HARMONIE

Four channel real-time sound and vibration measurement system

01dB-Stell
MVI technologies group

overview

The Harmonie system consists of one or more transducers (microphones/accelerometers/intensity probe, etc.) connected to a small acquisition unit (four channels) which transfers data in real-time to a notebook computer.

But Harmonie is also much more: four measurement channels for static and quasi-static phenomena (temperature, pressure, flow rate, etc.), plus one tachometric measurement channel to correlate noise and vibrations with operating conditions.

Harmonie belongs to the 01dB-Stell range of systems integrated on a notebook computer and, as such, offers real-time performances for the simultaneous measurement of time and frequency data.

In one step, Harmonie replaces many traditional instruments (sound level meter, vibrometer, frequency analyser, digital tape recorder, intensity meter, voltmeter, etc.).

Harmonie combines many instrument functions, recording the raw signal (like a DAT recorder), while measuring the complete noise or vibration level time history (like a data logging sound level meter or vibrometer), and showing the changing real-time spectrum (like a frequency analyser).

Signal recordings can be played back directly from a time history plot through Harmonie, or through any PC sound system.

These abilities, unique in the market, guarantee a complete and powerful analysis of any noise and vibration environment.

The many data processing functions of Harmonie software packages ensure an efficient analysis of physical data and fast preparation of the measurement report.

HARMONIE
main functions

The **Harmonie** system features many possibilities for noise and vibration measurements, offering the user great flexibility in the field:

- Supports many transducers types: microphones, accelerometers, sound intensity probe, tacho probes, etc.
- Signal conditioning of most transducers
- Digital inputs/outputs (remote control, tachometry) and static channels
- Signal generator (white / pink / sine / loop)
- Four measurement channels in real-time
- Narrow band FFT and real-time digital filtering fulfilling IEC 61260 Class 1
- Manual or automatic remote calibration

The following real-life applications can be addressed by the 01dB-Stell application software packages:

- Digital tape recording
- Real-time analysis in octave and third octave from 20 Hz (option 1 Hz) to 20 kHz on 4 channels
- Detailed analysis down to 1/48th octave bandwidth
- Real-time spectra in narrow bands, 0-20 kHz and zoom on 4 channels
- Sonagrams and 3D display
- Sound intensity spectra and sound power according to ISO9614
- Sound Power according to ISO374X
- Transient signal analysis
- Time-frequency analysis
- Structural Analysis
- Order analysis
- Noise and/or vibration monitoring with sources events coding
- Multitasking with external applications (weather data, remote access, modem control, GSM, etc.)
- Loudness, PNL, PLNT all in real-time, EPNL
- Sound quality and Psychoacoustics

HARMONIE software packages

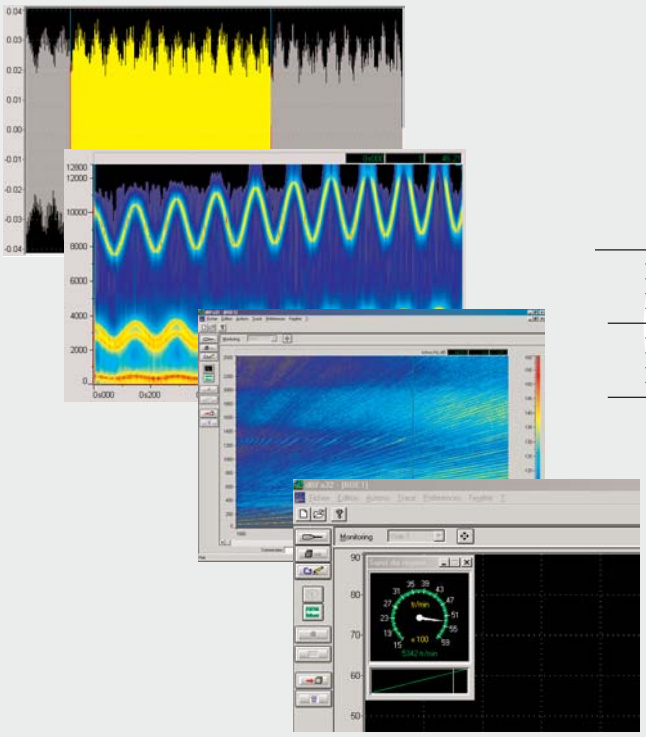
dBENV32
Environmental noise

Harmonie with **dBENV32** transforms your notebook computer into an intelligent long-term noise and vibration monitoring terminal, with up to 4 dynamic and 4 low frequency channels.

dBENV32 combines the functions of a datalogging integrating sound level and vibrometer, a digital tape recorder and a real-time frequency analyser, all running at the same time. Therefore, overall levels, as well as third octave spectra and signals, can be acquired over long periods.

Using **dBTRAIT32**, the processing module of **dBENV32**, signal recordings stored on computer hard disk can be played back through the PC sound system for identification of noise sources.

The combination of **dBENV32** and **Harmonie** is a powerful investigation tool which can be used for a wide range of applications, such as noise complaints, noise impact studies or monitoring of noise in urban areas, with quantification and identification of offending noise sources.



dBFa32
Industry

With the **dBFA32** software package, **Harmonie** becomes a real-time narrow and broad (1/N octave) band analyser designed for industrial noise and vibration applications.

The **dBFA32** software suite consists of a large number of modules such as real-time analysis, digital signal recording, sound intensity and sound power measurements (according to ISO9614), transient signal and FRF calculations for modal investigations or acquisition of an additional tachometric channel for order analysis.

Several analysis modules for post-processing are also available: psychoacoustics analysis in order to obtain subjective criteria information, signal editing, various operations on spectra and signals, time-frequency analysis (pseudo Wigner-Ville, wavelets, AR model, Capon), order analysis, etc.

Harmonie complies with the requirements of the legislation regarding noise at the work place, noise control of industrial areas and machinery noise labelling.

dBBATI32
Building acoustics

With the **dBBATI32** software package, **Harmonie** becomes an efficient building acoustics analyser.

The **dBBATI32** software package allows the user to perform a complete study of any building, including reverberation time and spectrum measurements. Calculations of airborne and impact sound insulation criteria are made according to ISO717-140 specifications.

HARMONIE hardware

Harmonie hardware is a powerful two-DSP low-consumption acquisition unit powered by the Notebook PcCard interface.

The design of the unit allows the system to fulfil type 1 specifications of IEC60651 and IEC60804, while the digital filters fulfil class 0 specifications of IEC61260.

Technical specifications

General characteristics

Connection	To the computer, interface PC CARD Type II (PCMCIA)
Power supply	From the computer
Dimensions	110 x 35 x 220 mm
Weight	700 g
Computer	Pentium II or III, RAM 32 MB, Windows 95/98/ME and PCCard Type II

Dynamic inputs (4 channels)

Connection	Four 7 pin LEMO connectors
Impedance	1 MΩ
Coupling	DC or AC
Conditioning	Microphone preamplifier (28 V - 10 mA), condenser microphone (0 or 200 V), ICP® accelerometer (4.3 mA), direct input for voltage signals
Max. voltage	Peak to peak: 20 V, overload protection
Phase match	< 0.1° if channel 1 gain = channel 2 gain < 0.5° if channel 1 gain <> channel 2 gain
Filters	High-pass filter (cut-off frequency: 0/0.15/10 Hz), low-pass filter 2 kHz
Noise	Electrical: 0 dB(A)
Resolution	20 bits sigma/delta A/D conversion
Sampling	Synchronous, 51.2 kHz max
Anti aliasing	Butterworth, 22.4 kHz, 120 dB/octave
Offset	Automatic adjustment
Overload	Separate indicator for each channel
Signal / Noise	> 90 dB per range
Amplification	Up to 60 dB in steps of 5 dB

Static inputs (4 channels)

Connections	8-pin LEMO (combining static/tacho/digital channels)
Voltage	0-10 V
Resolution	12 bits A/D conversion
Sampling	Multiplexed, 4 channels/50 Hz overall

Tachometric input (1 channel)

Connections	8-pin LEMO (combining static/tacho/digital channels)
Counter	Tachometer (accuracy 0.02%)/TTL external input
Frequency	From 1/60 Hz to 1 MHz
Voltage	Min: TTL, Max: +15 V

Digital inputs/outputs (4 channels: Trigger, Remote Control)

Connections	8-pin LEMO (for static/tacho/digital channels)
Inputs	2 (1 shared with tacho input)
Outputs	2 (shared with 2 static inputs)
Voltage	Input: min. TTL, max +15 V Output: +5 V/-5 V/Off

Analogue Outputs (2/4 channels)

Connections	Two 6.25 mm Jack Stereo connectors
Type	Parallel single or dual channel during acquisition 4 channel playback
Resolution	20 bits, sigma/delta D/A
Sampling	Synchronous, 51.2 kHz max
Max. voltage	Peak to peak : 5 V
Gain	From +10 to -50 dB in steps of 1 dB

Digital section

Processors	Double TMS320C31 + 1 TMS320C203
Performance	100 MFLOPS
Words	32 bits coding
SRAM	512 k x 32 bits
RAM	Dual port 64 k x 8 bits

Sound level meter mode (dENV32) *

Functions	Lp, Leq, Peak, Slow, Fast, Impulse
Linearity	> 70 dB according to IEC 60651 and IEC 60804
Freq. analysis	Spectra in 1/1 and 1/3 octave by digital filtering from 20 Hz (1 Hz optional) up to 20 kHz in real-time on 4 channels
Signal acquisition	20 kHz max (up to 4 channels)
Performance	Overall levels, time signal recordings and spectrum calculations on 4 channels 20 kHz simultaneously
Weightings	A, B, C, G, Lin
Time base	Down to 20 ms in real-time, down to 1 ms in post-processing
Options	Dual-channel acquisition, with 120 dB maximum dynamic range Digital filtering from 0.5 Hz to 20 kHz and overall vibration levels according to ISO2631, frequency analysis down to 1/48th octave Psychoacoustics (PNL, PNLT, loudness), expert mode

Building acoustics mode (dBBATI32) *

Functions	Spectra acquisition, measurements and analysis of reverberation times, calculation of sound insulation (ISO717-140)
Freq. analysis	Spectra in 1/1 and 1/3 octave by digital filtering from 20 Hz up to 20 kHz in real-time
Time base	Down to 20 ms in real-time, down to 1 ms in post-processing
Generator	Pink and white noise

Analyser mode (dBFA32). Different Packages available.*

Functions	Real-time spectra acquisition and analysis, signal acquisition and editing, calculations on signals and spectra
Freq. analysis	Spectra in 1/1 and 1/3 octave by digital filtering from 1 Hz up to 20 kHz in real-time (on 4 channels) FFT analysis: up to 3200 lines, auto and cross-spectra (1 and 2 passes)
Time acquisition	Up to 20 kHz (on 4 channels)
Trigger	Manual level or by remote control
Signal editing	Low-pass, high-pass, band-pass and notch filters, re-sampling
Results	Storage, printing, copy/paste, export, etc.
Options	Psychoacoustics module, transient analysis module, sound intensity and sound power (ISO9614) modules, signal editing, tacho recording, order analysis, sonagram and 3D display, MATLAB data link, etc.

*** See appropriate datasheet**

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AFAQ ISO 9002

Production and servicing for calibration and repair

HARMONIE

Benefits

- Four channels
- Fulfills standards
- Level meter, digital signal recorder, spectrum analyser
- Order analysis, tachometry
- Structural analysis
- Time-Frequency analysis
- Psychoacoustics
- Different transducers
- PC-based system

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