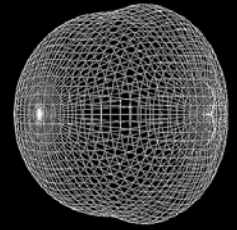


CLIO 10



Turns your PC into the most complete easy-to-use electrical and acoustical measurement system ...

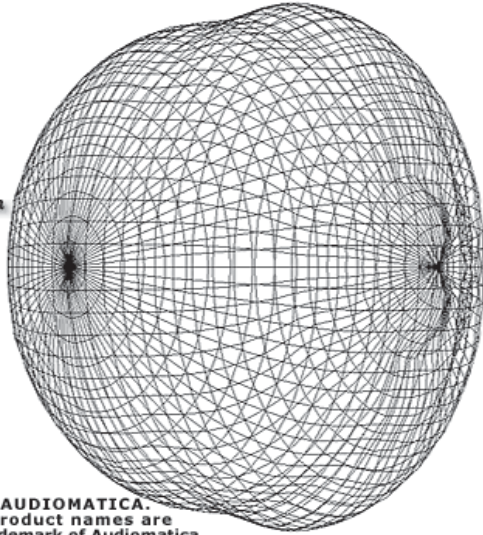
CLIO

electrical and acoustical
measurement system

CLIO 10

Audiomatica
Florence - Italy

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■ **CLIO 10**, by Audiomatica, is the new measurement software for the CLIO System. The CLIO System is the easiest and less expensive way to measure:

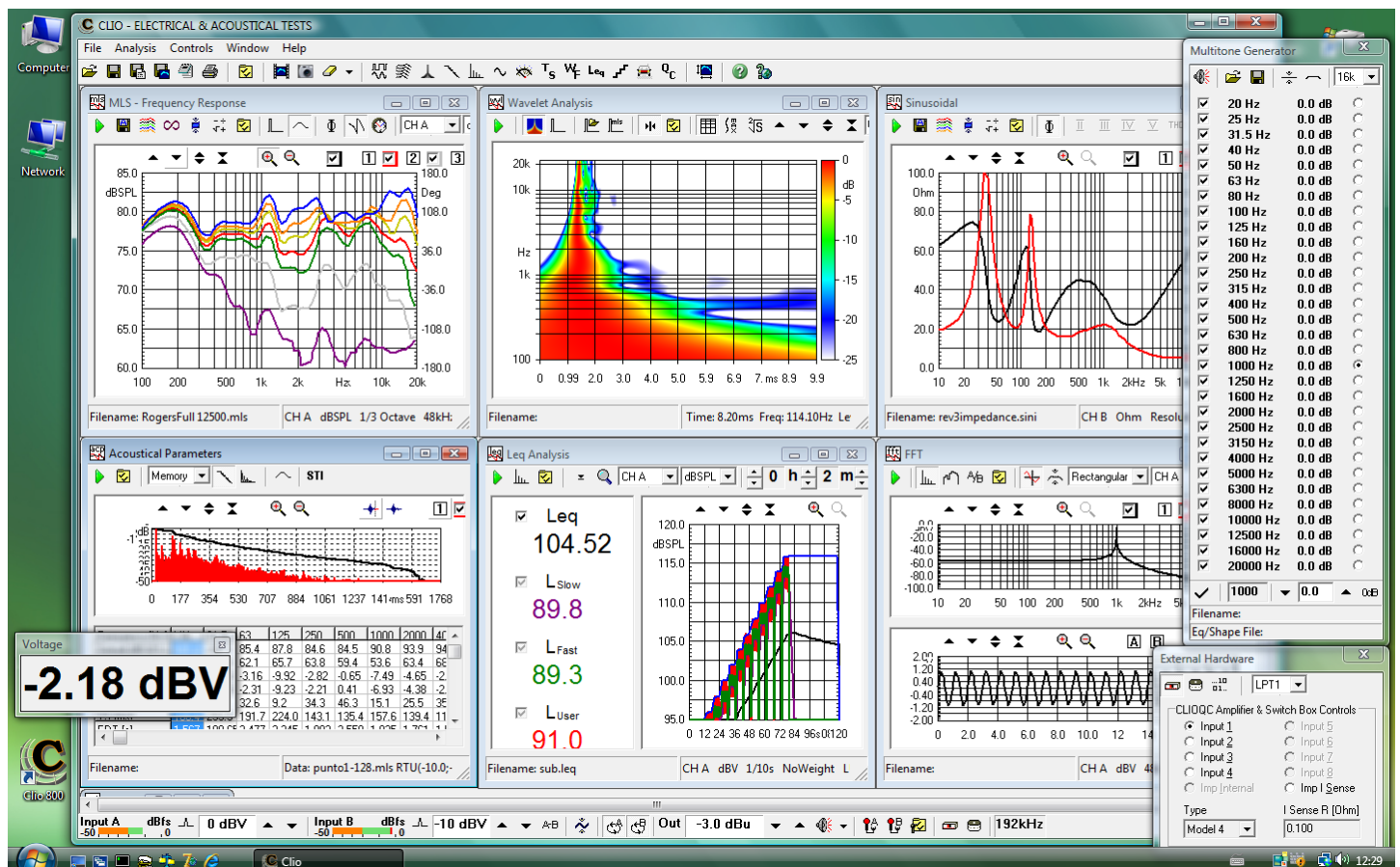
- electrical networks
- electronic equipment
- loudspeaker systems
- telephones & hearing aids
- environmental noise
- rooms acoustics
- quality of production lines

CLIO 10 runs on a standard PC computer driving the measurement hardware and accessories supplied by Audiomatica; the power, precision and reliability of the resulting instrument is 100% warranted.

CLIO 10 is fully compliant with Windows Vista.

CLIO 10 is a new design based on a huge work which is the synthesis of more than 18 years of experience and excellence in electro-acoustic measurement systems and gives you all the power and flexibility you need. **CLIO 10** adds new exciting functionality:

- Simultaneous stereo measurements (frequency response and impedance together)
- Displacement laser measurements for non-invasive Thiele/Small parameters evaluation
- 3-D "balloons" directivity analysis with complete data export
- Fast-Track™ Rub&Buzz detection routine



■ CLIO 10 MAIN SOFTWARE RELEASES AND VERSIONS

CLIO 10 controls and manages the Audiomatica FW-01 Firewire Audio Interface (24 bit @ 192kHz).

CLIO 10 STANDARD: Laboratory grade software with most of the features present.

CLIO 10 QC: Adds a **Quality Control Processor** for state-of-the-art testing and controlling a production line; also adds some particular applications like 3D measurement analysis.

■ CLIO 10 MEASUREMENT TECHNIQUES

Compared to other measurement systems, **CLIO 10** concentrates the power of many different instruments into a single one.

Three different measurement techniques are available for system identification and characterization:

■ **MLS & LogChirp analysis** using either pseudo-random noise or logarithmic chirps as stimuli

■ **Sinusoidal Sweeps** using sinusoidal signals

■ **FFT, RTA and 'Live' Transfer Function** letting you the choice of any stimulus, even live music.

While other instruments offer one single possible measurement choice, **CLIO 10** gives you three alternatives permitting to view the physical phenomenon like frequency response, impedance or other parameters, from three different points of view. The final result will be then validated by the consistency of these measurements: as any expert technician knows, this is the correct approach that should always be adopted.

The following specialized control panels are dedicated to other **specific measurements**:

■ **Sound Level Meter** a IEC61672 integrating sound level meter with Leq and frequency analysis

■ **Linearity and Distortion** measures the non linear behavior of an electronic equipment

■ **Interactive L-C-R Bridge** permits passive components measurement on the fly

■ **Wow&Flutter Meter** with time and frequency analysis

■ **Frequency Counter**

Beyond measured results you get sophisticated **post-processing tools** for:

■ **Thiele&Small Parameters** for loudspeaker characterization

■ **ISO 3382 Acoustical Parameters & STI** for rooms and auditoria characterization

■ **Waterfall plots** to evaluate sound decay as 3D or Color graphs

■ **Directivity analysis** for loudspeaker characterization as Color maps, Circular or waterfall-like plots

■ **3-D Balloons analysis** for complete 3D loudspeaker directivity characterization

■ **Wavelet analysis** for joint time-frequency loudspeaker characterization

■ **Loudness Rating Calculator** for assessing RLR, SLR and STMR (only in QC version)

Using all the aforementioned measuring and post-processing techniques it is possible to tailor powerful **Quality Control** scripts that will manage and identify any production line of electronic or electro-acoustic devices.

■ MLS & LOG CHIRP ANALYSIS

CLIO 10 implements linear systems measurement with the well established MLS analysis technique

now enriched by the possibility of using Logarithmic Chirps. The result is the system's **impulse response** measurement, by means of sophisticated algorithms; this lets you perform accurate anechoic analysis of loudspeakers and room acoustics evaluation. The measurement is highly accurate and extremely fast to execute; the data recorded by the computer, can be instantly analyzed or stored for later processing.

What MLS & LogChirp analysis gives you:

■ MLS and Chirp size up to 512k.

■ Frequency response

■ Phase response, minimum and excess.

■ Group Delay

■ Impedance measurement

■ Step response

■ Energy-Time curve (ETC)

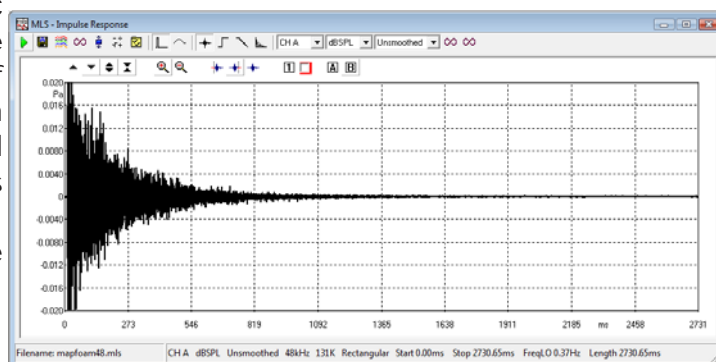
■ Schroeder reverberant decay

■ Selectable analysis window

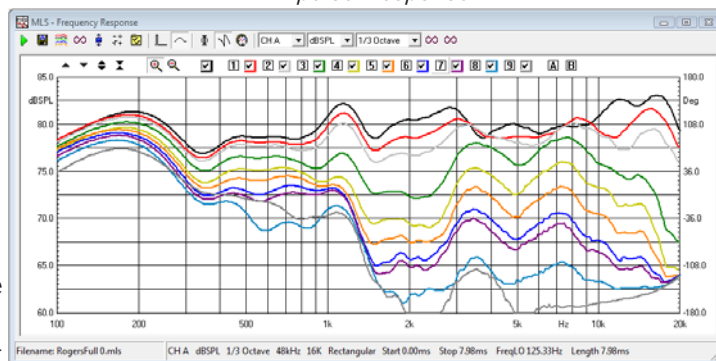
■ Manual or continuous programmable time average

■ Loop function with continuous measurement

■ Mathematical operations on data in memory



Impulse response



Frequency response

- Automatic merge between near and far field
- Selectable smoothing (1/2 to 1/12 of octave)

■ SINUSOIDAL ANALYSIS

CLIO 10 executes sinusoidal analysis with a digital filtering of input signal to achieve the highest noise-immunity; in this way you add the power of the PC to the most traditional frequency analysis. The sinusoidal technique is oriented to:

- Stereo sweep for simultaneous frequency and impedance response
- Phase response
- A/B channels difference response
- Continuous and stepped sweeps
- Sweep amplitude equalization vs. frequency
- Frequency resolution from 1/3 to 1/48 oct.
- 2nd to 10th harmonic and THD plot vs. frequency
- Fast-Track™ Rub&Buzz plot vs. frequency
- Gating system with auto-delay for quasi-anechoic measurements

■ FFT, RTA & 'LIVE' TRANSFER FUNCTION

These measurements are implemented with an interactive control panel that permits the simultaneous display of time and frequency domains. Three operating modes:

- Narrowband FFT
- Octave bands RTA
- 'LIVE' transfer function

The main features are:

- Two channels measurement and display
- Internal trigger with programmable delay
- FFT from 256 points up to 128k points
- Linear or exponential averaging
- Max hold and min hold functions
- Linear or logarithmic frequency axis
- 1/3 octave or 1/6 octave RTA display
- Equal Loudness Contours display
- Frequency smoothing

It is possible to easily execute bursted distortion measurements delivering, for a definable short period of time, very high power to the load.

■ MULTI-METER

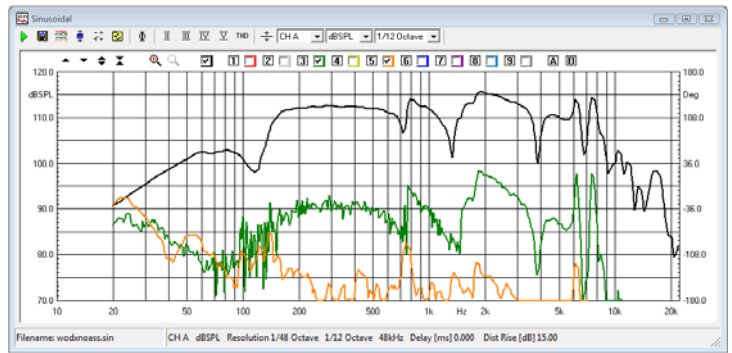
This multi-meter control panel is a real-time, interactive, measuring instrument giving the following functionality:

- SPL Meter (dB SPL, dB Pa, dBA, dBC)
- Millivoltmeter (V, dBV, dBu, dBr)
- Displacement (m, dBmeter)
- Velocity (m/s, dBm/s)
- Acceleration (g, m/s², dBm/s²)
- Frequency Counter (Hz)
- Distortion meter: THD and IMD (% , dB)
- L-C-R Bridge (H, uF, Ohm)
- Crest Factor
- Fast and Slow integration

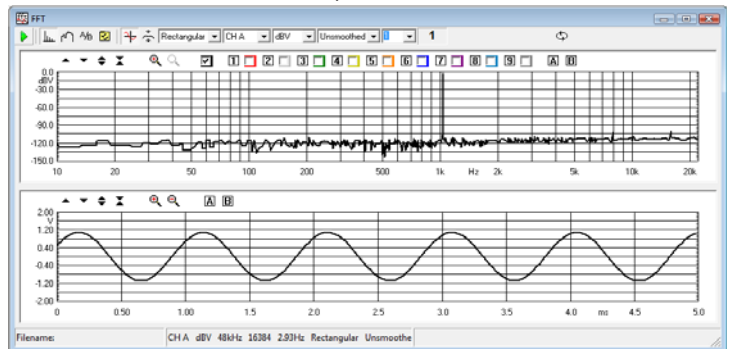
■ SIGNAL GENERATOR

The programmable signal generator is capable of the following functions or signals generation:

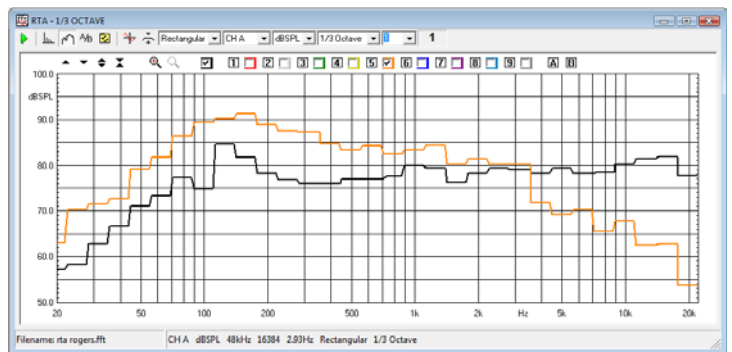
- Sinusoids with burst and FFT bin round
- Two sinusoids



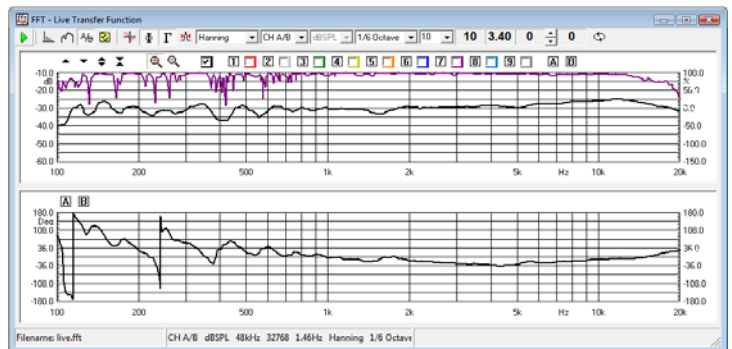
Sinusoidal response + harmonics



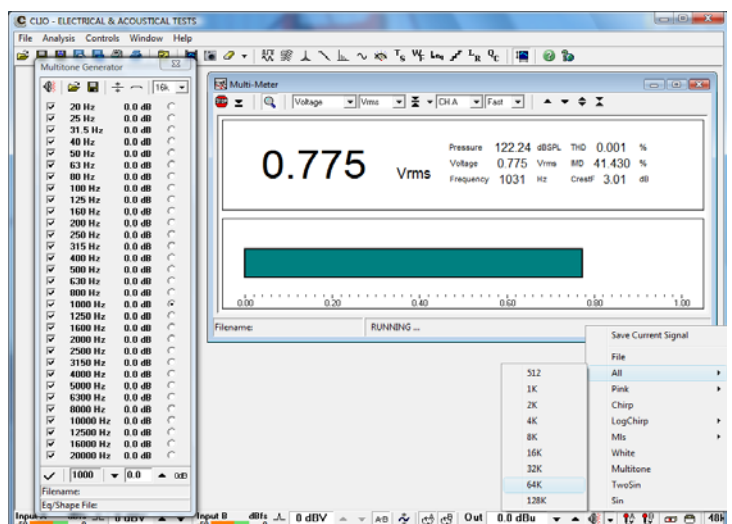
Narrowband FFT



Octave bands RTA



'LIVE' transfer function



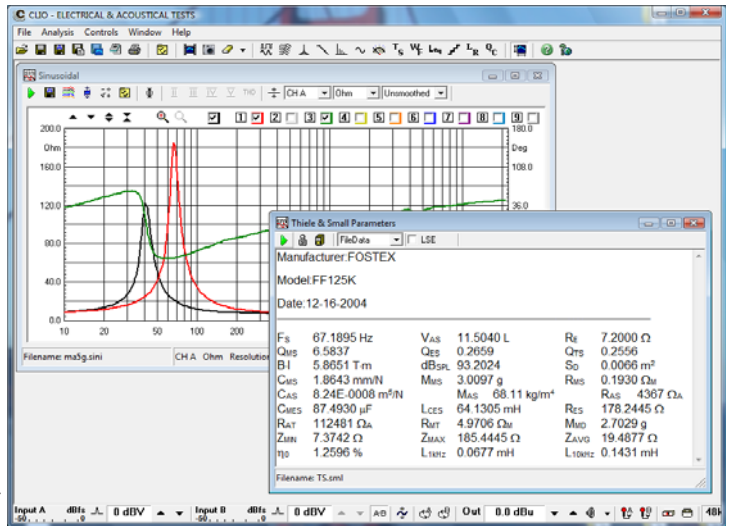
Multimeter and signal generator

- Multitones & All Tones
- Linear or Logarithmic Chirps
- MLS (Maximum Length Sequences)
- Pink and White noise
- Wave files (.wav) playback and save
- **IMPEDANCE MEASUREMENTS AND THIELE&SMALL PARAMETERS**

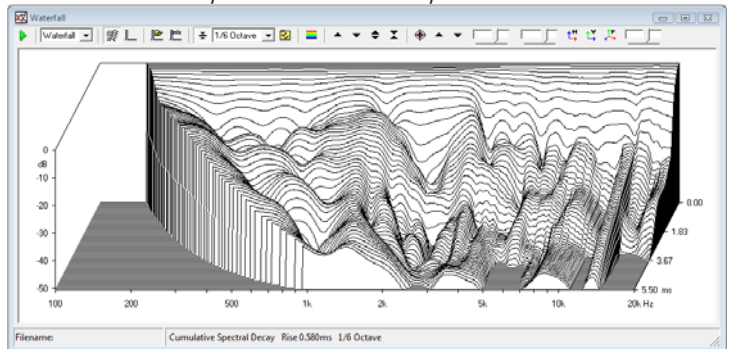
The impedance measurements can be done with a direct connection to the analyzing hardware or with an external amplifier and a sensing resistor both in constant current or constant voltage configurations. Using an Audiomatica QCBox Amplifier, its current sensing output is used to permit simultaneous frequency response and impedance measurement. The evaluation of speaker parameters may use a single-pass, non-invasive, laser displacement measurement or the classical added-mass or known-volume methods with least square error routines.

■ **WATERFALL, DIRECTIVITY & 3-D**

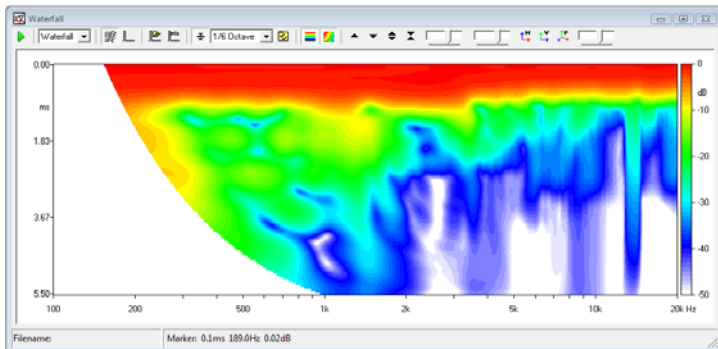
The Waterfall, Directivity and 3-D post processing routines give **CLIO 10** the possibility of making 3D or Color plots by adding a third dimension (time or degrees) to classical amplitude-frequency graphs. Waterfalls are used to characterize the anechoic sound decay of a loudspeaker or the



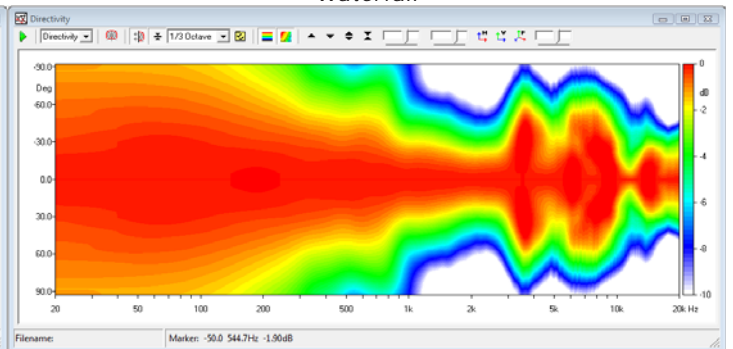
Impedance and T&S parameters



Waterfall



Color Waterfall



Directivity color map

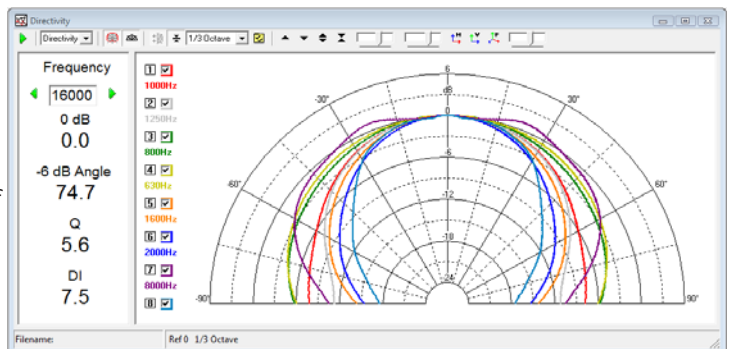
sound decay in a room.

The Waterfall post processing permits the following 3-D or Color types of analysis:

- **Cumulative spectral decay (CSD)**
- **Energy Time Frequency (ETF)**

Directivity analysis characterizes the radiation of a loudspeaker versus vertical or horizontal angle. The Directivity post processing permits the following analysis:

- **3-D directivity (waterfall like)**
- **Color map directivity**
- **Classical polar plots**

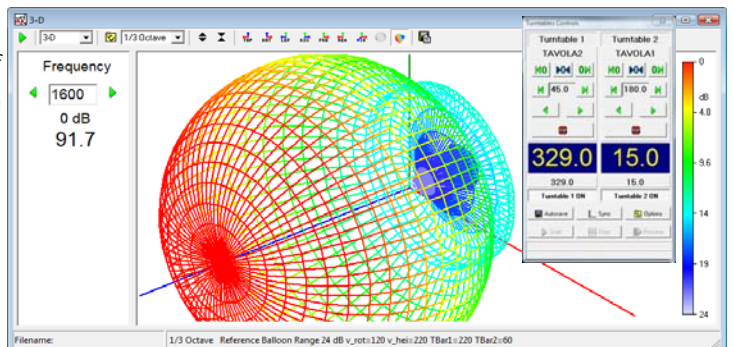


Circular polar plots

To fully measure and characterize the radiation of a loudspeaker in space there are the following (in QC software version only):

- **3-D turntables control**
- **3-D measurement manager**
- **3-D "Balloons" analysis**
- **Data export in text formats as EASE (.xhn), CLF (.tab) or impulse responses.**

Balloon data is thus available to import in simulation software packages.



3-D Balloon, turntables control and measurement manager

■ WAVELET ANALYSIS

The Wavelet Analysis tool allows to post-process impulse responses and to create color plots of the energy of the signal versus time and frequency. The tool is similar to the Energy Time Frequency analysis but, since it is based on wavelet transform instead of Fourier Transform, does not suffer from a fixed time-frequency resolution.

■ Leq ANALYSIS

With the Leq Analysis control panel it is possible to execute **real-time capture and level measurement** of any kind of signal present at CLIO's input. The behaviour of the instrument closely resemble that of a graphical level recorder plus direct-to-disk data capture. When analyzing an acoustical event this control panel gives you complete information about the equivalent continuous sound level (Leq) and related quantities according to IEC 61672 standard; if used together the FFT frequency analysis you get a complete **integrating sound level meter**.

■ ACOUSTICAL PARAMETERS & STI

With the Acoustical Parameters control panel it is possible to evaluate the acoustical behaviour of a room and carry out sophisticated post processing of a measured impulse response to calculate the acoustical parameters as defined by the **ISO 3382** standard. The **STI, Speech Transmission Index**, is also calculated. All these parameters are of common use to characterize auditoria, concert halls and are applicable to any room intended for speech or music reproduction.

■ LINEARITY AND DISTORTION

Linearity and Distortion analysis is a complete tool to inspect the non linear behavior of any electronic equipment as power amplifiers or preamplifiers.

■ Up to 1250W/80hm (higher with external attenuator)

■ THD vs. input or output

■ SMPTE, DIN, CCIFF Intermodulation

■ DUT's gain and deviation from linearity

■ WOW & FLUTTER ANALYSIS

CLIO 10 executes Wow & Flutter analysis measuring the frequency modulation that follows instantaneous speed variations due to mechanical imperfections in analog recording or playback devices.

■ IEC and NAB standards

■ Time and frequency display

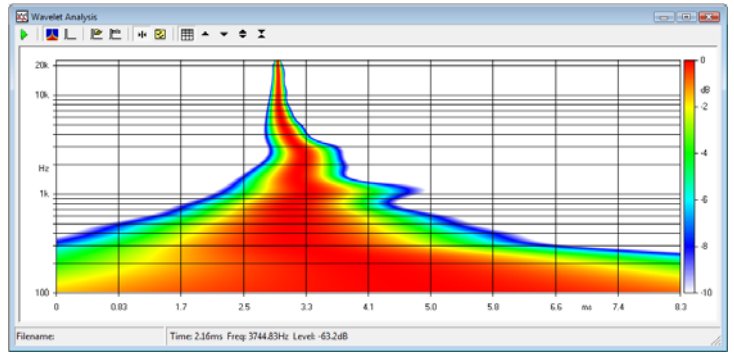
■ CLIO 10 USER INTERFACE

The various control panels give you the impression of facing a real instrument. The software displays multiple curves giving you powerful editing capabilities together import and export facilities as a link to simulation programs. Featuring:

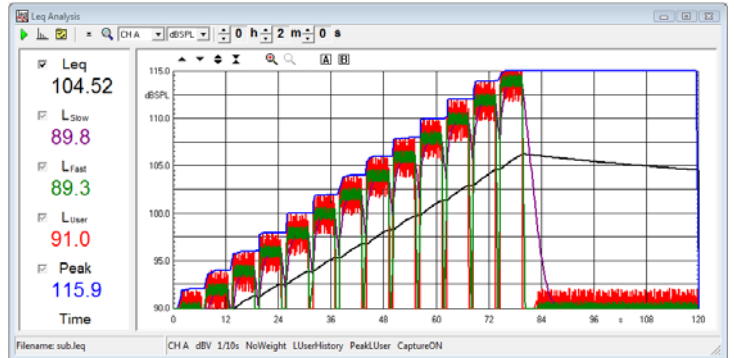
■ Measurement session management

■ ASCII data output

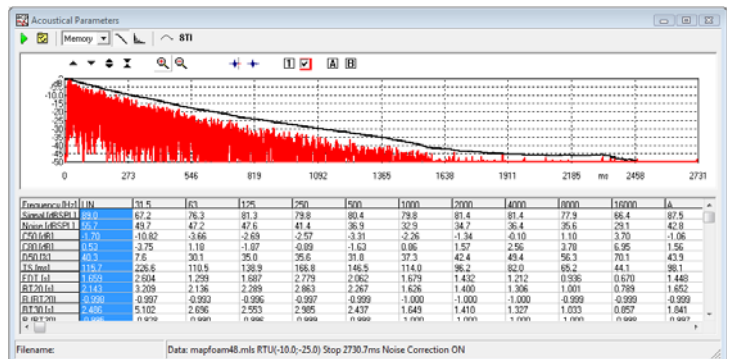
■ EMF, Bitmap, PNG, GIF, JPEG graphics export



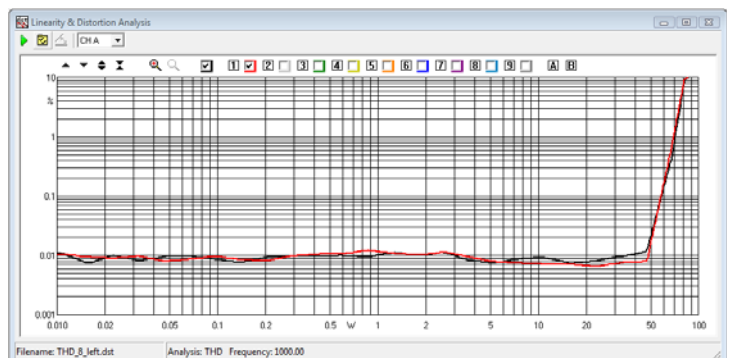
Wavelet



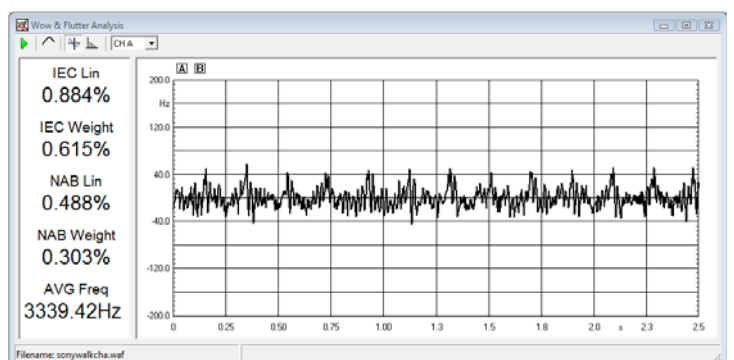
Leq analysis



ISO 3382 Acoustical Parameters



Distortion vs. output power



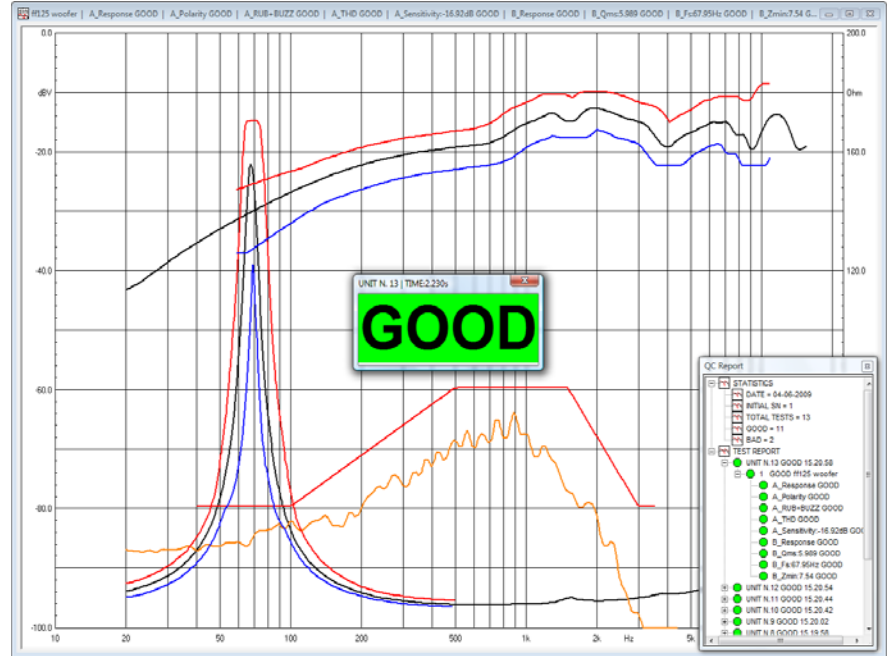
Wow & Flutter

■ QUALITY CONTROL

The **Quality Control** software extension for **CLIO 10** is a powerful suite for executing state of the art production line testing. **CLIO 10 QC** is able to test the production of loudspeakers, drivers, microphones, amplifiers and any other electroacoustic device. **CLIO 10 QC** can interact with external hardware or production line controllers in addition to PC peripherals to implement a fully automatic line. **CLIO 10 QC** is also able to behave as a **TCP/IP measurement server** to let you write and implement your custom written code. **CLIO 10 QC** takes full advantage of all the measurement techniques found in the CLIO standard software adding a versatile script processor capable of handling a **virtually unlimited sequence of tests** to accomplish even the most complex tasks; on the other hand a **single ultra-fast sinusoidal test** may ensure you production **cycle times of less than 1 second**.

Some of the quality control checks possible within one single test:

- Frequency response and impedance response (mono or stereo tests)
- Average (or single frequency) level
- Sensitivity (average or up to eight frequencies)
- Polarity
- Total harmonic distortion response
- Single harmonic response (from 2nd to 10th)
- Fast-Track™ Rub&Buzz response
- T&S parameters (Fs, Qt, Qe, Qm, Cms, Mms, Mmd, Vas, BI, dB SPL, ZMin)
- Loudness Rating (RLR, SLR, STMR)



■ POWERFUL HARDWARE CONTROL

The key feature of the CLIO System running **CLIO 10** is the precision, laboratory grade, **hardware control** that gives you complete, instant access to all the measurement parameters and let you easily interact via software to adapt your measurement interface to any environmental need; using CLIO you get **results** that are 100% warranted by the hardware interface built by Audiomatica.

- Stereo input and output control
- Peak Meter to monitor input signal
- 0.1dB output level control
- Output DC voltage control

Two channels separate input monitor and control up to +40 dBV (280 Vpp)

Programmable AC output generator

QCBox&Turntables



■ **CLIO 10** integrates the software control for the new **Model 5 Amplifier, Switching and Testing box:**

- USB controlled
- 50W (80hm) output stage w/DC control
- Output stage current limit control
- 4 input w/phantom supply (programmable 0÷24V)
- 2 DC voltage measuring input
- I-Sense output with DC current measuring
- General Purpose I/O bits



■ PC REQUIREMENTS

- **CLIO 10:** P4 or Dual Core 2Ghz, XP or Vista



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CLIO

ELECTRICAL & ACOUSTICAL TESTS