Soundbook™

The 2nd generation of our Soundbook acoustics analyzer - now based on the new 24 bit Apollo™ hardware platform

- Sound level measurement
- Frequency analysis
- Signal recording
- Human vibration measurement
- Pass-by noise measurement
- Building acoustics
- Machine vibration measurement
- Modal analysis
- Order tracking analysis
- Operational vibration analysis

SINUS
Messtechnik GmbH

Soundbook_MK2

2nd generation of our Soundbook universal acoustic measuring system:
Class 1 sound level meter conforming to IEC standards, multi-channel real-time analyzer and personal computer suited for field applications

Soundbook™, our universal portable measuring system for acoustic, vibration and engineering measurements in general, is now available in its 2nd generation on the basis of the innovative **Apollo™** platform.

The powerful 24-bit A/D converters in combination with the innovative Apollo filter processors provide many channels with high precision and bandwidth. Naturally, Soundbook_MK2 also uses the robust Panasonic Toughbook CF-19 as its basis.

The Soundbook allows you to work practically everywhere - in the office as well as outdoors. Neither heat, cold, rain, dust nor heavy mechanical shocks have an impact on the device. Having a weight of only 3 kilograms, a robust magnesium alloy exterior, a convertible bright TFT display, a moderate power consumption and many interfaces, the Soundbook unites the performance of a high-quality measuring device with the possibilities of a PC. According to your demands you may choose from variants with 2, 4 or 8 measuring channels and with LEMO7 or BNC input connectors. The Soundbook is particularly suitable for:

- Industrial safety and environmental protection
- Engineering services
- Quality assurance
- Research and development.

Our **SAMURAI™ 2.0** software package includes sound level meters (SLM) according to IEC 61672-1 and third-octave analyzers according to IEC 61260, with 2, 4 or 8 channels. The PTB certification of the system has been applied for.

SAMURAI 2.0 provides an even better intuitive user interface and allows **multi-analysis both in real-time and as post-processing**. Saving and loading of created setups, optimized working modes, a convenient transducer database with sensor calibration, as well as data export and import (including time signals from other devices for post-processing) offer a comfortable user experience. The **Easy Operator Mode** allows to create setups with restricted features for less experienced users, in order to avoid operator errors in field measurements. The **REPLAY Mode** allows stored measurements to be replayed at various speeds.

The measured values are displayed independently from the data acquisition and storage in **up to 16 windowpanes**. The display settings may be adjusted before, during and after the measurement. A wide range of auxiliary channels allow for external triggering, the additional capture of 8 slow process signals, and an extension of the number of channels by means of an Apollo box working sample-synchronously.

The two output channels may be used either for signal generators or for the output of the input signals.

SAMURAI contains the following virtual measuring devices as basic features for each channel:

Sound level meter
Class 1 SLM according to IEC 61672-1 allowing simultaneous measurements with the frequency weightings A, C, Z and the time weightings Fast, Slow, Impulse. The SLM also supports the processing of percentiles, automatic impulse detection, measurement of Takt-maximal levels, impulsive and low-frequency characteristics as well as intelligent markers and triggers.

Frequency analyzer
Real-time 1/3 octave analysis from 1/3 octave center frequencies of 0.04 Hz ... 40 kHz (class 1 according to IEC 61260) and FFT analysis of 100 ... 25600 lines, each feature including freely adjustable averaging modes and storage intervals. In addition the sum levels are displayed and stored.

Sound signal storage
Triggered storage of the time signal from DC up to 40 kHz with freely adjustable decimation option (up to 200 Hz) to reduce data volumes.

Reverberation time measurement
Measurement of the reverberation time in 1/3 octaves. Excitation types: switched-off noise, impulse and sine-sweep. The 2 signal outputs are used for output of the generated signals.

Several sound level meters and frequency analyzers with different parameters can be applied for each channel.

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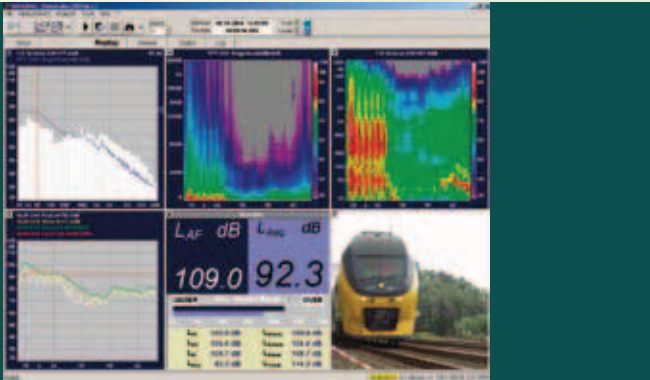
Scope of Software options for SAMURAI 2.0 :

Option: Post-Processing
This option offers a new analysis from stored or imported samples. The data browser allows a comfortable selection and cut of the time signals which have to be analyzed in post process.

Option: Automation
Automatic comparison of a frequency analysis with reference spectra and their management as well as automatic detection by the device and start of an application (e. g. to send an email).

Option: Building acoustics (SAMBA)
The whole acoustic testing of airborne noise and impact sound insulation is organized according to ISO 717 and ISO 140. The measurements are prepared (rooms, partitions, measuring tasks) and performed; the results are then provided in printable form.

Option: Building vibration
Measurement of building vibration according to DIN 4150 with the 3D-Seismometer and assessment of the vibration impacts on people in buildings with the KB (t) value

Option: Fractional octaves
This option provides 1/1 to 1/48 octaves up to 40 kHz in real-time (filters comply with class 1, IEC 61260).

Option: Human Vibration Multi Analyzer
The **HVMA** allows the 3-channel measurements according to all filter curves of the ISO 8041 and the calculation of the resultant vectors for hand-arm or whole body vibrations.

Option: Monitoring
Transfer of Sound Level Meter & 1/3 octave values with selectable time intervals and MP3-export of sound during a running measurement.

Option: Multi-Generator
This option additionally provides the signal types: sine, rectangle, triangle, impulse, multi-sine, sine-sweep (lin and log), pseudo-noise and the synchronized output of *.wav files.

Option: NoiseCam
Together with sound signal storage, this webcam-based solution allows video documentation with measurement values blended-in and the export to a multimedia standard format.

Option: Order tracking
This option allows measurement and display of spectra versus order of a basic frequency or RPM of a rotating machine.

Option: Remote client and TCP/IP interface
These options allow all features of SAMURAI to be controlled via network and integrated into a complex measuring system.

Option: Room acoustics
Measurement of the room-acoustics parameters Clarity, Distinctness (C30 / C50 / C80 / D50 / D80), RASTI, STIPA and STITEL according to ISO 3382 and ISO 18233 on the basis of sine-sweep.

Option: Sound intensity 1 and 2
Sound pressure and intensity measurements according to ISO 9614 parts 1 and 2 with sound mapping on digital photos.

Option: Sound power measurement
The sound power in 1/3 octaves and as a sum is measured in real-time or sequentially using various geometries and numbers of microphones.

Option: Transfer FRF
The transfer function of a structure is obtained using an impulse hammer and a triax accelerometer. The data storage corresponds with the measurement's geometry.

Option: Vibration Meter
Double integration of the time signal as well as filtering according to the standards ISO 2954, ISO 7919 and DIN ISO 10816.

Option: Weather Station
Measurement of weather data with the DFTWR sensor.

Other software options on request

General technical specification of Soundbook_MK2

The following data refer to the 8 channel versions Soundbook_MK2_8L (LEMO7) and Soundbook_MK2_8B (BNC).
Soundbook versions with 2 or 4 input channels (expandable to 8 channels) are also available.
Alternative we offer the Apollo_box with 4 input channels for operation with a Windows-PC and USB 2.0 interface.

Soundbook base device — Panasonic Toughbook CF-19

Processor	Intel ™ Core i5 1.2 GHz, 2 GB RAM
Display	TFT 10.4" 1024 x 768
Storage medium	HDD 160 GByte, SSD optional
Interface	2x USB, RS232, LAN, WLAN, Modem, Cardbus, VGA, Bluetooth, SD-Card Firewire, ExpressCard 34/54
Operating system	Windows 7 multi lingual

Input channels 1-2/4/8

Resolution	24 bit
Real-time bandwidth	DC ... 40 kHz @ 8 channels (80 kHz optional)
Dynamic range	120 dB
Random noise	> 1 µV(A), < 2 µV(Z) @ 0.1 Hz ... 40 kHz
Sample rates	51.2 kHz / 102.4 kHz (204.8 kHz optional)
Decimation	down to 200 Hz sample rate, selectable per channel
Anti-aliasing filter	yes
Max. input voltage	± 10 V peak
Amplification	0 dB, 20 dB
Overload detection	yes
Phase mismatch	< 0.1° @ 20 Hz ... 20 kHz
Offset adjust	yes, automatically with self-calibration
Input coupling	DC, AC 0.15 Hz, HP 10 Hz, LP 2 kHz
Microphone power supply	± 14 V, + 20 / 63 / 200 V switchable (with BNC versions on AUX)
ICP power supply	2 / 4 mA switchable
Cable error detection	yes, with ICP sensors
Support of IEEE 1451.4	yes

AUX channels

Digital Input	2x TTL
Digital Output	2x TTL
Microphone power supply	± 14 V, + 20 / 63 / 200 V switchable

Slow channels 1-8

Resolution	24 bit
Real-time bandwidth	DC ... 80 Hz @ 8 channels
Input voltage range	-25 V ... +25 V

Output channels 1-2

Resolution	24 bit
Real-time bandwidth	DC ... 20 / 40 / 80 kHz
Max. output voltage	± 3.16 Vpeak

Service channels

Trigger	2x Trigger / Tacho, trigger level setable via software
Synchronization	Sample-syncronous synchronization on external clock (e.g. GPS 1 Hz)

Physical characteristics

Dimensions	280 mm x 220 mm x 65 mm
Weight	3100 gr
Battery	Lithium Ion battery pack, capacity 4 h measurement
External power supply	100 ... 240 VAC or 10 ... 36 VDC with adapters

Environmental conditions

Protection rating	IP54
Shock resistance	according to MIL-STD 810F
Humidity	30 % ... 90 %
Temperature range	-10 °C ... +50 °C
Storage conditions	-20 °C ... +60 °C, max. 95 % humidity

EMC

Emission	conforming with EN50081-1
Immision	conforming with EN50082-1

SAMURAI 2.0™

General-purpose acoustics software package for real-time & post-processing use

Detailled description of all SAMURAI options see **www.soundbook.de/download.htm**

SAMURAI control windowpane:
- device status information
- device control buttons
- time information
- overload/underflow indicators

Human Vibration Multi Analyzer:
- 3 axial window with sum vector
- filter curves according ISO 2631
- digital and bar graph display
- 3 selectable values per axis

Signal:
- multi channel window
- scrolling & scaleable x-axis
- time signals from all channels
- quick scaling for y-axis

Sonogram:
- single channel window
- FFT- or 1/n octaves spectra
- scrolling & scaleable x-axis
- quick scaling for y- and z-axis

Frequency Analyzer:
- multi channel window
- FFT- or 1/n octaves parallel
- additional sum levels
- linear or log x-axis

NoiseCAM:
- measurement video documentation
- flexible resolution and frame rate
- values of one channel blended-in
- time stamp

Sound Level Meter:
- single channel window with 10 values
- 2 main values additional as bar graphs
- alarm level indicator in one bar graph
- table or level history below bar graphs

Other display types: History, 3D Waterfall, RPM ...

- high brightness TFT display with Touchscreen
- magnesium case with protection rating IP54
- interface: Bluetooth, LAN, WLAN, USB, RS232, VGA, Modem, CardBus, ExpressCard, SD-Card, Firewire
- battery and HDD detechable without tools
- HDD with heating / shock protection or SSD
- 2-8 input channels with BNC or LEMO7 connectors
- channel expansion through Apollo_box

- Soundbook_MK2, 8 channel BNC version

- Soundbook_MK2, 8 channel LEMO7 version

PTB type approval
as sound level meter coming soon

Scope: **Soundbook + siNoise Version 2.0**

Microphones:	MM210, MK221, WME952
Number of channels:	2 / 4 / 8 input channels
Sound level meter:	type 1 according to IEC 61672-1
1/3 octave analyzer:	type 1 according to IEC 61260
Displayed values:	SLM, 1/3 octaves, level recorder
Measuring range:	25 dB(A)...135 dB(A) @ crest factor 10
Frequency weighting:	A, C, Z (simultaneously)
Time weighting:	Fast, Slow, Impulse, Peak (simultaneously)
Measurement values:	L_{AF}, L_{Aeq}, L_{AS}, L_{AFmax}, L_{ZF}, L_{Atm5}, L_E, L_{Aleq}, L_{Cpeak}, L_{Zpeak},
Further values:	1/3 octaves 20 Hz...20 kHz, level recorder, time
Integration time:	freely adjustable via Start / Stop
AC outputs:	2x audio signals of measuring channels
TCP/IP-interface:	control of measurement via LAN