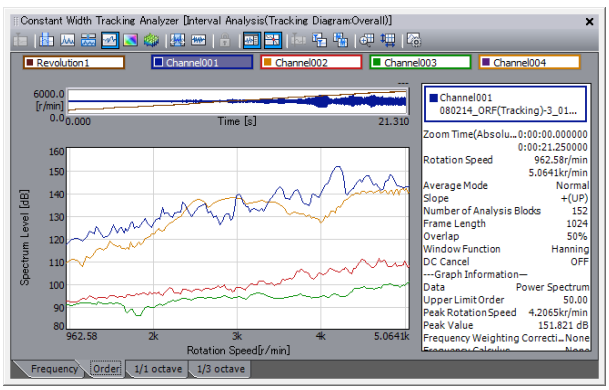
- ・Time constant : 10 ms/35 ms/125 ms（fast）/630 ms/1 s（slow）/8 s/10 s/impulse
- ・Frequency weighting correction : A, B, C, G, Vv, Vh, V hand, custom
- ・Hour rate : 5 %, 10 %, 50 %, 90 %, 95 %
- ・Overall, All pass, Peak display



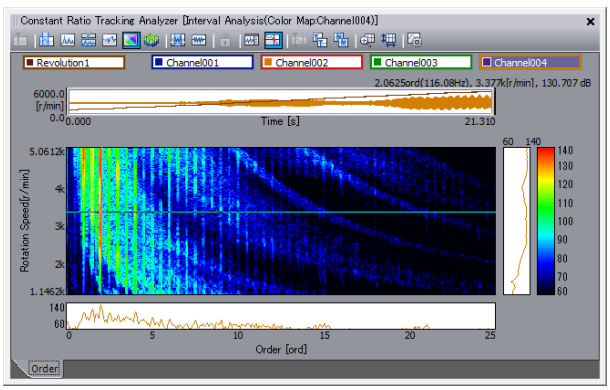
1/3 octave analysis

● OS-0265 Tracking Analysis

Allows analyses of constant-width tracking (i.e., frequency resolution is not dependent on rotation speed) and constant-ratio tracking (i.e., order resolution is not dependent on rotation speed). In either analysis, tracking diagrams can be produced by overlaying up to 4 signals.
・Various search cursors are provided, including those for frequency, order, harmonic, band and side band.
・Orders and frequencies can be displayed together on tracking diagrams.



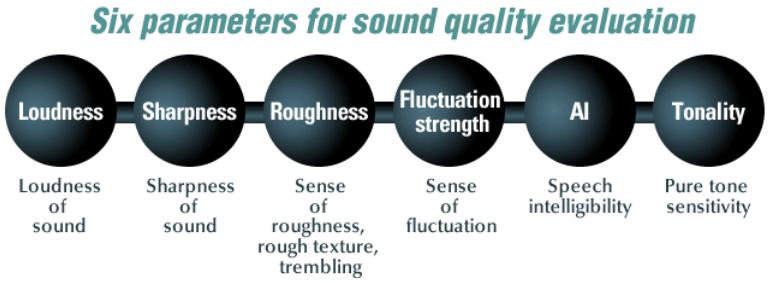
Tracking diagram



Color map (constant-ratio tracking)

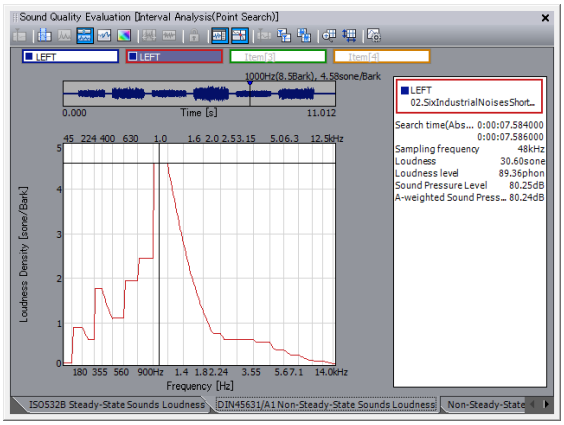
● OS-0271 Sound Quality Evaluation

It is difficult to quantify pleasant or unpleasant sounds, that is, how individuals feel when they hear a sound. The sound quality evaluation analysis quantifies human feelings based on 6 evaluation parameters including loudness, sharpness and roughness.
By using these evaluation parameters as indexes, a quantitative decision can be made when taking measures to eliminate unpleasant sounds. This approach helps identify and eliminate the cause or take effective measures such as changing the sound quality to a pleasant sound.
This function also supports ISO532B (loudness of stationary sound) and DIN45631/A1 (loudness of non-stationary sound).

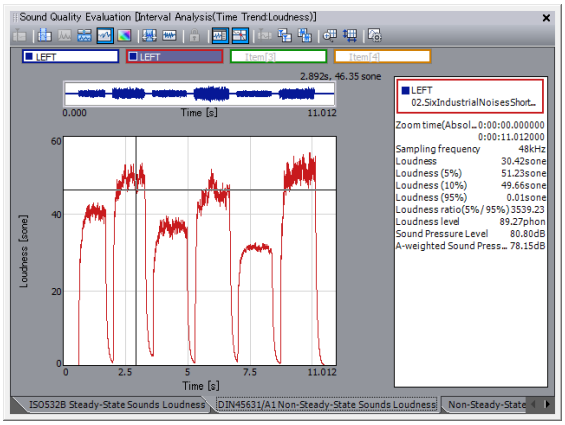


What is loudness?
Loudness refers to the amount of sensation (total amount of excitation of the auditory nerves) that is felt subjectively by individuals. The loudness of a pure tone of 1 kHz and 40 dB is defined as 1, and the loudness of other sounds is expressed as multiples of this. The unit is sone.

System configuration



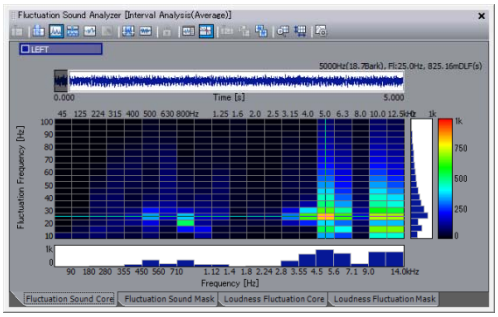
Loudness density



Time trend

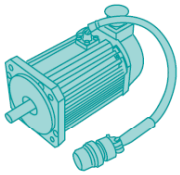
● OS-0272 Fluctuation Sound Analysis

The fluctuating sound analysis represents low chattering or clacking sounds that are difficult to detect by FFT but are annoying to people. It uses 2 axes (frequency and fluctuating frequency) for clear representation of components that greatly fluctuate over time.

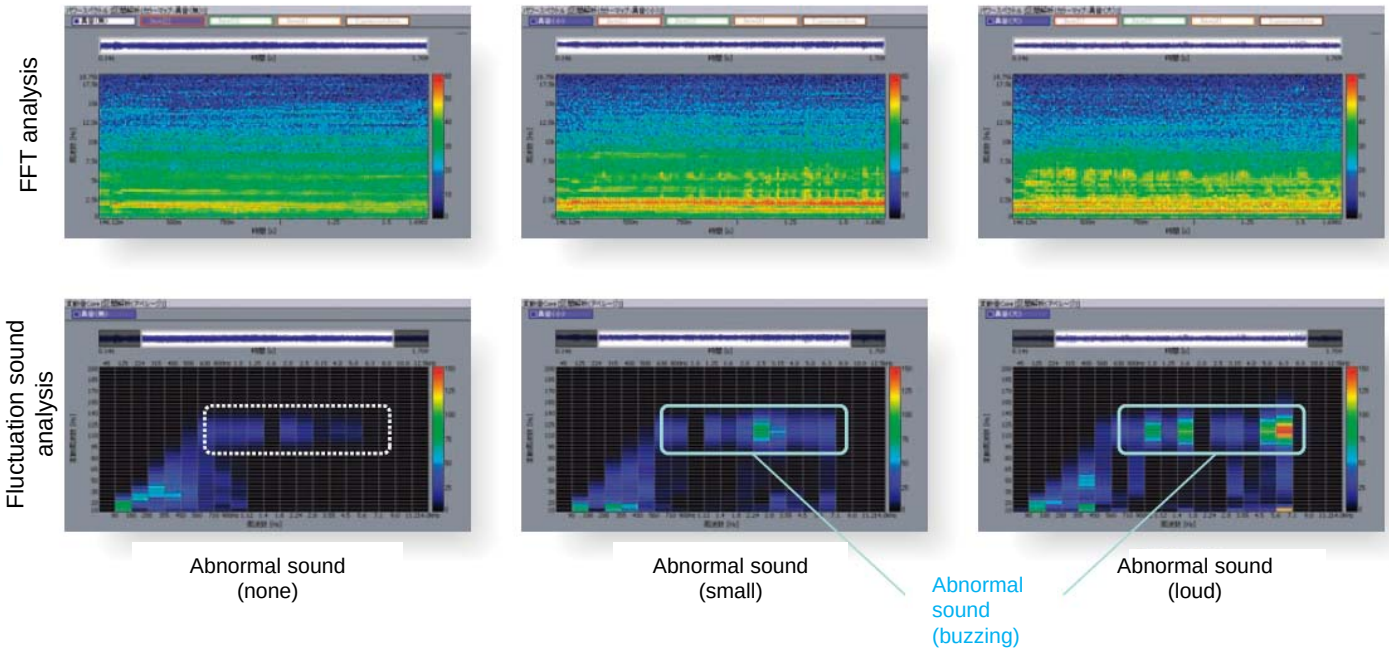


◆ Analysis example

FFT analysis cannot make a correct pass/reject judgment on different operating sounds including abnormal sound (none), abnormal sound (small) and abnormal sound (loud). Since these abnormal sounds are fluctuating components, the fluctuating sound analysis method can clearly express their characteristic quantities for each level.

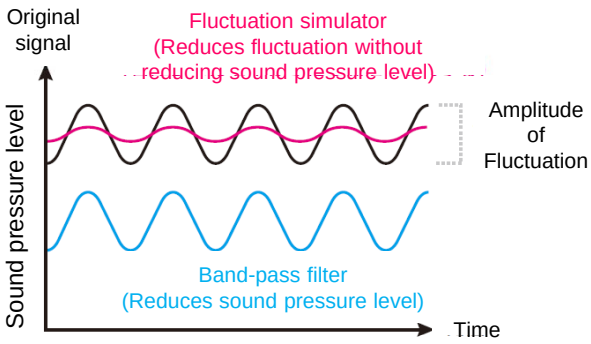


Abnormal sound (buzzing) judgment of a small motor



● OS-0273 Fluctuation Sound Simulator

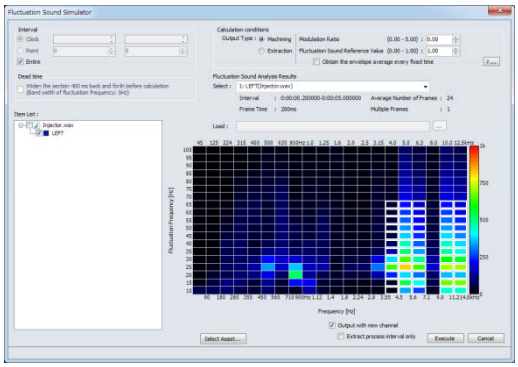
This function allows simulation of a sound whose time fluctuation components identified by the fluctuating sound analysis have been removed or enhanced. It is also possible to create sound source files by extracting a certain fluctuation from original sounds. Unlike ordinary band-pass filters that increase or decrease the sound pressure level in specified bands, this filter is intended to increase or reduce only fluctuation components while minimizing changes in the sound pressure level.



Output type (generation of time waveform)

Processing : Outputs sounds whose fluctuation components in a selected range have been removed or enhanced. Original sounds are output in unselected ranges.

Extraction : Outputs sounds of only fluctuation components that have been removed or enhanced in a specified range. Sounds in unselected ranges are not included.



● OS-0281 Video Playback

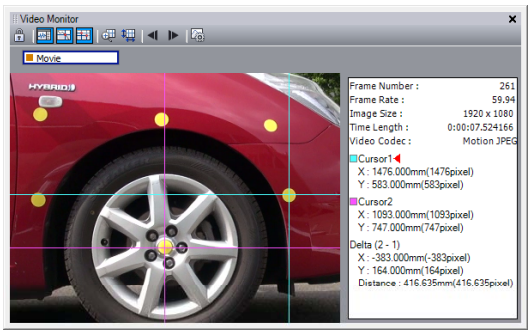
Videos recorded during measurement using a home video camera can be loaded into the OS-2000 and replayed together with analysis results of sound or vibration.*1, *2
This function is useful for checking on video various phenomena during measurement that are difficult to see on analysis graphs.

*1: Additional video conversion software may be required depending on the video file format.
*2: Some AVI and WMV formats are not supported.

System configuration

Display of distance between 2 points : Distances and displacements in images can be checked using 2 search cursors.

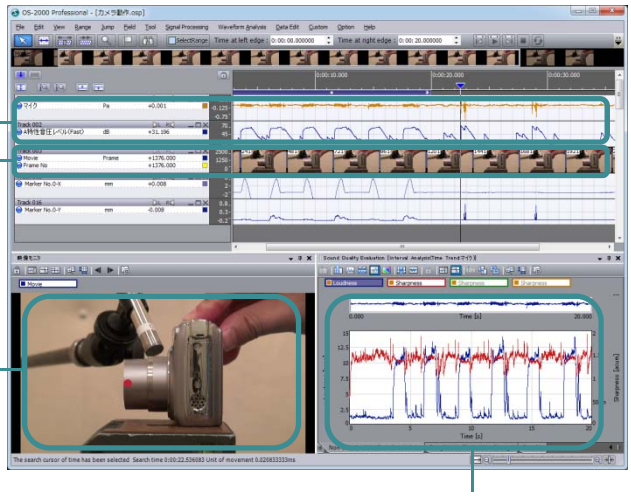
Brightness and contrast adjustment : Dark images due to insufficient lighting during recording can be made brighter for enhanced clarity.



◆ Analysis example

Analysis of operating sound of compact digital camera

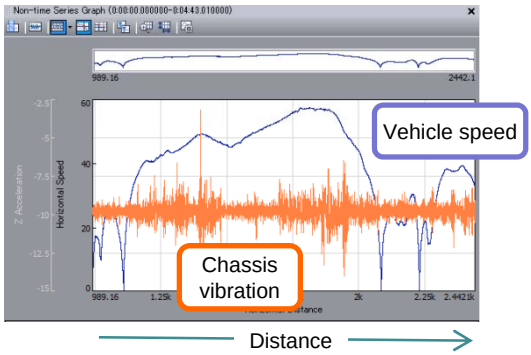
By recording with a video camera and microphone the movement of the optical tube when the zoom button is pressed, the video and sound quality evaluation analysis results can be seen together on the same screen. Thus, the sound quality, etc. when the tube extends can be quantitatively evaluated.



Sound quality evaluation analysis (loudness, sharpness)

● OS-0291 Non-time Series Graph

The horizontal axis of a graph can be assigned to a parameter other than time. This makes it possible to graph, for example, chassis vibration or vehicle speed with respect to each travel distance of a vehicle.



Specifications

■ OS-2000 Series ver.2.7

Item	Specifications		OS-2500 Basic	OS-2600 Standard	OS-2700 Professional
Basic function	Waveform editing functions		●		
	Numerical data display and editing functions		●		
	Search cursor function		● (Delta display supported)		
	Marker function		● (Automatic marker placement function)		
	Sound playback function *1		● (Repeat available)		
	Search function		● (Logic settings supported and high and low values / level trigger / range trigger / difference values for each condition)		
	Merging / combining sections		●		
	Printing function		●		
Display	Number of tracks		Up to 1024 tracks		
	Number of display items		Up to 10 items for each track		
Sampling frequency			0.01 Hz to 20 MHz		
Data import	Number of files		Up to 10 files		
	Number of channels		Up to 1024 channels		
	Number of data points		Up to 500 million data points (number of files x number of records x number of channels)		
	File format		ASCII(*.txt, *.csv) *2 / WAVE(*.wav) *3 / Video file(*.avi, *wmv) *4,5,6 / Excel(*.xls, *.xlsx) *7 / DS/CF(*.dat, *.rcd) *8 / ORF(*.orf) / AU-4100A(*.inf) / VARTS-II(*.dat) / FAMS(*.thd, *.lhd, *.fhd) / KY-1000(*.trn, *.frz, *.ave, *.log, *.txt) / MCU(*.mat) / WS-5160(*.s01, *.s02) / TEAC Corporation TAFFmat(*.hdr) *9 / TEAC Corporation AQ-VU(*.aqv) *10 / HIOKI E.E. Corporation MEMORY HiCODER(*.mem) *11 / Meidensha MEIDACS(*.meid) *12 / Yokogawa Electric Corporation WVF/WDF(*.wvf, *.wdf) *13		
Data export	File format		CSV(*.csv) / WAVE(*.wav) / UFF(*.uff) *14 / ORF(*.orf) / AVI(*.avi) / MDF(*.mf4) *15		
Data editing	Channel setting / Signal type setting		●	●	●
	Combine file generation tool / File merge tool / Waveform generator tool		–	–	●
Signal processing function	Simple calculation / Moving average / Event counter / Effective value calculation		●	●	●
	Search value extraction / Time axis calculus / Level adjustment / F/V converter		–	●	●
	Inter-channel calculation / Resampling		–	●	●
	Hilbert transform / Taper processing		–	–	●
	Fluctuation sound simulator	OS-0273	○	○	○
	FIR filter	OS-0253	○	○	○
	IIR filter	OS-0261	○	○	○
Custom	Graphic equalizer	OS-0261	○	○	○
	Parametric equalizer	OS-0261	○	○	○
	Statistical processing (interval) / Synchronizer / DR-7100 recording condition setting / Meter / Signal calibration		●	●	●
	Playback (Absolute sound pressure) *16 / Recording *16		–	–	●
	Continuous automatic analysis *17	OS-0254	○	○	○
	Video playback	OS-0281	○	○	○
	Non-time series graph	OS-0291	○	○	○
Waveform analysis	Standard statistical analysis	OS-0251	○	○	○
	2 variate analysis / 3 variate analysis	OS-0251	○	○	○
	Frequency analysis	OS-0251	○	○	○
	Standard frequency analysis	OS-0252	○	○	○
	Standard frequency analysis EX	OS-0252	○	○	○
	Cross frequency analysis	OS-0252	○	○	○
	Cross frequency analysis EX	OS-0252	○	○	○
	Time frequency analysis	OS-0263	○	○	○
	1/N octave analysis	OS-0264	○	○	○
	Constant-width tracking analysis	OS-0265	○	○	○
	Constant-ratio tracking analysis	OS-0265	○	○	○
	Sound quality evaluation	OS-0271	○	○	○
	Speech intelligibility analysis	OS-0271	○	○	○
	Fluctuation sound analysis	OS-0272	○	○	○

●: Provided as standard / ○: Optionally provided / –: Not provided

*1: The cycle accuracy differs depending on any of the following: operating environment, processing conditions, and sampling frequency.
*2: Comma-delimited and tab-delimited values can be read.
*3: Limited to Microsoft Windows® -standard RIFF-format PCM sound data (uncompressed).
*4: Up to four screen simultaneous playback is available. However, the number of available playback screens relies on the image size or frame rate.
*5: Available video formats are avi and wmv. Not these formats are available for all models. Available frame rate is up to 10000 fps.
*6: The optional video conversion software is required depending on the format of the video file.

*7: In order to handle Microsoft® Excel workbooks, Microsoft® Excel 2003 or later (sold separately) must be installed on the same PC. Furthermore, in order to handle Microsoft® Excel workbooks with the xlsx extension, Microsoft® Excel 2007 or later (sold separately) must be installed on the same PC.
*8: Limited to internal sampling data.
*9: [DR-C, DR-F/M, DS] Series, GX-1, LX-10/20, LX-110/120, WX-7000 series. For supported models, refer to the website, etc. before purchasing.
*10: The image size is as same as the image which is output from the AQ-VU viewer software.
*11: MR8880, MR8875, MR8847-01/-02/-03, 8870, 8861-50/8860-50, 8861/8860, 8855, 8847, 8842/8841, 8835-01, 8826, 8808/8807. For supported models, refer to the website, etc. before purchasing.
*12: Supports high-speed measurement and continuous measurement data files measured with Meidensha MEIDACS-DY (6100P, 6200P, 6300P, 6400P, 6500P, 6600P) series ver. 3.0 or later. (Note: Average measurement data files cannot be read.)
*13: DL750/850/850E/9000/7400/1700/1700E/1600 series, WE7000, SL1400, SL1000, DLM2000, DLM4000. For supported models, refer to the website, etc. before purchasing. (Note: Target data for the SL1000 is to be trigger measurement data only.)
*14: Supports only Universal File Format dataset 58 time-series data.
*15: Measurement data format version 4.0. is supported.
*16: Supported with the Recording function OSRECO (OSRECO.exe).
*17: The OS-0252 FFT Analysis (option) and the OS-0264 1/N Octave Analysis (option) are required when the use of continuous automatic analysis.

Product Lineup

■ OS-2000 Series ver.2.7

・Please refer to the OS-2000 Series brochure for the functions provided as standard.

Type	Model name	Overview
Basic	OS-2500	This is the basic version, equipped with the Event counter, Search function, Effective value calculation, and other essential capabilities.
Standard	OS-2600	This is the standard version which is equipped with enhanced features of Inter-channel calculation, Search value extraction, and F/V functions added to the Basic version.
Professional	OS-2700	This is the professional version, equipped with numerous advanced functions in addition to those in the Standard version, including File merge, Waveform generation tool, Hilbert transform, and Recording functions.

■ OS-2000 Series ver.2.7 Option & Package

		Package (based on OS-2700)				Page
Type	Model name	**OS-2710** Package for Engine Bench Test	**OS-2720** Package for FFT Analysis	**OS-2740** Sound Quality Evaluation Package	**OS-2760** Fluctuation Sound Analysis Package	
Statistical Analysis	OS-0251	●	○	●	●	1
FFT Analysis	OS-0252	○	●	●	●	1
FIR Filter	OS-0253	●	●	●	●	1
Continuous Automatic Analysis	OS-0254	○	○	○	○	2
IIR Filter	OS-0261	○	○	●	●	2
Time Frequency Analysis	OS-0263	○	○	○	○	3
1/N Octave Analysis	OS-0264	○	○	●	●	3
Tracking Analysis	OS-0265	○	○	○	○	3
Sound Quality Evaluation	OS-0271	○	○	●	●	4
Fluctuation Sound Analysis	OS-0272	○	○	○	●	4
Fluctuation Sound Simulator	OS-0273	○	○	○	●	5
Video Playback	OS-0281	○	○	○	○	6
Non-time Series Graph	OS-0291	○	○	○	○	6
●: Provided as standard / ○: Optionally provided						

Operating Environments

Item	Specifications	Remarks
OS	Microsoft Windows® 7 (running as a 32-bit application in 64-bit version)	.Net Framework 3.5 Service Pack 1 must be installed.
CPU	Intel® Pentium® 4, 2 GHz or greater	Intel® Core™ processor or higher recommended
Memory	2 GB or greater	–
Hard disk	1 GB or more	–
Display	Capable of display at resolution of 1024 × 768 or above	1280 × 1024 or above recommended
Direct X	Direct X 9.0c or later (when the use of the OS-0281)	–

・CPU, memory, and hard disk requirements differ depending on factors such as the operating environment, size of data to be processed, and video files to be played.
・Optical drive capable of reading DVD-R and CD-R is required for installation and update.
・Installation of this product in a shared folder is prohibited.

ONO SOKKI

WORLDWIDE ONO SOKKI CO., LTD.
1-16-1 Hakusan, Midori-ku, Yokohama, 226-8507, Japan
Phone : +81-45-935-3918 Fax : +81-45-930-1808
E-mail : overseas@onosokki.co.jp

URL: http://www.onosokki.co.jp/English/english.htm

U.S.A.
Ono Sokki Technology Inc.
2171 Executive Drive, Suite 400
Addison, IL. 60101, U.S.A.
Phone : +1-630-627-9700
Fax : +1-630-627-0004
E-mail : info@onosokki.net
http://www.onosokki.net

THAILAND
Ono Sokki (Thailand) Co., Ltd.
1/293-4 Moo.9 T.Bangphud
A.Pakkred
Nonthaburi 11120, Thailand
Phone : +66-2-584-6735
FAX : +66-2-584-6740
E-mail : sales@onosokki.co.th

INDIA
Ono Sokki India Private Ltd.
Unit No.4B,Ground Floor, Tower-A, Spazedge,
Sector 47, Gurgaon-Sohna Expressway,
Gurgaon, Haryana-122002, INDIA
Phone : +91-124-421-1807
Fax : +91-124-421-1809
E-mail : osid@onosokki.co.in

P.R.CHINA
Ono Sokki Shanghai Technology Co., Ltd.
Room 506, No.47 Zhengyi Road, Yangpu
District, Shanghai, 200433, P.R.C.
Phone : +86-21-6503-2656
Fax : +86-21-6506-0327
E-mail : admin@shonosokki.com

20150710-01e