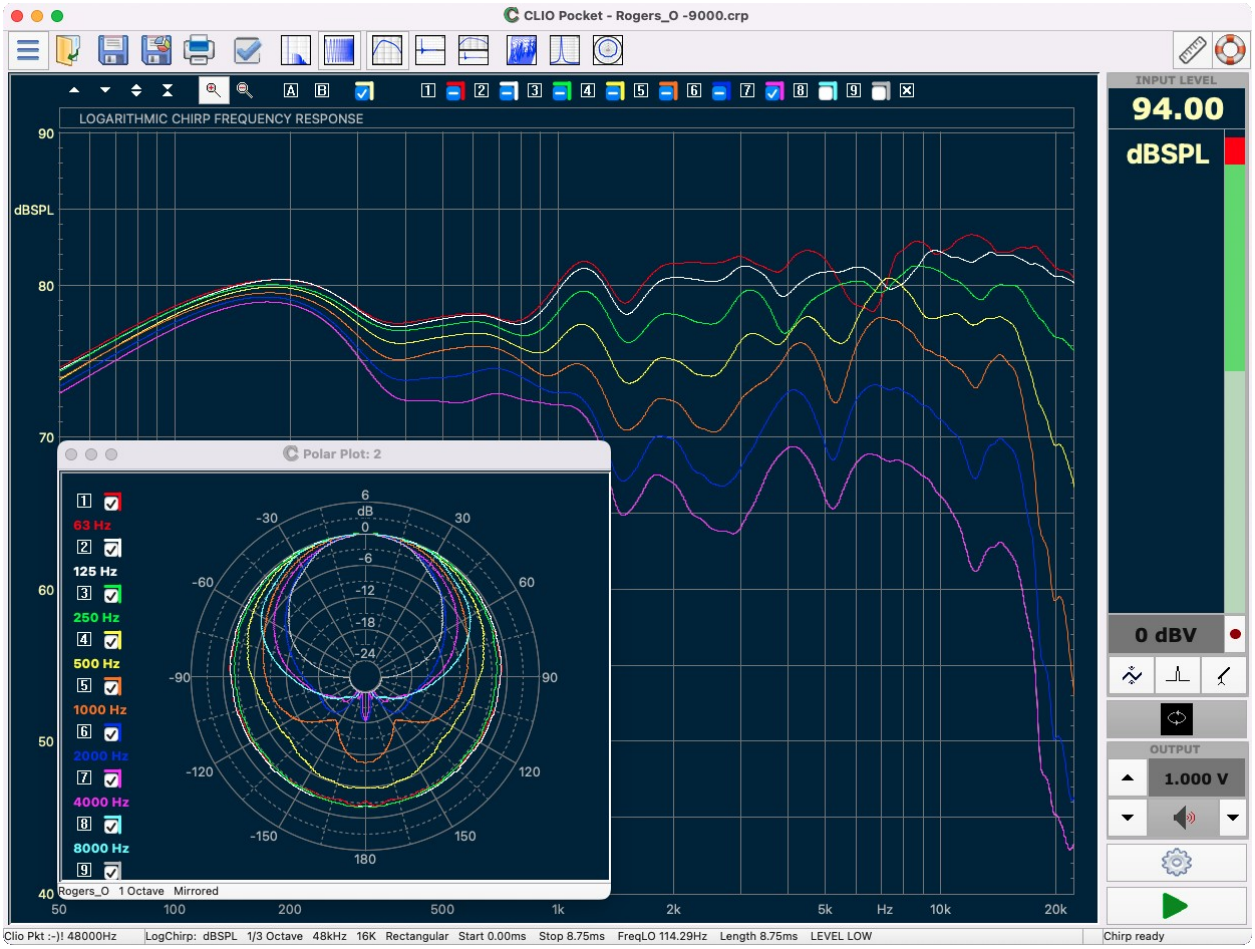
CLIO

ELECTRICAL & ACOUSTICAL TESTS



CLIO Software

Release 3.1
Version Pocket

Survival Guide

AUDIOMATICA

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INSIDE THE CLIO POCKET BOX

You should receive your CLIO Pocket housed in a plastic box like this:

Inside the box you find:

- The CP-01 Audio Interface
- The CLIO Pocket SD with software and drivers
- The Microphone MIC-02
- One USB 2.0 cable
- One RCA to RCA 2.7m long microphone cable
- One RCA to alligators impedance cable

TECHNICAL SPECIFICATIONS

CP-01 AUDIO INTERFACE

GENERATOR

24 Bit sigma-delta D/A Converter

Frequency range:	1Hz-45kHz
Frequency accuracy:	better than 0.01%
Frequency resolution:	0.01Hz
Output impedance:	150Ω
Max output level (Sine):	13dBu (3.46Vrms)
Attenuation:	0.1 dB steps to full mute
THD+Noise(Sine):	.008%

AC ANALYZER

24 bit sigma-delta A/D Converter

Input range (full scale):	+40dBV down to -40dBV
Max input acceptance:	+40dBV (283Vpp)
Input impedance:	64kΩ (5.6kΩ mic)
Phantom power supply:	8.2V

DC ANALYZER

12 bit A/D Converter

Input range:	± 6.5V

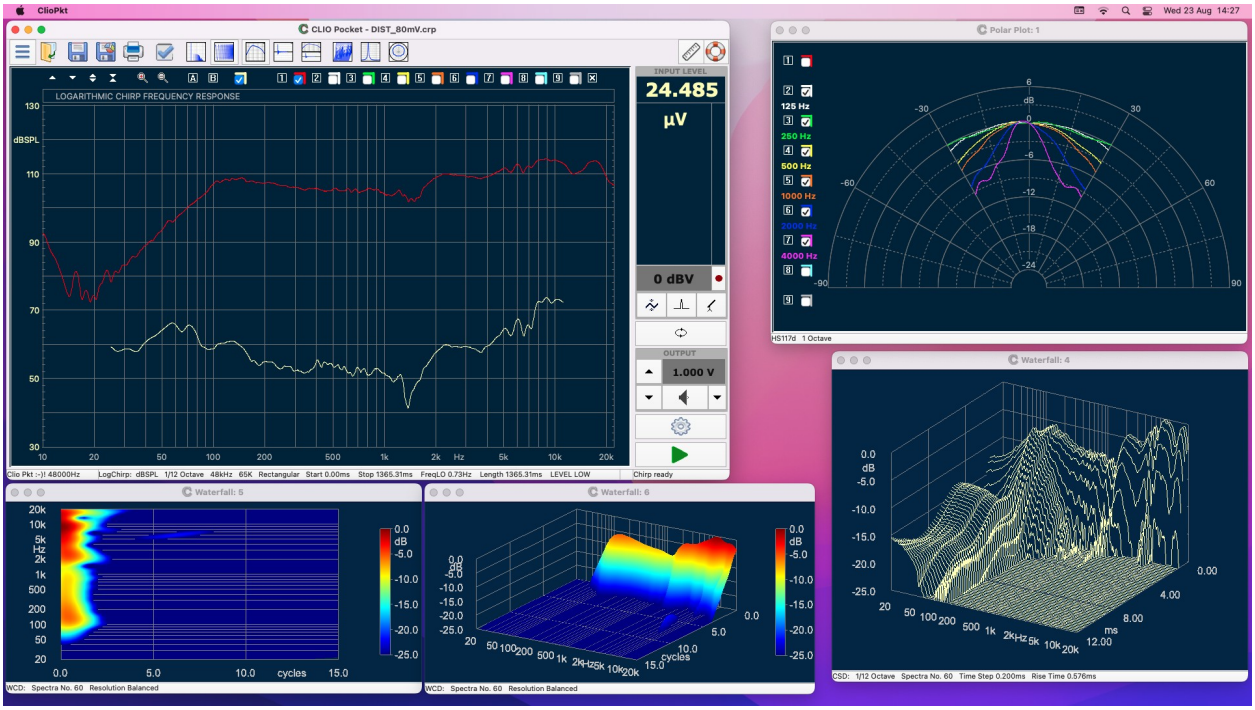
MISCELLANEOUS

Sampling frequencies:	96kHz and 48kHz.
Connections:	analog RCA in and out
Digital connection:	USB 2.0 port
Power supply:	USB powered (480 mA)
Dimensions (cm):	9(w)x12(d)x2.5(h)
Weight:	0.3 kg

MIC-02 MICROPHONE

Type:	Condenser electret
Accuracy:	±1 dB, 20 Hz to 10 kHz ±2 dB, 10 kHz to 20 kHz (direct field)
Maximum level:	130 dB SPL
Dimensions:	8 mm diameter, 12 cm long

CLIO POCKET SOFTWARE REL.3.1 UNDER X-RAYS



LOG CHIRP ANALYSIS

- Amplitude, frequency and time calibrated response.
**- Graph title display
*- Second harmonic, Third harmonic and THD response.
- Chirp length: 16384, 65536 points
- Impulse length range: 1.36s down to 170ms
- Frequency range: 10Hz to 45kHz
- Frequency response units: dBV, dBu, dBRel, dBSPL
**- Current measurement with (A, dBAmpere) units
- Impedance response units: Ohm
- Frequency and time simultaneous display, analysis and post-processing
- Frequency smoothing (1/48 to 1 fraction of octave)
- Phase response (Normal, Minimum and Excess)
- Auto-Capture Delay with manual interactive fine-tuning
- Group Delay response (Normal, Minimum and Excess)
- Time Impulse response
- Step response
- Schroeder impulse decay
- Energy Time Curve
- Quasi-Anechoic acoustic response with start and stop time window selection
- Time window: Rectangular, Auto-Half Hann tuned to impulse max
***- Time window: Auto-Dist Remove tuned to impulse max
- Continuous loop measurements for easy interactive tuning of systems
- AutoStore to Overlay function to track up to 10 curves on screen
*- Math processing: Add file, Subtract file, Divide by file
*- Math processing: Add Value, Multiply by value
- Math processing: Merge High and Low frequency response
- Math processing: dB Shift
- Math processing: MIB (Microphone In the Box) technique
*- Math processing: LP, HP, BP filter

**- Math processing: Divide-by-file for impedance
*- Save Impulse time data to wav file
*- Export ASCII or Excel data to file or clipboard
- Export Graphic data to file or clipboard for easy reporting
*- Dedicated Hot Keys to facilitate measurement inspection
*- AutoSave function with automatic file name generation with specific controls for managing polar measurements sets

FFT AND RTA ANALYSIS

- Narrow-band FFT analyzer
**- Graph title display
- FFT size: 4096, 16384, 65536 points
- Acquisition range: 1.36s down to 42ms
- Frequency range: 10Hz to 45kHz
- Measurement units: dBV, dBu, dBRel, dBSPL
**- Current measurement with (A, dBAmpere) units
- Time window: Rectangular, Hanning, Hamming, Bartlett, FlatTop
- Average: linear to target count or continuously exponential
- Average count: 1 to 9999
- Continue average function to add next linear count
- Max or Min hold function
- Frequency and time simultaneous display and analysis
- Frequency smoothing (1/48 to 1 fraction of octave)
- Real-Time fraction-of-octave analyzer (RTA)
- RTA bands: 1/3 or 1/6 octave
**- FFT Bar Graph measurement with Max Hold display
- Event trigger with programmable delay and threshold
- OneShot event trigger function
**- Internal Trigger
- Save acquired time data to wav file
*- Export ASCII or Excel data to file or clipboard
- Export Graphic data to file or clipboard for easy reporting
*- AutoStore to Overlay function to track up to 10 curves on screen
*- AutoSave function with automatic file name generation

SIGNAL GENERATOR AND OUTPUT CONTROLS

- Dedicated Generator Panel with on-the-fly controls
- Plays standard wav files
- Highly optimized waveform calculator
- Waveform: Sinusoid, FFT-bin optimized, bursted and tapered
- Waveform: Two Sinusoids with relative amplitudes
- Waveform: CEA burst with cycles control, FFT-bin optimized and tapered
- Waveform: White noise
- Waveform: Chirp, Lin or Log, up to 256k size and start and stop frequencies
- Waveform: Pink noise, FFT matched, pseudorandom, low crest factor
- Waveform: All Tones, FFT matched, low crest factor
- Dedicated main window surface with output controls
- All controls speeded up by hot keys
- Direct 3-digit input of output level
- Button control for 1dB or 0.1dB steps
**- Continuous Sweep with manual control

INPUT METER AND CONTROLS

- Free-running Voltmeter and Sound Level Meter with bar graph
- Measurement units: V, dBV, dBr, dBSPL
**- Current measurement with (A, dBAmpere) units
- Integration: Slow, Fast, Impulse
- Filter: A-Weight
*- Filter: C-Weight
- Voltage reading range: from few µV to 100V RMS
*- THD reading: % and dB
**- THD+N reading: % and dB
*- Frequency reading with 0.1Hz resolution
- Interactive L-C-R meter
- Measured components: Resistors, Capacitors, Inductors
*- L,C,R % readings for easy components selection
- Direct measurement of microphone sensitivity
- Direct measurement of reference voltage
- Dedicated main window surface with input controls
- All controls speeded up by hot keys
- Button control input sensitivity in 10dB steps
- Input-Output Loop button
- Input polarity inversion
- Input gain autorange
- Microphone power supply
**- Input recording function

WATERFALL

- Decay analysis with 3-D gesture-controlled swiveling graph
*-Color map 3D & 2D display
*-Selectable color map shading
*-Powerful 3D marker inspection
- Multiple windows allowed for easy comparison
- Analyzes Log Chirp Impulse response or FFT time data
- Classical Cumulative Spectral Decay for loudspeakers characterization
*- Wavelet Cycle Decay for detailed decay analysis
- Frequency smoothing (1/48 to 1 fraction of octave)
- Reference operation
*- Fully configurable frequency, time, cycle and amplitude axis
- Number of spectra: 15 to 120

POLAR PLOTS

*- Circular Polar Plots
*- Half polar display
*- Analyzes Log Chirp frequency response
*- Frequency smoothing
*- Possibility of mirroring data of symmetrical speakers
*- Up to nine simultaneous plots at specified frequencies

MEDUSA TURNTABLE CONTROL

*- Support for Audiomatica computer controlled Medusa Open Source Turntable

THIELE & SMALL PARAMETERS

- Interactive Control Panel to simplify operation
- Free Air parameters
- Added Mass or Known Volume methods for full parameters estimation
- Direct measurement of ReDC.
- Multiple windows allowed for easy comparison

SYSTEM

***- 64bit software executable operates native under 64 bit Windows versions XP, Vista, 7, 8, 8.1, 10, 11 or Apple Mac OS X/macOS (10.9 to 15)
**- Enable System Audio Devices Play Control
- Touch and gesture compliant software design
- Hardware relies on dedicated USB driver
- Ultra stable, glitch-free, streaming operation
- Self-calibration with comparison to Audiomatica Labs calibration conditions
- Stored calibration parameters trace international standards
- Assistance warning in case of any component run out of spec with time
- Security warning in case of any unauthorized parameter change

(*) New in release 3.0 compared to 1.0
(**) New in release 3.0 compared to 2.2
(***) New in release 3.1 compared to 3.0

1 CLIO POCKET INSTALLATION

1.1 MINIMUM PC CONFIGURATION

The CLIO CP-01 audio interface running the CLIO Pocket software can be installed in any personal computer with the following minimum system requirements:
– Pentium IV class processor (suggested minimum 2GHz)
– One free USB 2.0 port
– 1024x768 video adapter
– Microsoft Windows 64 bit XP, Vista, 7, 8, 8.1, 10, 11 or Apple Mac OS X/macOS (10.9 to 15)

PLEASE FOLLOW THESE PROCEDURES TO INSTALL AND GET STARTED WITH YOUR CLIO POCKET!

1.2 DRIVER INSTALLATION UNDER WINDOWS

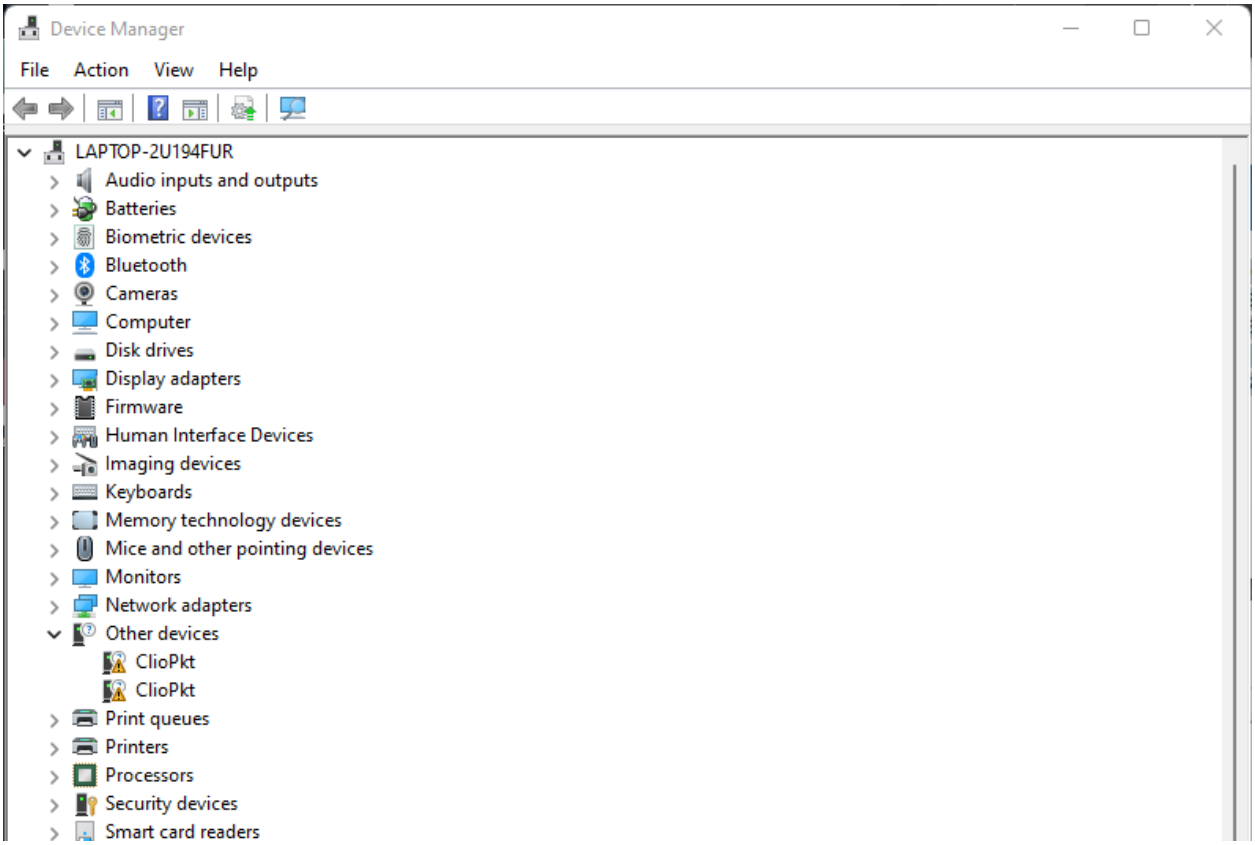
1.2.1 INSTALLING UNDER WINDOWS 10 AND 11

Connect your CLIO Pocket to a free USB 2.0 port on your PC.

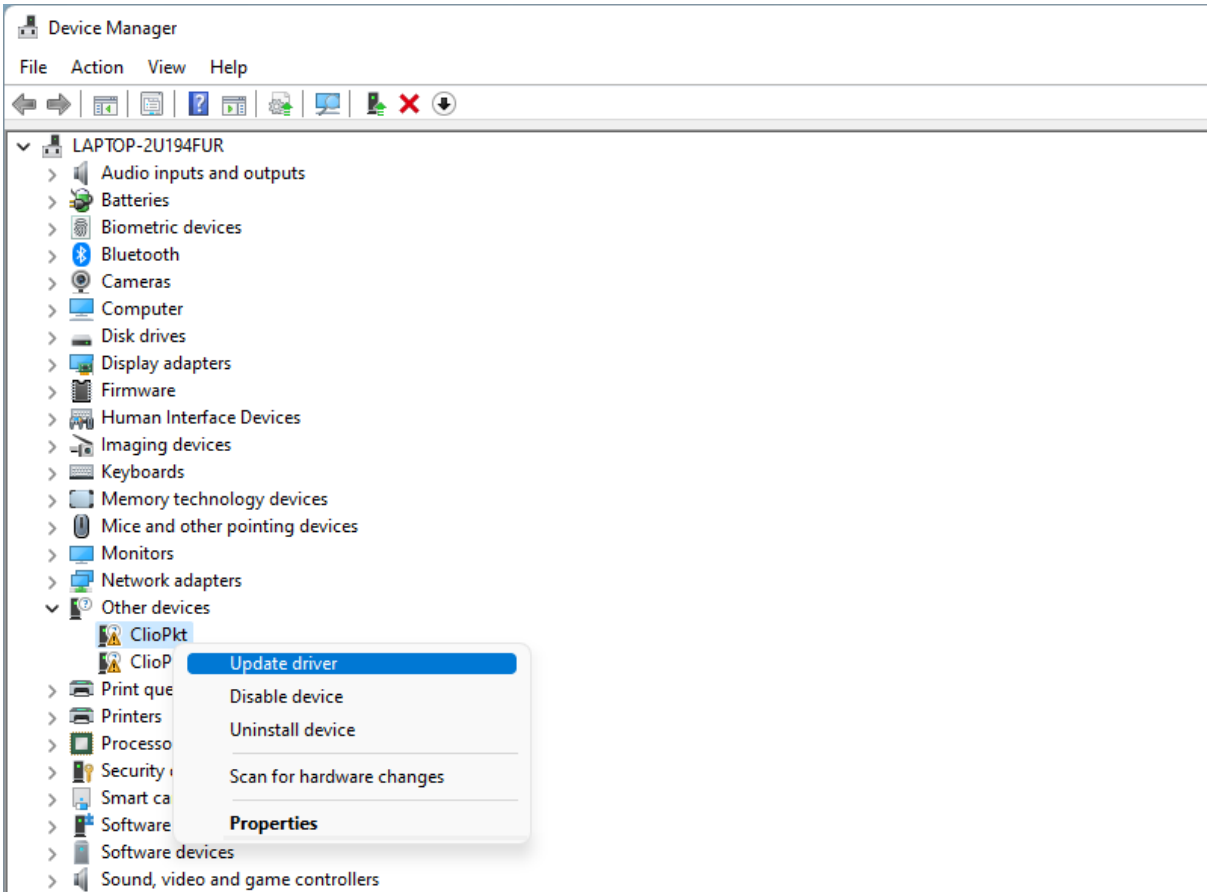
You should hear the classical sound of plug and play device; note: *the front panel blue LED should NOT be lit at this time*.

After the initial automatic driver detection only one device should be found by Windows, the USB Composite Device; two more devices, named ClioPkt should be installed manually.

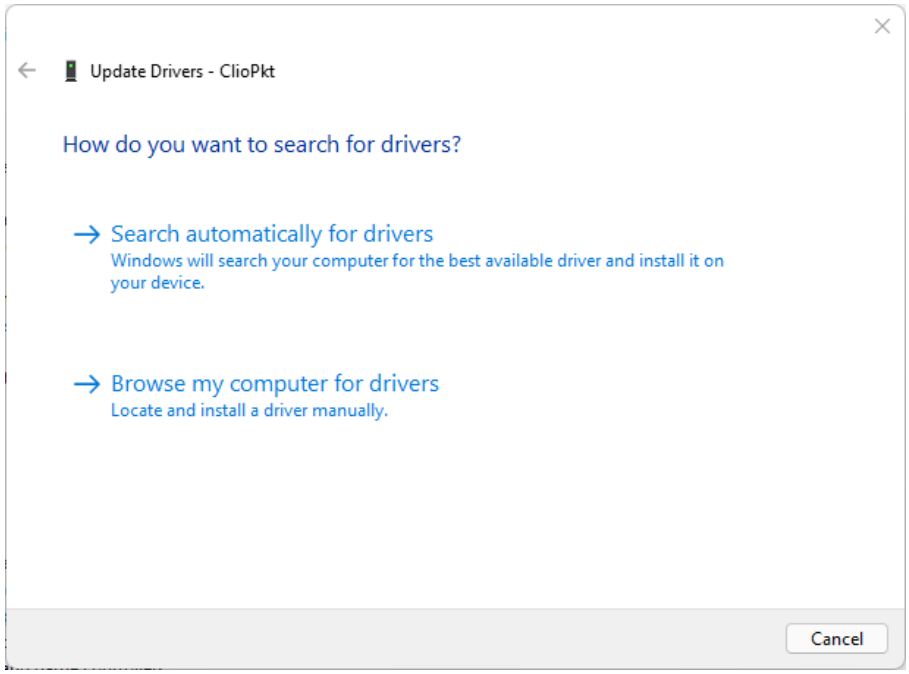
Open Device Manager (type *devmgmt.msc* from Run prompt or click Control Panel>System>Device Manager), you should find this situation:



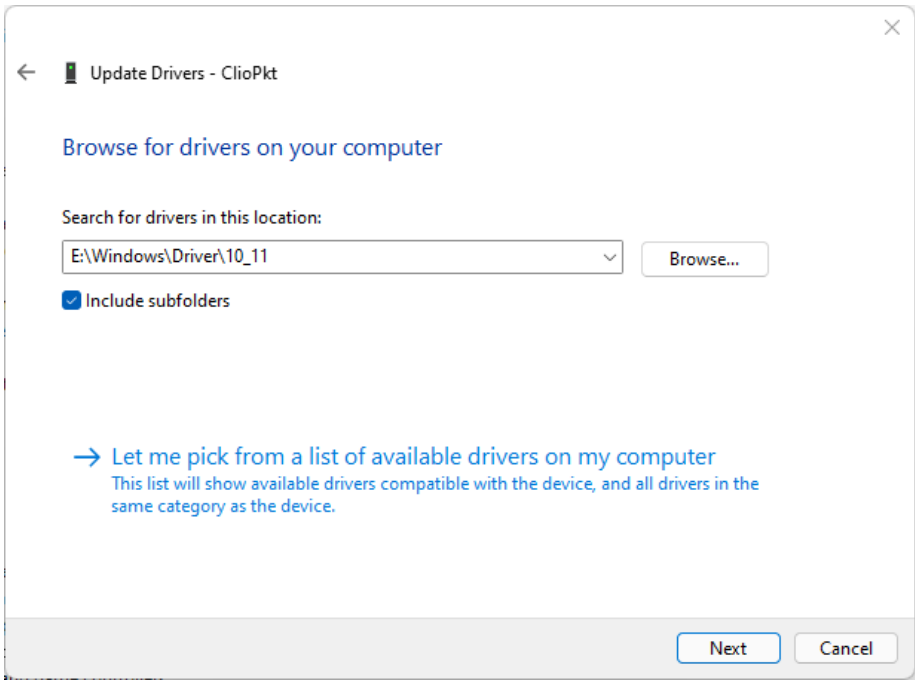
Right-Click on each ClioPkt device under Other Devices and choose Update Driver Software.



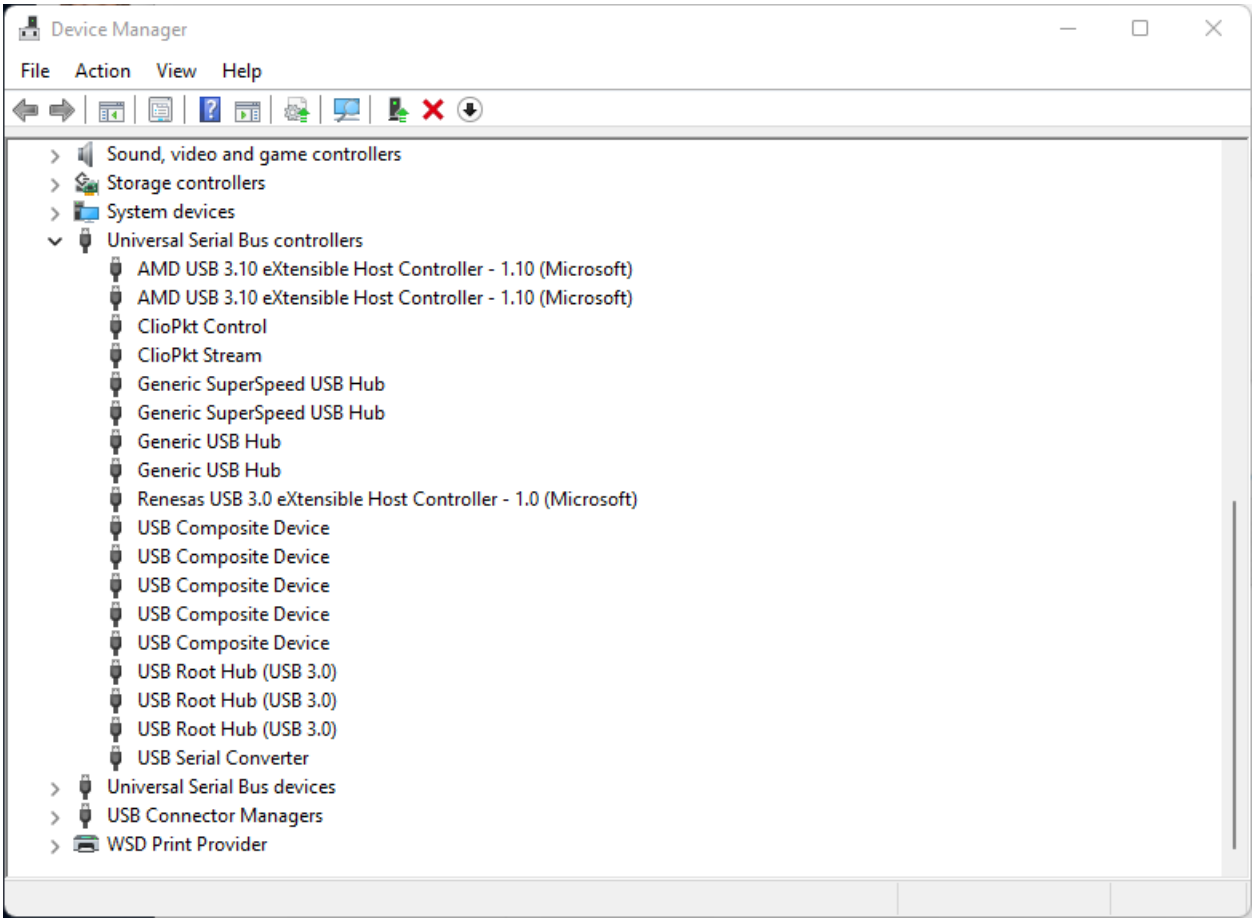
At the successive prompt:



Browse your computer and point to the folder inside the installation SD card where the proper drivers are located (usually \Windows\Driver\10_11).



At the end of installation you will get the **ClioPkt Control** and **ClioPkt Stream** entries within Device Manager:



Your driver installation was successful!

1.2.2 INSTALLING UNDER WINDOWS 7

If enabled, **disable Secure Boot**. More information on Secure Boot and how to

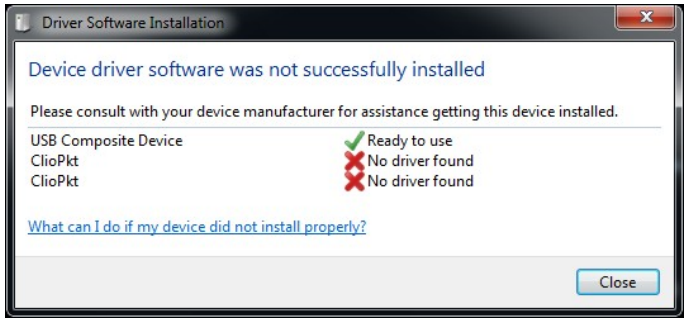
disable it are available in our Technical Note:

http://www.audiomatica.com/wp/wp-content/uploads/technote_009.pdf

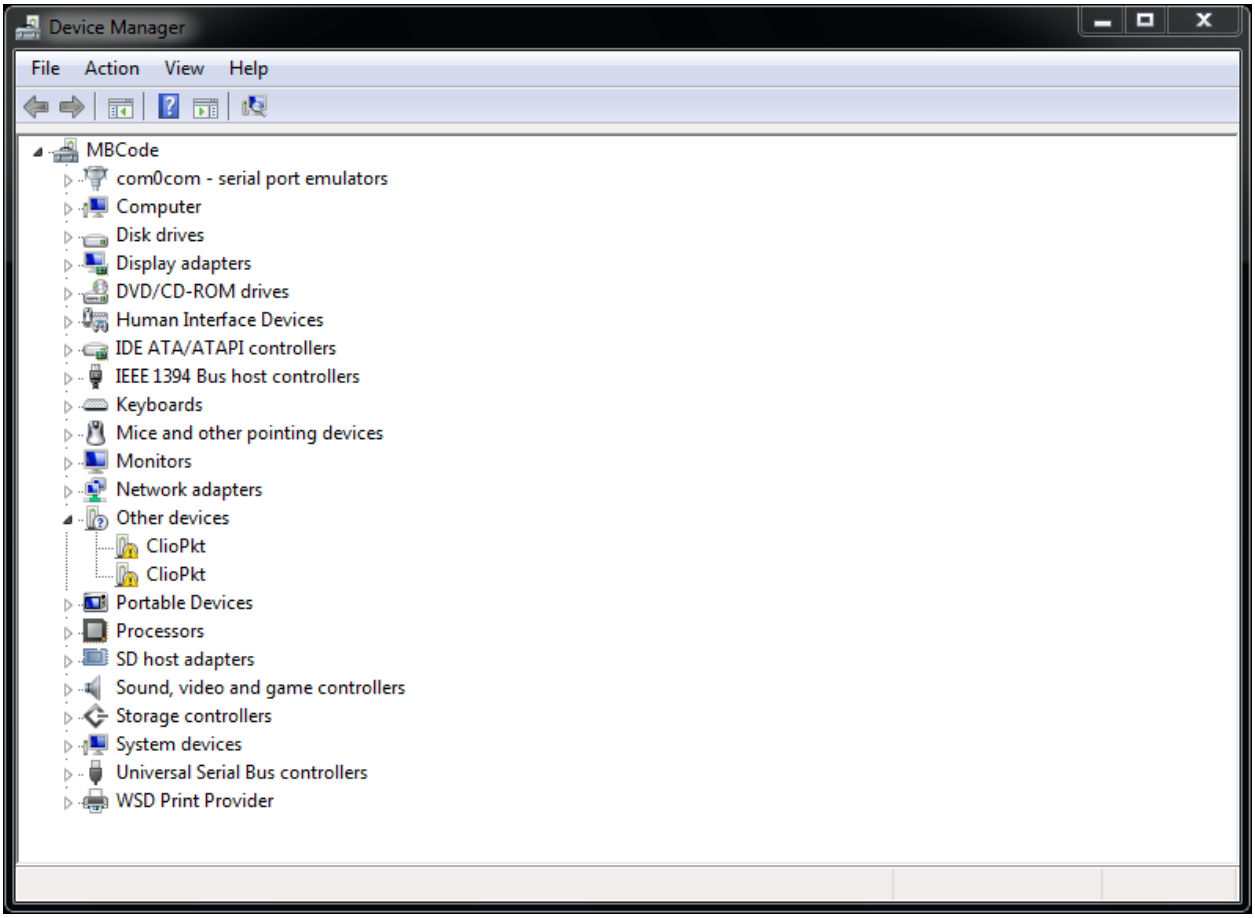
Connect your CLIO Pocket to a free USB 2.0 port on your PC.

You should hear the classical sound of plug and play device; note: *the front panel blue LED should NOT be lit at this time*.

After the initial automatic driver detection only one device should be found by Windows, the USB Composite Device; two more devices, named ClioPkt should be installed manually.

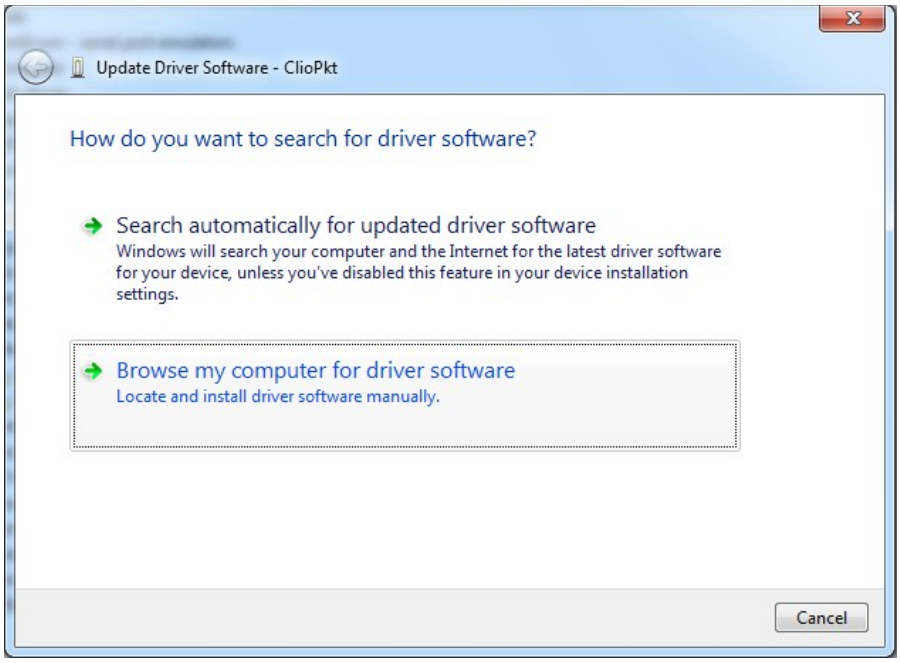


Open Device Manager (type *devmgmt.msc* from Run prompt or click Control Panel>System>Device Manager):



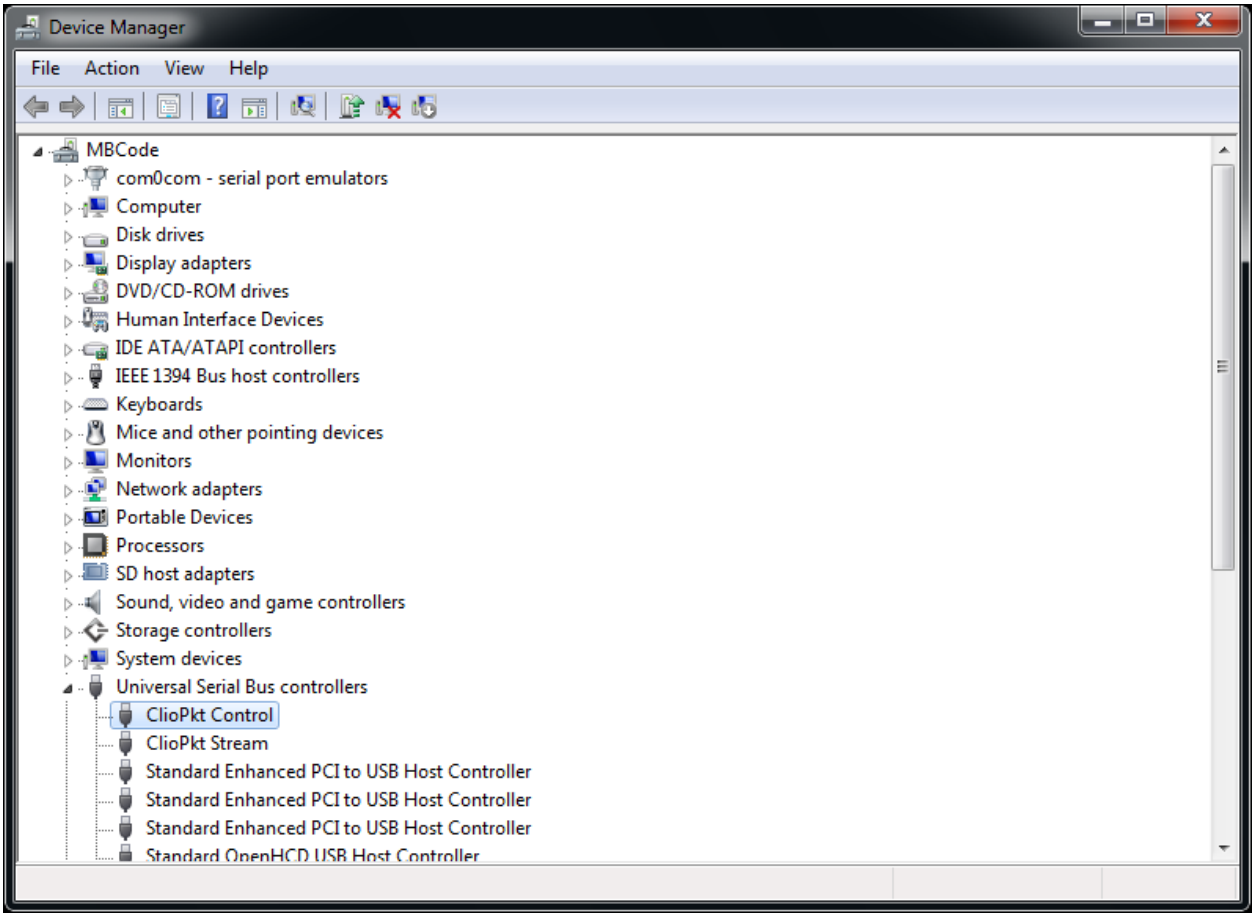
Right-Click on each ClioPkt device under Other Devices and choose Update Driver Software.

At the successive prompt:



Browse your computer and point to the folder inside the installation SD card where the proper drivers are located (usually \Windows\Driver\Vista_7_8).

At the end of installation you will get the **ClioPkt Control** and **ClioPkt Stream** entries within Device Manager:

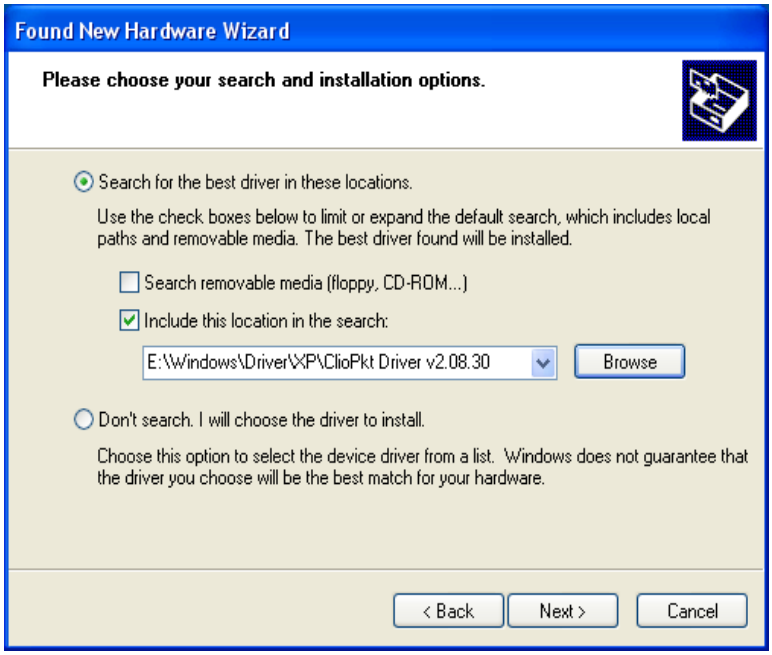


Your driver installation was successful!

1.2.3 INSTALLING UNDER WINDOWS XP

Installing under XP differs as, when you plug in CLIO Pocket, the Found New Hardware Wizard starts

The wizard will direct you while installing the two drivers needed. You should *Install from a specific location* and point to the driver folder for XP on the CD (usually \ Windows\Driver\XP) and then answer **Continue Anyway** to the prompt about Windows Logo testing.



At the end please go back to above 1.2 and inspect Device Manager to verify proper installation of the drivers.

1.3 SOFTWARE INSTALLATION UNDER WINDOWS

This paragraph deals with **software installation.**

Be sure to have administrative rights when installing CLIO Pocket.

Launch the CLIO Pocket installer running the *ClioPktSetup.exe* file from the installation CD:

At the end of the wizard the CLIO Pocket software should be installed smoothly; take note of the installation folder (usually C:\Program Files\Audiomatica\ClioPkt).

1.4 INSTALLING UNDER OS X/MACOS

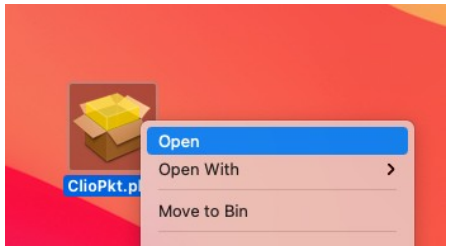
ClioPkt is a 64 bit application compiled for Intel processor, you can run it under Apple Silicon Macs using Rosetta 2 AOT translation.

Connect your CLIO Pocket to a free USB 2.0 port on your Mac. **Note: *the front panel blue LED should NOT be lit at this time.***

You may find the OS X/macOS installer (ClioPkt.pkg) in the CLIO Pocket SD under the /OSX folder.

Double click on the ClioPkt package icon to open the installer:

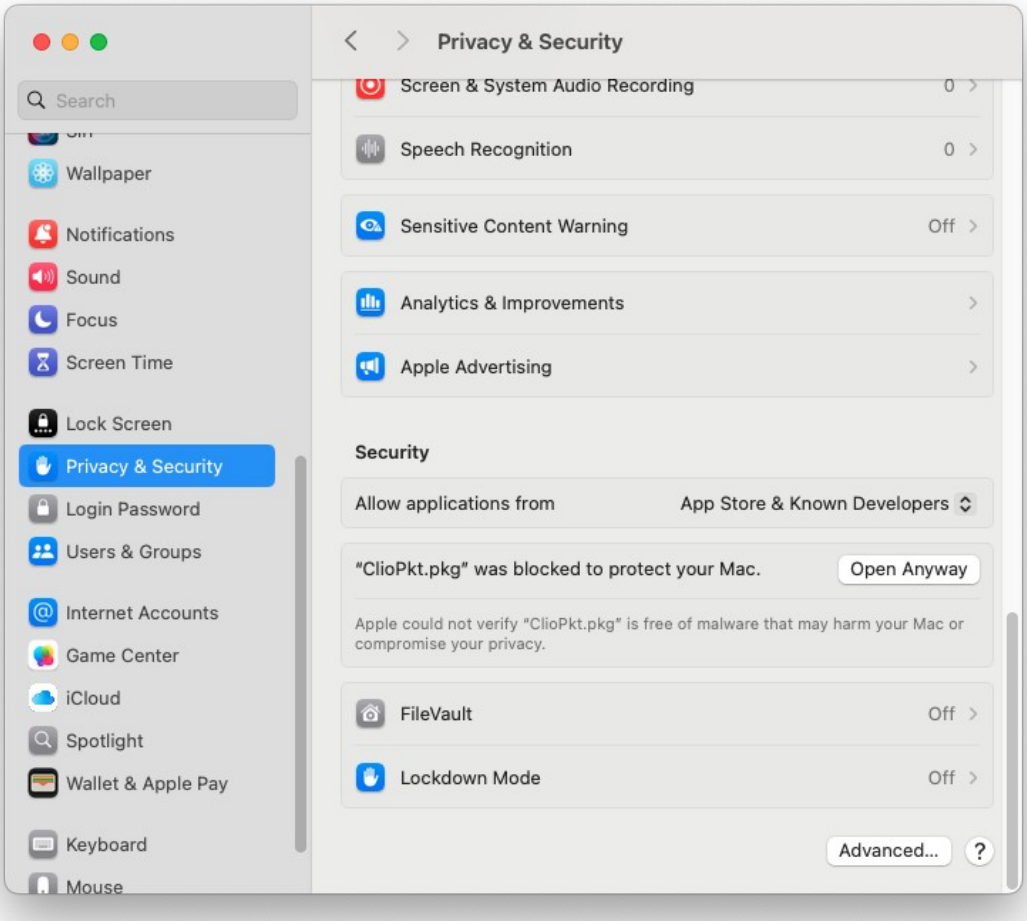
In some cases it might be necessary to right-click on the icon and select "Open":



Then at the following prompt select Open again:

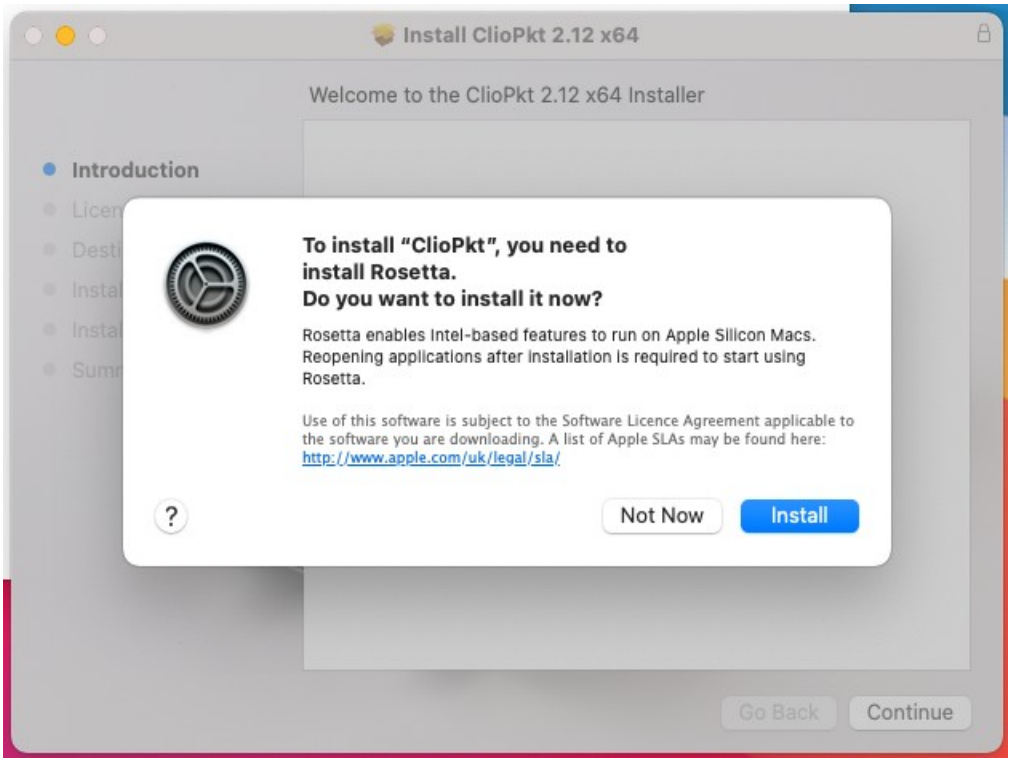
When trying to install CLIO Pocket under macOS 15 Sequoia you might find yourself in this situation where you cannot proceed further with the software installation:

In previous versions of macOS right+Click on the ClioPkt package used to lead to a similar dialog with "Open" button as seen before. To proceed with the installation of Clio Pocket you should also open System Settings and select the Privacy & Security section where you will find the following dialog.

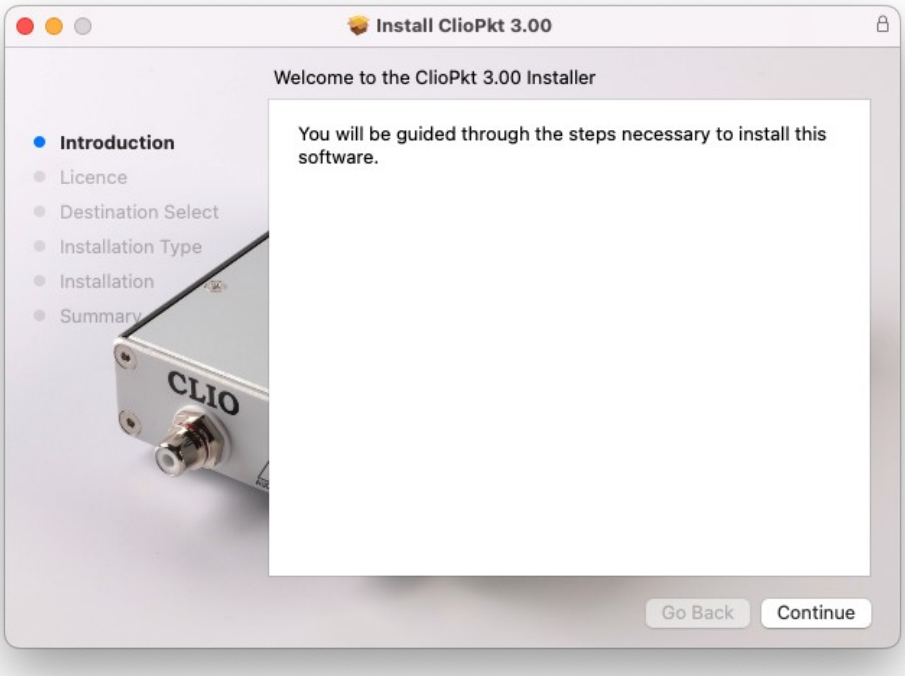


A click on "Open Anyway" does the trick.

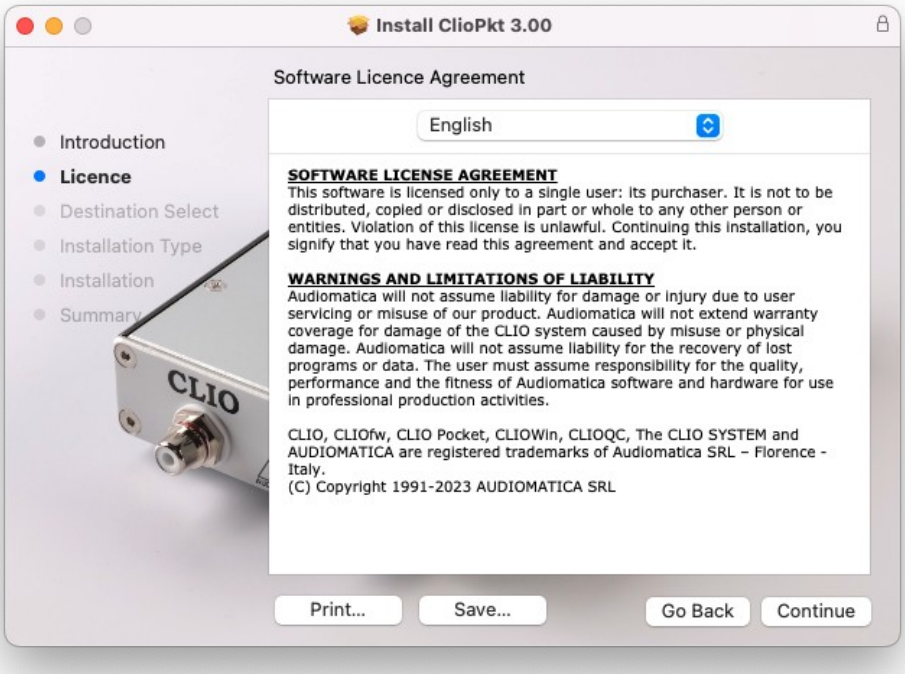
If you are on a Mac with Apple Silicon you might need to activate the Rosetta translation:



The installer window should open:



Click on Continue to proceed with the installation.



Accept the license agreement and proceed to the next screen.

Under OS X/macOS the installation is performed in four steps:

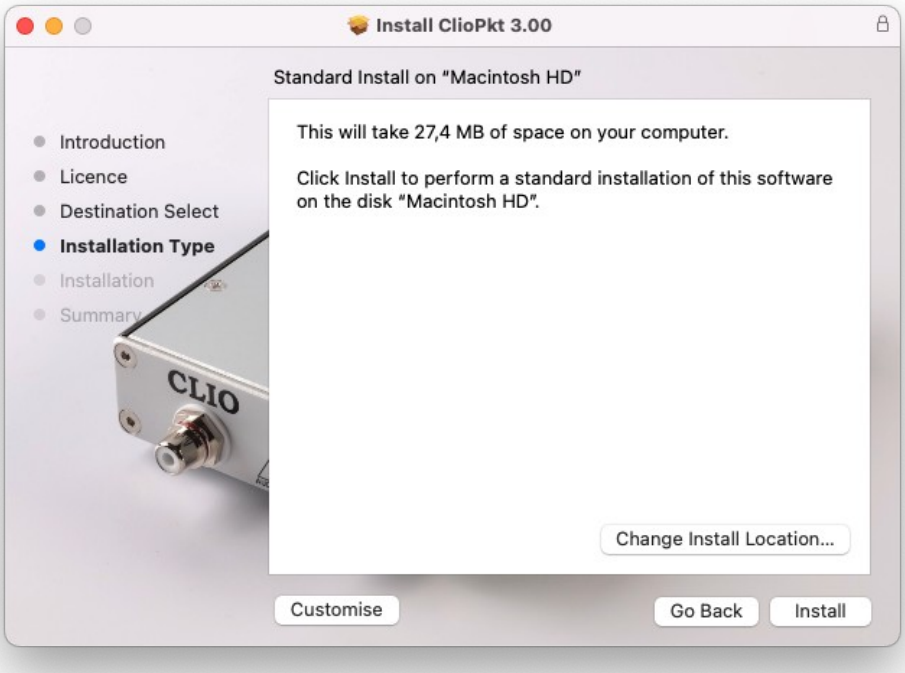
1 Device driver installation (device driver files are copied under /usr/local/lib/ folder)

2 ClioPkt application installation (application bundle is copied under Applications folder)

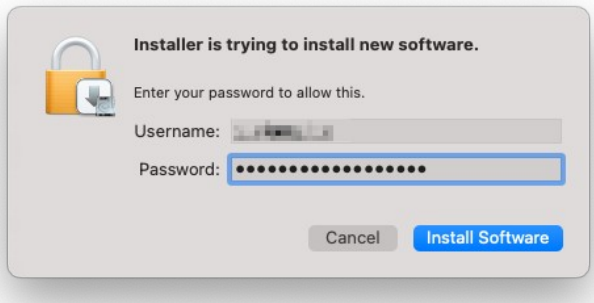
3 Ancillary files and folder structure installation (files and folders are copied under /Library/ClioPkt/ folder)

4 Audiomatica Medusa Open Source Turntable dynamic linked library installation (library file is copied under /usr/local/lib/ folder)

Click on Install to proceed with the Standard Installation elsewhere click on Customize to select which items you want to install.

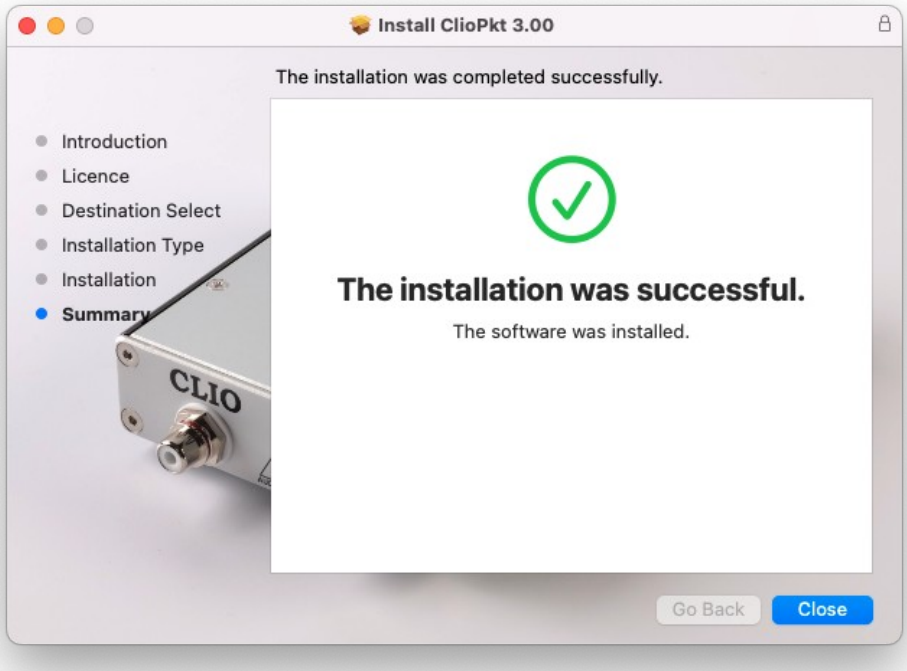


In order to install the Device Drivers the system root password should be typed:



At this point the installer copies the folders and files to the local installation media.

At the end of the installation you should get this message:



The installation is successful, depending on your OS X/macOS version you should find the ClioPkt application under user /Applications/ folder and Launchpad.

1.5 HOW TO UNINSTALL CLIO POCKET UNDER OS X/MACOS

At the end of the installation you should have the following items added to your system:

1 Device drivers library:

$ ls /usr/local/lib | grep libftd

libftd2xx.1.4.24.dylib

libftd2xx.dylib

2 ClioPkt application bundle:

$ ls /Applications/ | grep ClioPkt

ClioPkt.app

3 Directory structure:

$ ls /Library/ClioPkt/

Cal Help Signal Tables Temp

4 Audiomatica Medusa Open Source Turntable library:

$ ls /usr/local/lib | grep OpenBase

OpenBase.dylib

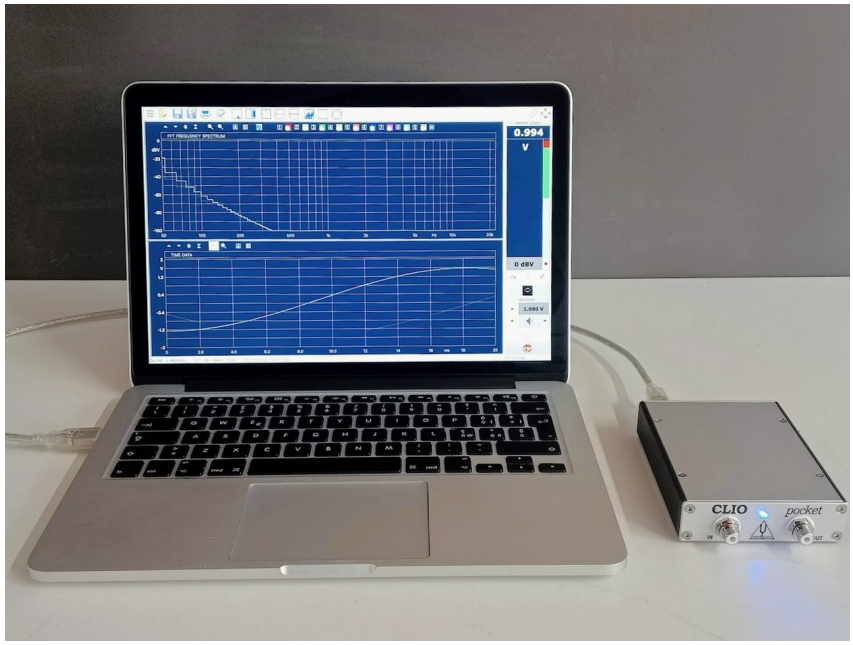
In order to completely uninstall CLIO Pocket from your Mac, and cleanup the files copied by the installer, you should delete all the files above.

2 CLIO POCKET MAP

2.1 RUNNING CLIO POCKET FOR THE FIRST TIME

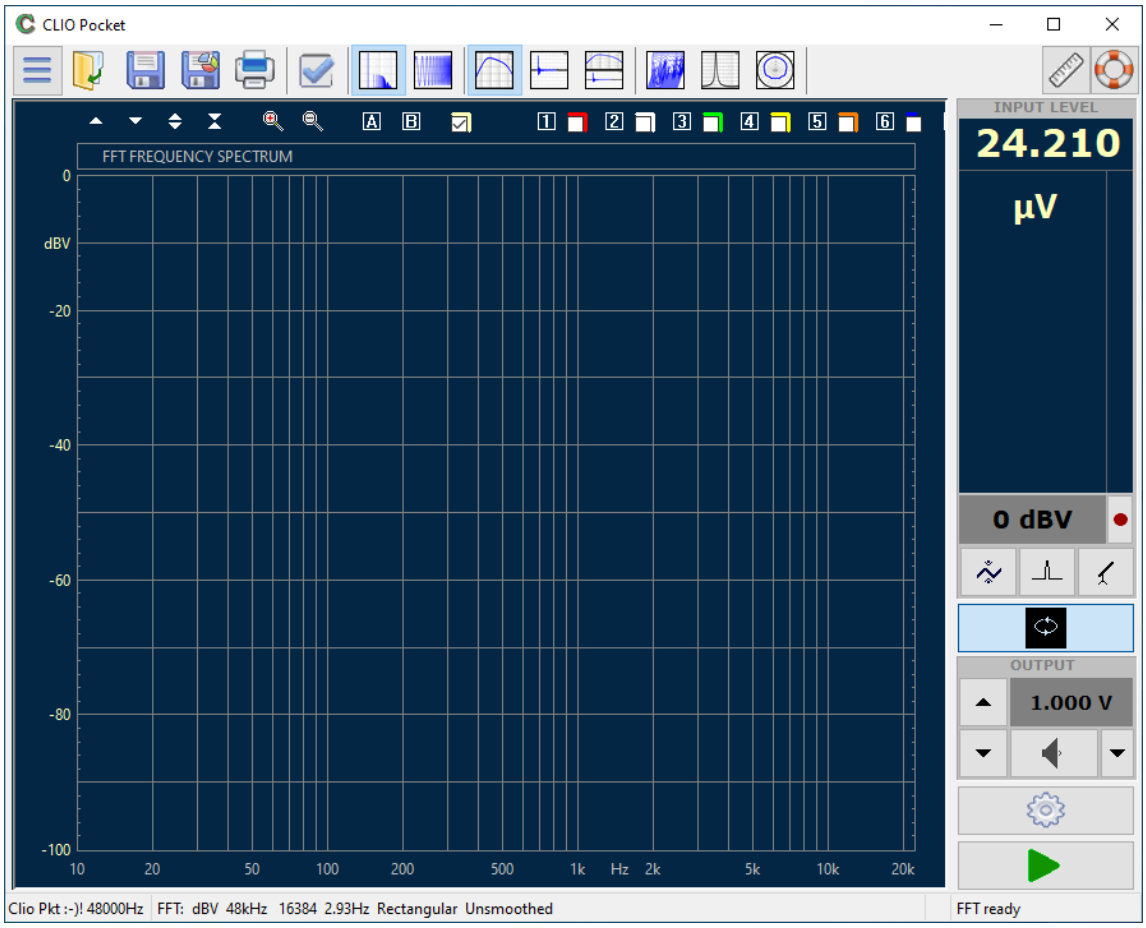
If you have completed the preceding installation procedures, you are ready to run CLIO Pocket!

From the **Start Menu** choose **Programs** (Under OS X/macOS go under Applications), then **CLIO Pocket** and click on the CLIO icon.

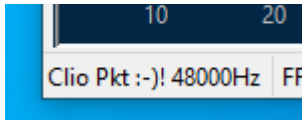


Upon a successful installation the front panel blue led should now light up, you may hear the internal relays clicking and the program should start smoothly and present the main desktop.

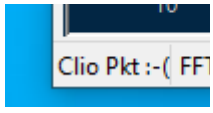
2.2 CLIO POCKET DESKTOP



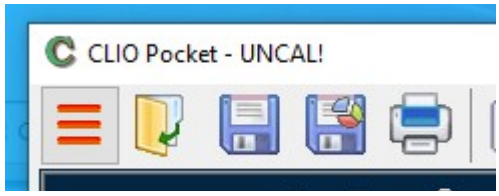
Particular attention should be paid to the **corners** of the main window of CLIO Pocket; there useful and important, sometime vital, information is displayed. The **lower left corner** keeps information on the hardware status. An *happy face* tells you that the device is running OK:



while a *sad face* is given **in case the hardware is not connected** or various problems are found:



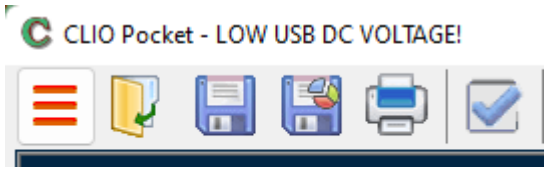
The **upper left corner** gives information inside the title bar of the window:



In the above figure, the software tells you that it has not been calibrated or that it needs to be calibrated. This is the default state when first running CLIO Pocket.

The **upper left corner** also gives information in the title bar in case of a *sad face*

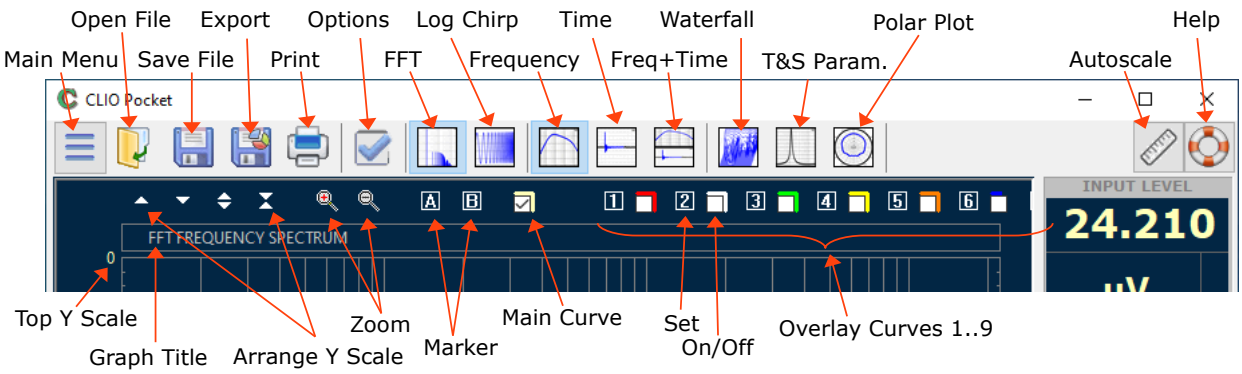
situation where the hardware is connected but the USB DC voltage is too low to run the hardware:



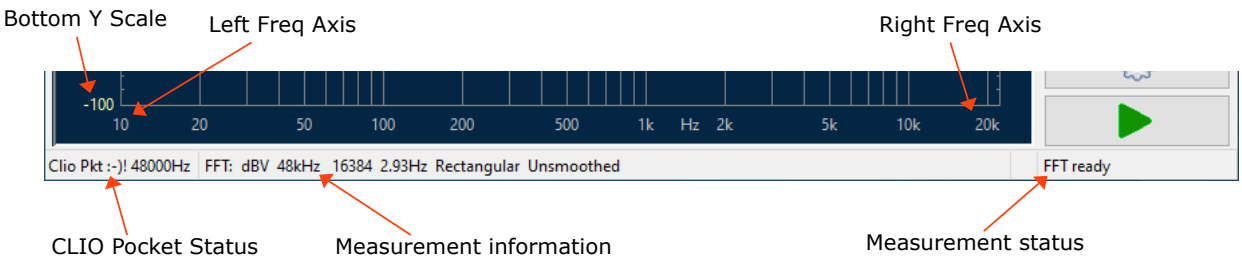
This might happen in case of a malfunctioning USB Cable or USB PC Port. The fact that the same USB cable and/or USB PC port is working with other devices does not guarantee that the DC voltage is sufficient to run CLIO Pocket CP-01 hardware. **Please always use high quality USB cables as the one provided with the CLIO Pocket system**.

Here we briefly describe the buttons and other mouse controllable areas of CLIO Pocket Desktop. Feel free to click on each of these and experiment yourself.

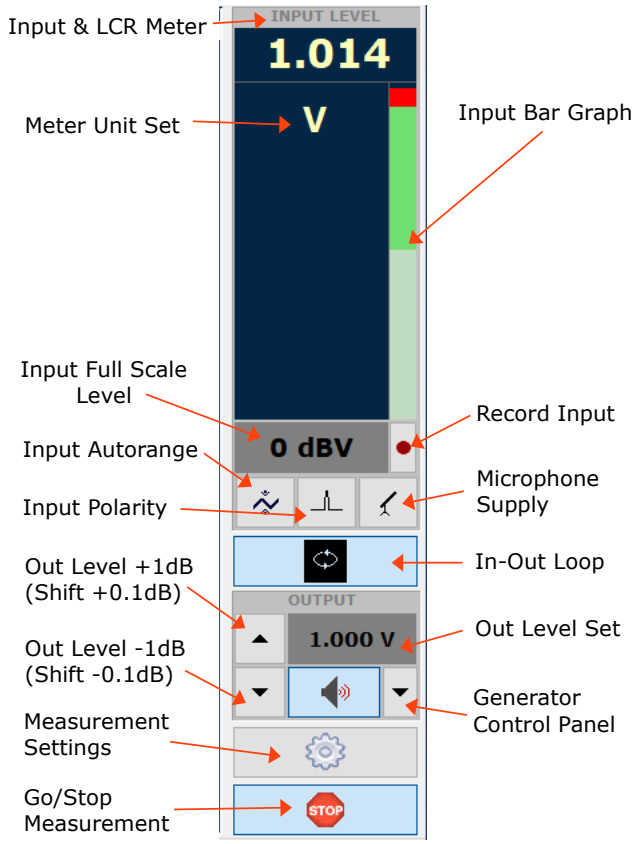
Upper bar, graph buttons and controls.



Lower bar and graph controls.



Side bar.


Input & LCR Meter
INPUT LEVEL
1.014
Meter Unit Set
V
Input Bar Graph
Input Full Scale Level
0 dBV
Record Input
Input Autorange
Input Polarity
Microphone Supply
In-Out Loop
Out Level +1dB (Shift +0.1dB)
OUTPUT
1.000 V
Out Level Set
Out Level -1dB (Shift -0.1dB)
Generator Control Panel
Measurement Settings
Go/Stop Measurement
STOP

2.3 HOT KEYS

ESC
Immediately kills the generator. Equivalent to releasing

F1 Invokes CLIO Pocket manual. Equivalent to

F2 Saves a measurement file relative to the active measurement. Equivalent to

SHIFT+F2 Export measurement data as a text or graphic file

F3 Loads a measurement file relative to the active measurement. Equivalent to

SHIFT+F3 Import data from .txt file

F5 Recalls Clio Pocket Options. Equivalent to

SHIFT+F5 Recalls measurements settings. Equivalent to

F6 Enables/disables autoscale. Equivalent to

F7 Decreases the output level by 1dB. Equivalent to

SHIFT+F7
Decreases the output level by 0.1dB. Equivalent to SHIFT+

F8 Increases the output level by 1dB. Equivalent to

SHIFT+F8
Increases the output level by 0.1dB. Equivalent to SHIFT+

F9 Increases input acceptance by 10dBV.

SHIFT+F9
Decreases input acceptance by 10dBV.

CTRL+L Opens Log Chirp Analysis

CTRL+F Opens FFT Analysis

ALT+T Time Graph view

ALT+F Frequency Graph view

ALT+B Frequency & Time Graphs view

G Starts measurement. Equivalent to

T Stops interactive measurement. Equivalent to

CTRL+P
Toggles Modulus and Phase. Valid for LogChirp measurement.

CTRL+1
Returns to fundamental response display when a harmonic distortion curve is

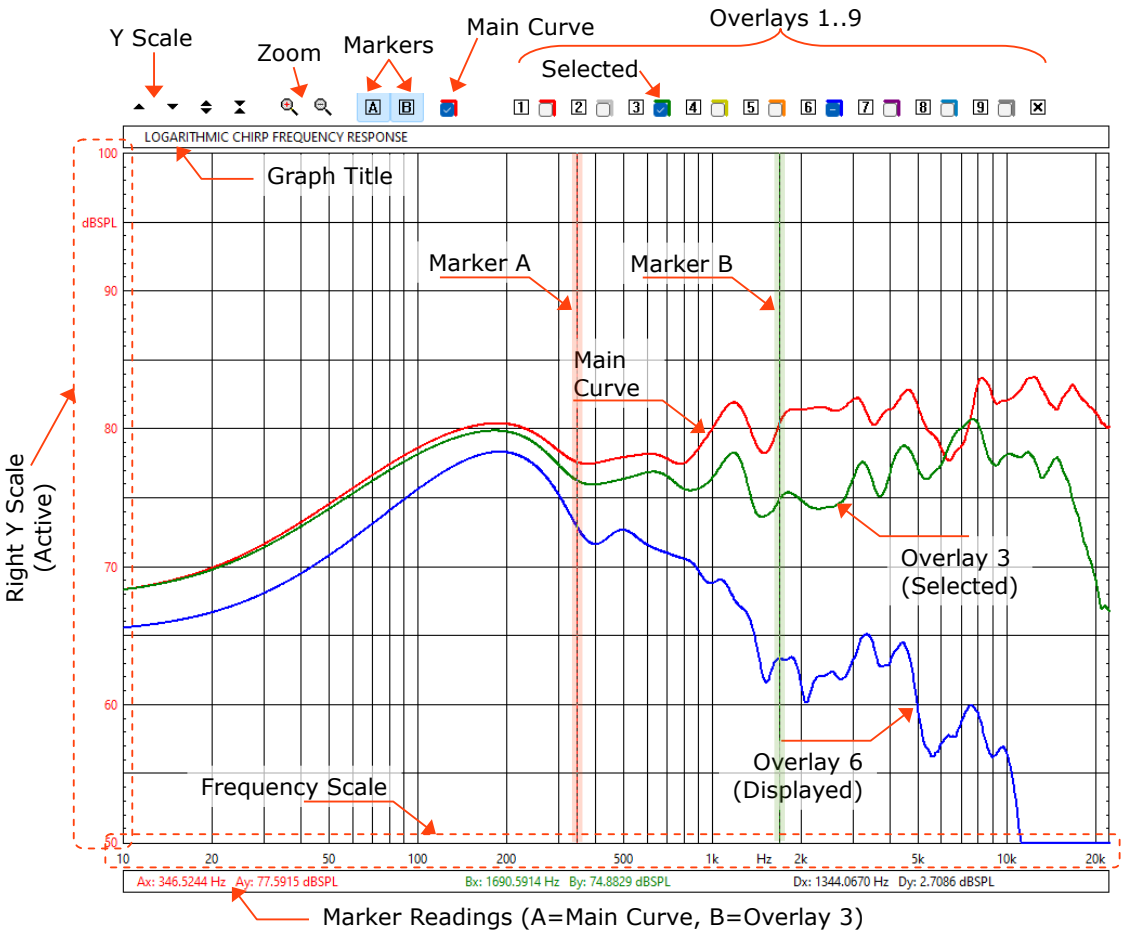
displayed. Valid for LogChirp measurement.

CTRL+2
Displays total harmonic distortion. Valid for LogChirp measurement.

CTRL+3
Displays second harmonic distortion. Valid for LogChirp measurement.

CTRL+4
Displays third harmonic distortion. Valid for LogChirp measurement.

2.4 THE GRAPH DISPLAY



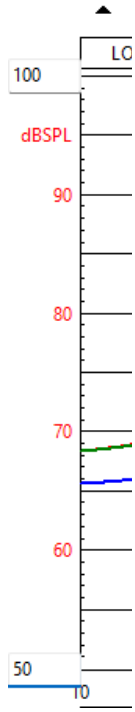
The figure explains the main objects found in a Frequency response measurement display. Inside the graph you find the **main curve** which reflects an executed (or loaded from disk) measurement; up to nine **overlays curves** which are stored by the user and can be controlled interactively, the two **markers** which are activated by clicking on the respective buttons. Above the graph itself we find several buttons and checkboxes which divide into three main categories: Y scales controls, main curve, zoom and overlays management.

Each overlay can be displayed, hidden or selected with the relative checkbox.

Marker A reads the main curve; marker B has a twofold operation: it reads the selected overlay, if present, otherwise it reads the main curve again.

Beside and below the graph we find the Y Scales, the Frequency (or Time) Scale and Marker Indicators. The Y scale is of the same color of the main curve selected.

It is possible to directly input the Y scale values; to activate the input boxes simply click on the scale extremes.



HOW TO ZOOM

1) Click on the Zoom+ button.

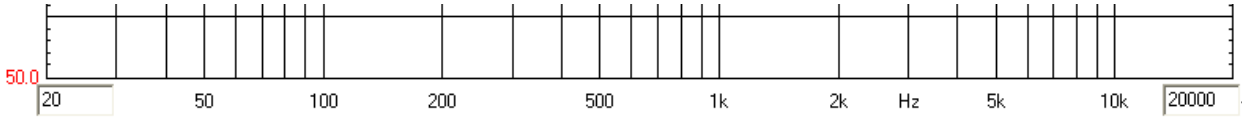
2) Position the mouse and PRESS the left mouse button at the beginning of your selection and **keep the mouse button pressed**. Don't just click otherwise you get a warning message!

3) With the mouse button pressed move the mouse until the second selection point.

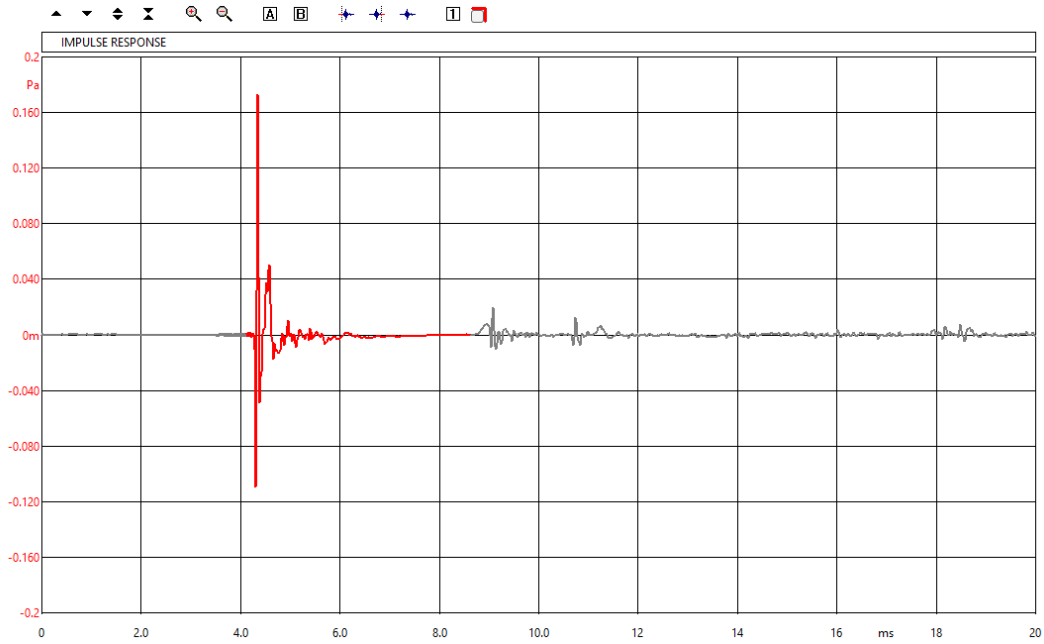
4) Now release the left mouse button.

Be careful: you must have the button pressed from point 2) to point 4)!

It is also possible to zoom by direct input of the Frequency extremes of the scale; to activate the input boxes simply click on the scale extremes.



THE CHIRP TIME DOMAIN DISPLAY



In this case there is only one overlay. It is also possible to **select** a portion of the main curve by means of three particular buttons. The selected portion of the main curve is identified by a **start** and **stop** point and is drawn in a different color from the unselected portion.

Defines the **start point** of the selection. **Before clicking with the button activate Marker A and position cursor to the desired point.**

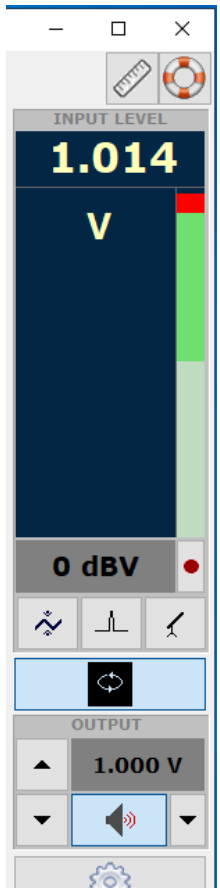
Defines the **stop point** of the selection. **Before clicking with the button activate Marker A and position cursor to the desired point.**

Returns the curve to a completely unselected state.

2.5 INITIAL TEST MEASUREMENT

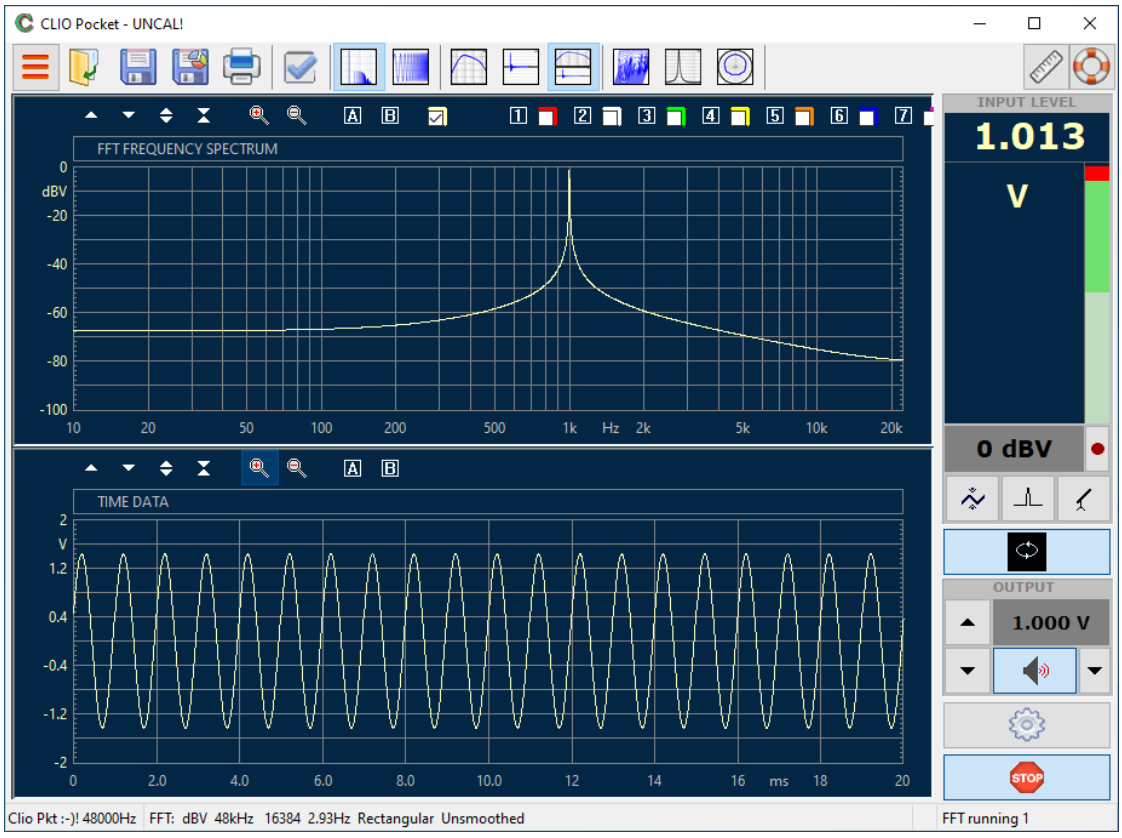
Let's now execute our first test measurement: to play and capture a 1kHz sinusoid. The In-Out Loop button should be **down**, click on it if not; in this way CLIO connects output with input with an internal relay. This connection is very important as it lets you capture and analyze a signal generated by CLIO without the need for an external connecting cable.

Then click on the generator icon to play a 1kHz sinusoid, it's the default signal. The input meter should react as in Figure and display the level in Volts of the signal at the input.



If everything is OK you should obtain a reading of circa 1V, variable between a minimum of 0.95V and a maximum of 1.05V, which is the mean output level of a sinusoidal signal when the system is not calibrated.

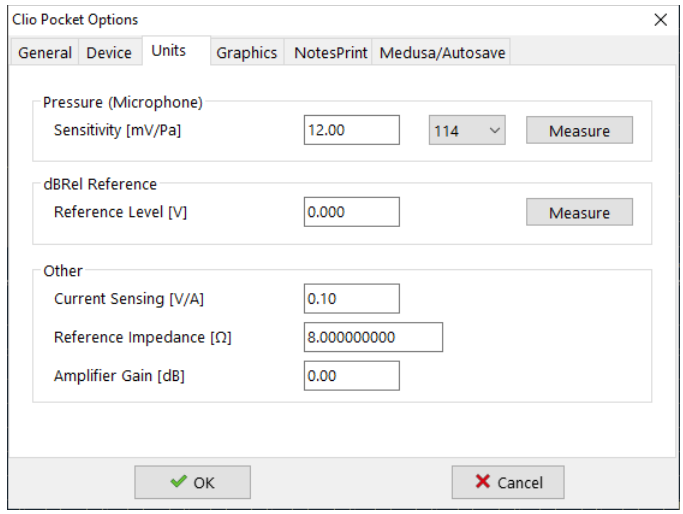
Now press the FFT button, the Frequency and Time Graphs button and finally the Go Button.



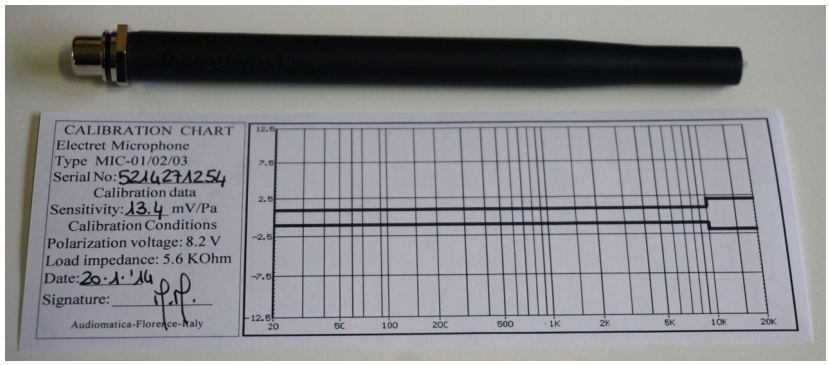
The result you should obtain is an FFT analysis of the 1kHz sinusoid and its time representation given by its waveform.

2.6 MICROPHONE SENSITIVITY

As seen, the main and default measurement unit of the instrument is AC voltage. Before taking measurements in different units, such as dBSPL, you must input the proper transducer sensitivity. To do this open the Options>Units dialog.



To prepare CLIO Pocket to take SPL measurements set your microphone sensitivity inside this dialog; you may read it from the calibration chart that comes with your microphone:



In the case of figure input 13.4 mV/Pa in the Pressure>Sensitivity edit box.

Otherwise you may directly measure it provided you have a proper acoustical calibrator and use the 1/2” adapter supplied with the MA-01 accessory kit:

In this case select the calibrator pressure used with the drop-down and, when ready, press the Measure button to capture the microphone sensitivity.

3 CALIBRATION

3.1 SYSTEM CALIBRATION

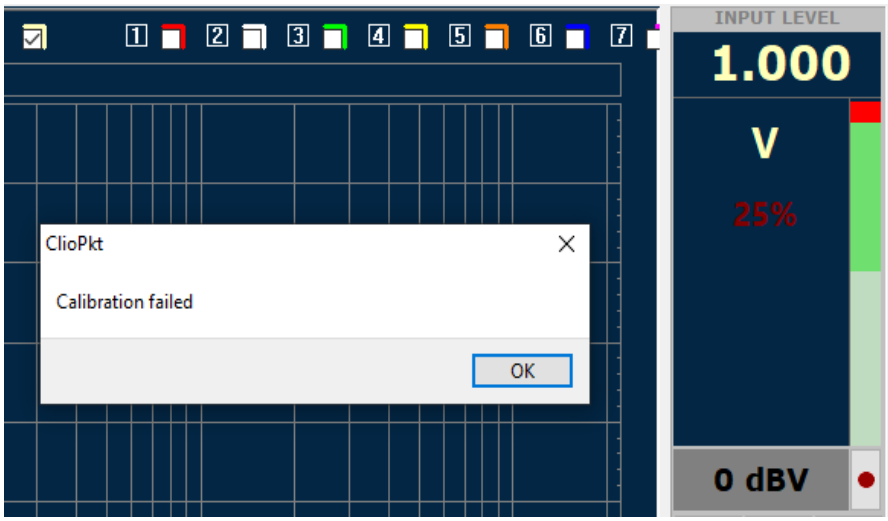
This section describes how to perform the system calibration.

Proceed only if previous test succeeded!

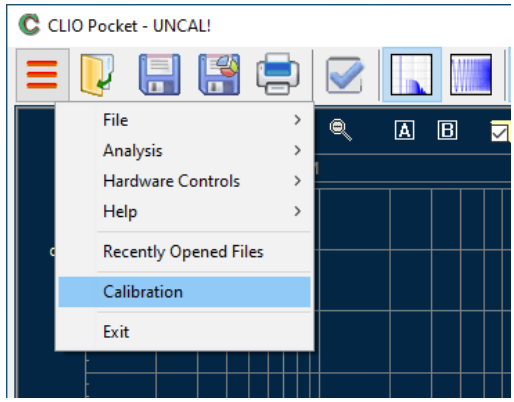
The calibration process ensures that your instrument traces laboratory conditions thus reaching its maximum precision when taking measurements; it also ensures that hardware has not degraded with time. To calibrate your CLIO Pocket keep it in a room at normal environmental conditions; *normal environmental conditions* should be, in terms of temperature, between 20 to 26 degrees Celsius; if out of this, calibration should not be attempted.

Be sure that, any time you perform a calibration, the system has warmed up for, at least 15-20 minutes. To warm up the blue front led should be ON; if the system is just hooked to USB it will never warm up. The best thing to do is to follow instructions given in 2.5 INITIAL TEST MEASUREMENT and leave the unit in that conditions i.e. generating a sinusoid in loop.

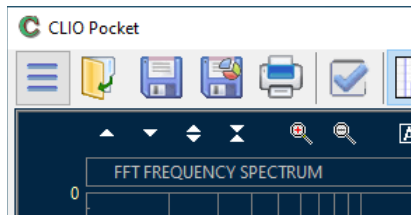
If done too soon, or too late, or out of normal environmental conditions, you may receive the **Calibration Failed** warning message; in case repeat the procedure after a while.



To start select **Calibration** from the **Main** menu



Leave the CLIO Pocket front plugs unconnected when calibrating.
At the end of the calibration process the UNCAL! warning is removed from the title of CLIO Pocket window.



Now it is mandatory to verify the calibration itself; this is done by two simple measurements as described in the following section.

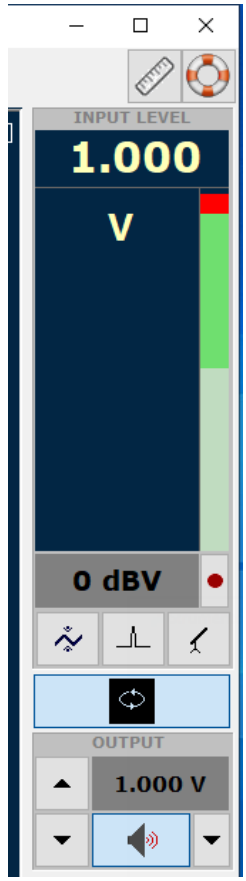
3.2 CALIBRATION VALIDATION

To verify the calibration:

STEP 1: check that the generator output level is set to 1V and that the Input Full Scale Level is 0dBV.

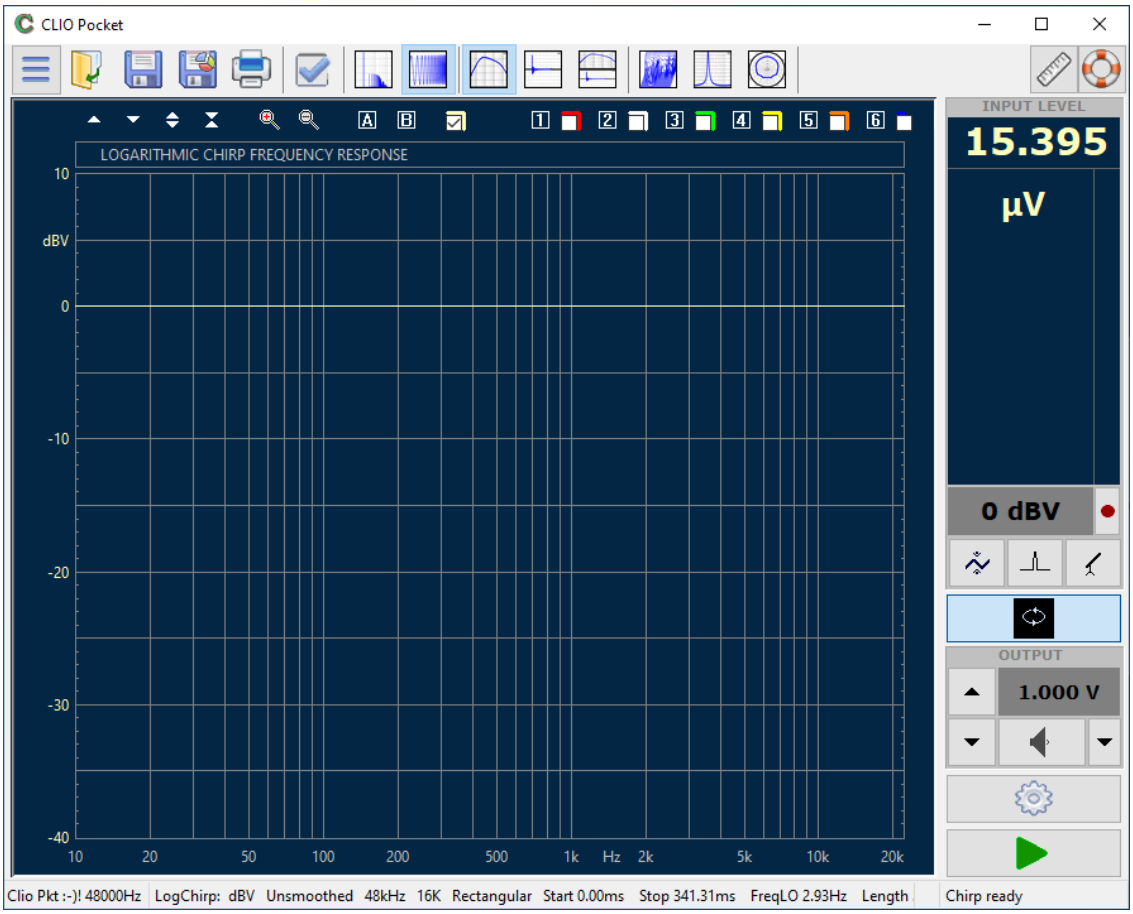
Press the In-Out Loop button .

Repeat the initial test described in 2.5; you should now obtain the following reading:



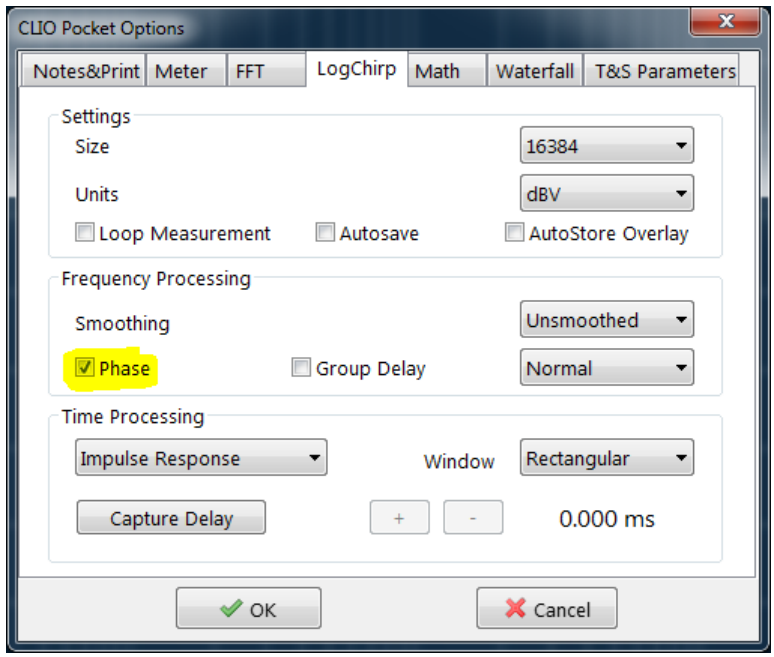
STEP 2: Then click on the LogChirp button to invoke the LogChirp panel and press the Frequency Graph button. Press the Go button to execute a LogChirp Frequency response measurement; after about **1 second** you should

obtain the desired result, a straight line as in the following Figure.



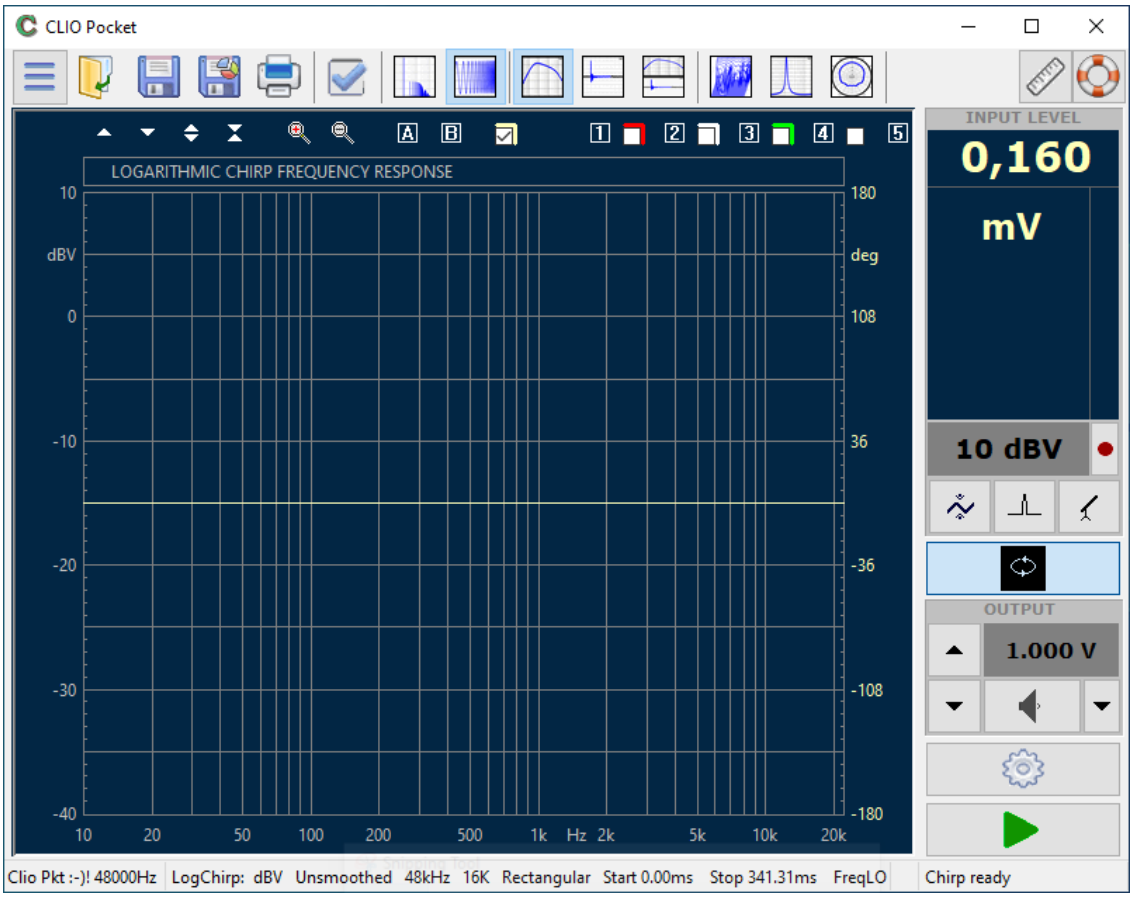
You can click on the marker [A] button and inspect the amplitude of the measured signal: you should obtain a reading around 0dBV, this is the correct output level of the LogChirp signal with the generator output set to 1V.

Now click on the Measurement Settings button to invoke the Log Chirp Settings dialog as in Figure.



Click on the **Phase** checkbox and press OK.

The measured phase response should be displayed.



The correct readings should be around zero degrees.

3.3 LIVING WITH YOUR CLIO POCKET

CLIO Pocket has been designed to give the user a high degree of precision, while maintaining ease of use thus ensuring confidence in the measurements taken.

Calibration check plays a key role in all this.

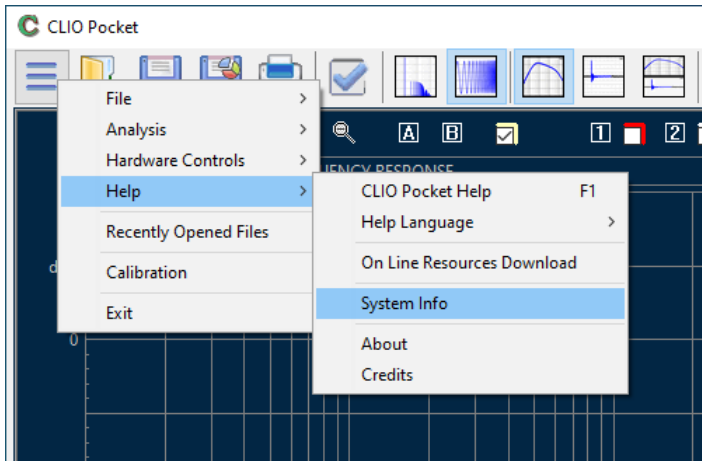
Note that as calibration needs to be performed under controlled conditions, *calibration should be attempted the least times possible*; calibration, on the other side, should be *verified* as needed or requested all the times the user wants; to do this learn and follow instructions given above in 3.2 CALIBRATION VALIDATION; verification, not calibration, of your hardware gives maximum confidence when taking measurements.

3.4 TROUBLESHOOTING CLIO INSTALLATION

To receive assistance please contact Audiomatica at support@audiomatica.com or connect to our website www.audiomatica.com.

When getting in contact with us please always send, as attachment to your email, the **System Info file** of your CLIO Pocket.

To create this file choose MainMenu>Help>SystemInfo



If your system has not completed calibration create the system info file **right after** the calibration has failed.

3.5 STARTUP OPTIONS AND GLOBAL SETTINGS

CLIO Pocket creates a **temporary folder** named Temp for several uses. This folder is located under the Common Application Data folder that has the following path (Windows XP):

C:\DocumentsAndSettings\AllUsers\ApplicationData\Audiomatica\ClioPkt\Temp

(Windows Vista, 7, 8, 10, 11):

C:\ProgramData\Audiomatica\ClioPkt\Temp

(OSX and macOS):

/Library/ClioPkt/Temp

CLIO Pocket relies, during startup, on a configuration file named **ClioPkt.stp** which resides in the temporary folder. This file is written each time the program ends and saves several settings that will be reloaded and reconfigure your system.

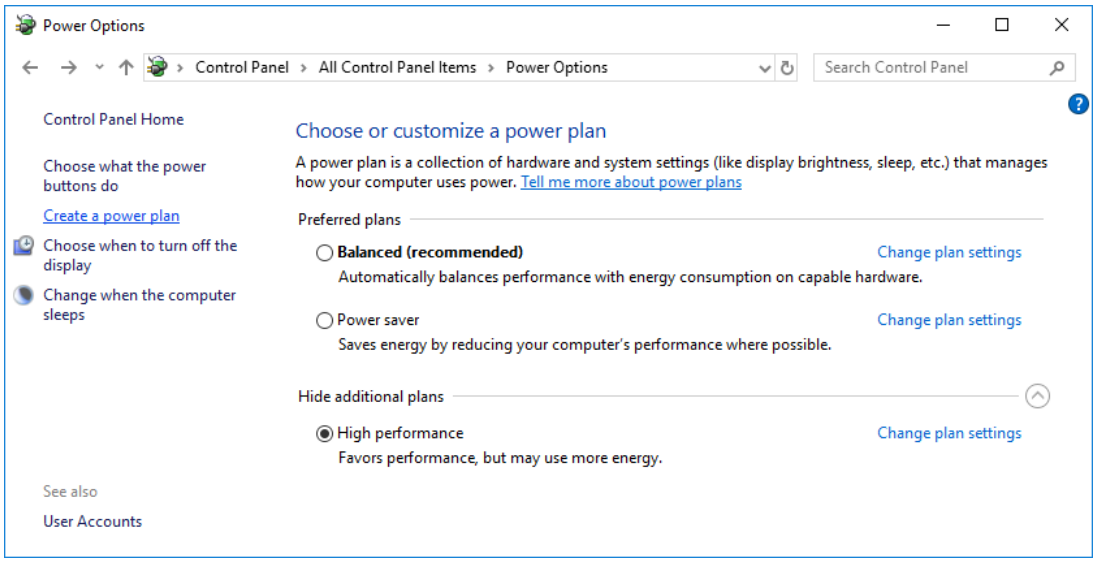
Among them we find:

- program Options
- generator output level
- input sensitivity
- phantom power supply state
- autorange state
- microphone settings
- main window state
- color scheme and other setup settings
- autoscale state

Note: It is possible to return the system to its initial default state (after installation) by deleting the ClioPkt.stp file.

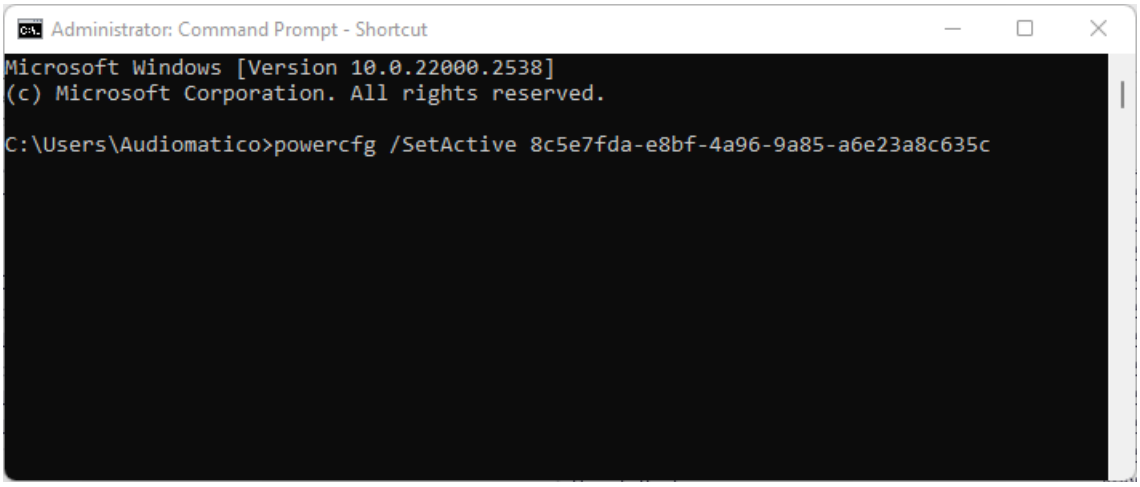
3.6 IMPORTANT COMPUTER SETTINGS FOR FLAWLESS OPERATION (WINDOWS ONLY)

Your computer would be best operated at **High Performance** level:



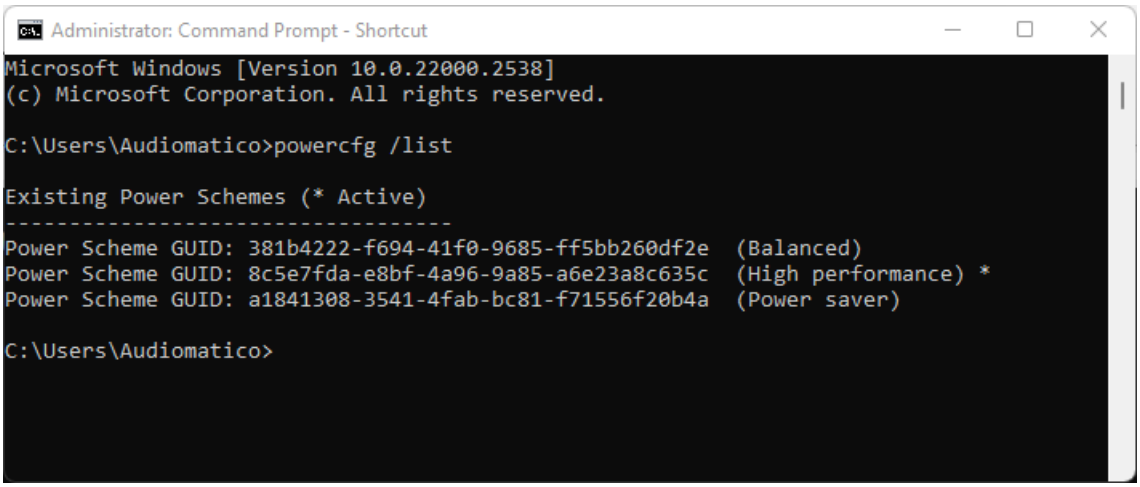
To set the High Performance power plan or scheme the easiest way is to open a **Command Prompt with administrative privileges** and execute the following command:

powercfg /SetActive 8c5e7fda-e8bf-4a96-9a85-a6e23a8c635c



To verify if High Performance plan is active execute:

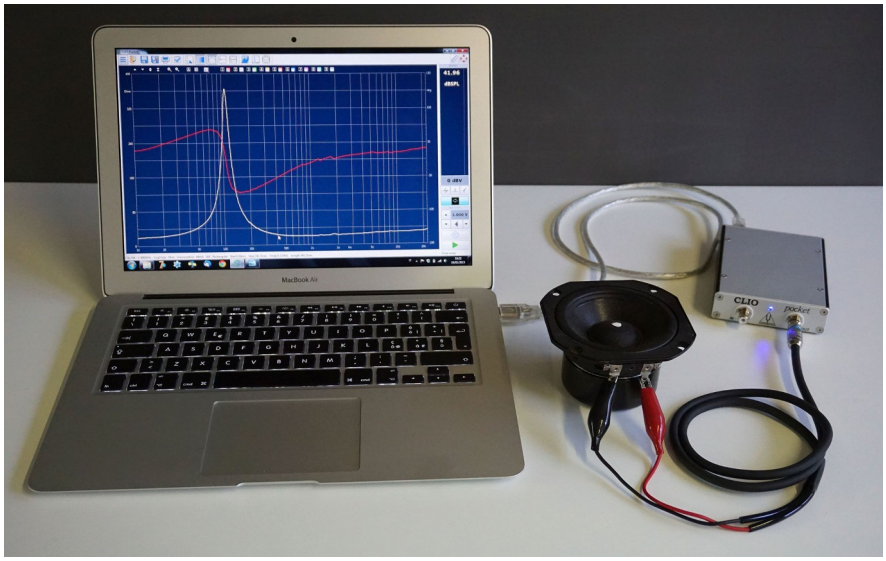
powercfg /list



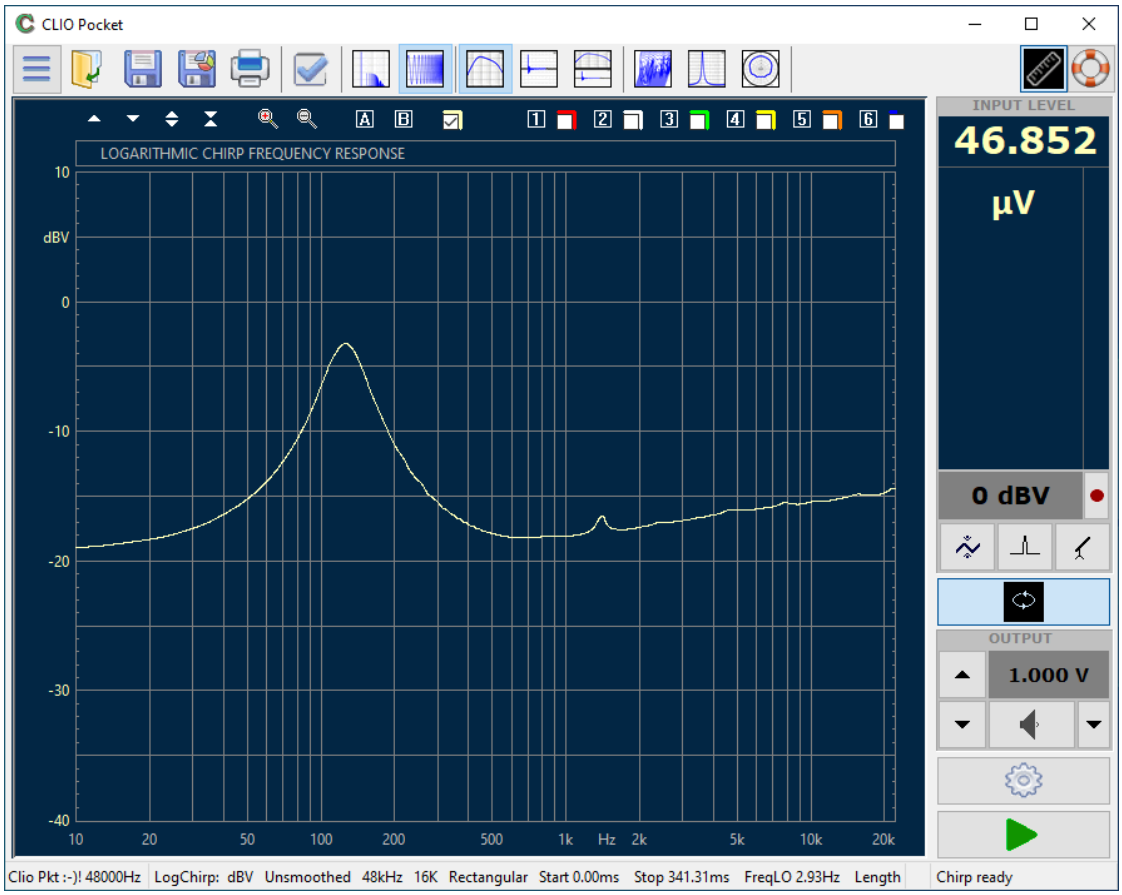
When using a notebook **never run on batteries**, always hook it to AC mains, as power saving schemes greatly reduce performances. As ultimate resource these are Recommended Advanced Power Settings, i.e. set 100% the Minimum processor state:

4 ENJOY CLIO POCKET

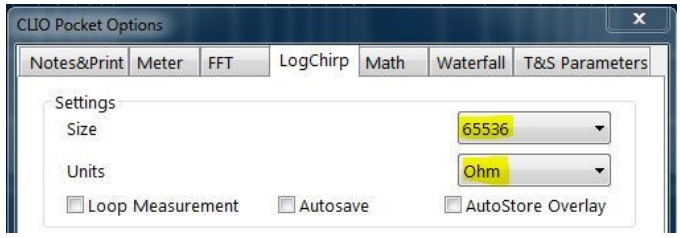
4.1 IMPEDANCE MEASUREMENTS AND T&S PARAMETERS



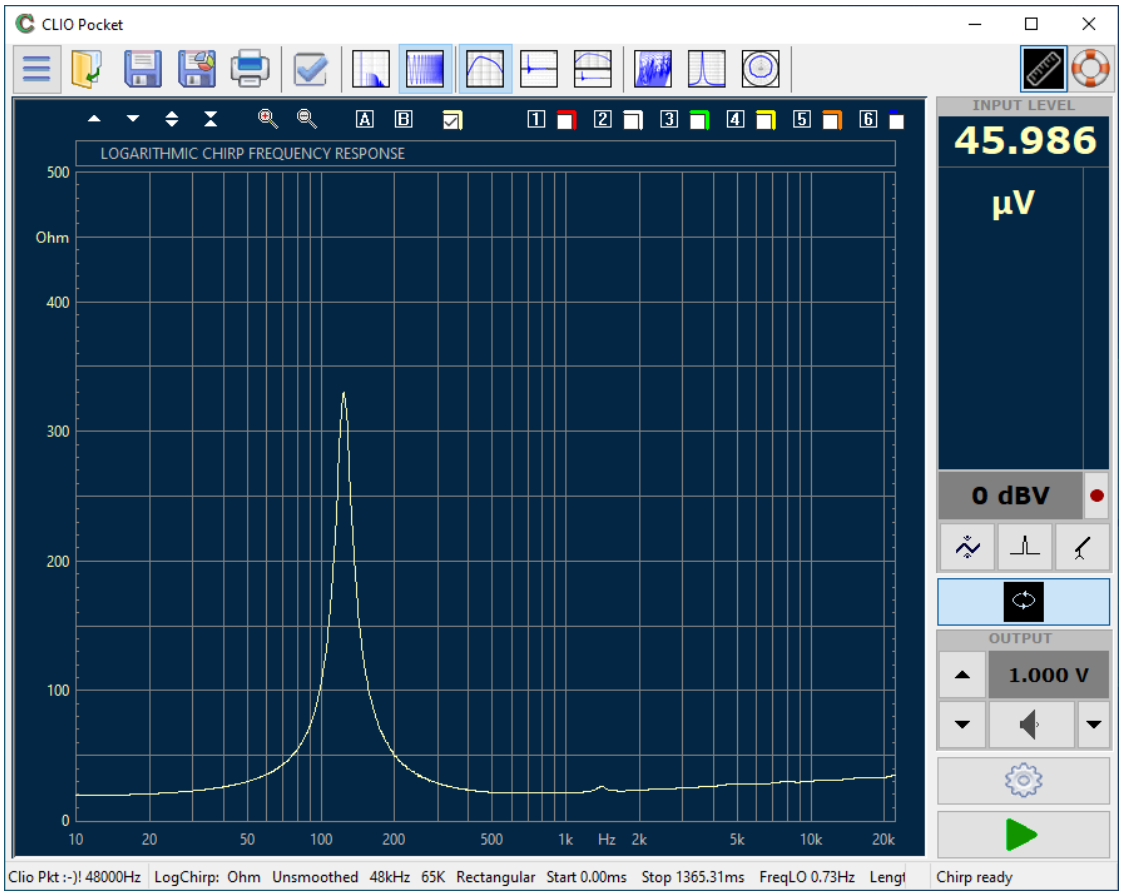
Once the Calibration has been verified it's time to start performing some measurements. Loudspeaker Impedance can be measured with CLIO Pocket out of the box. Connect the RCA to Alligator Impedance Cable to the CLIO output and to the Loudspeaker terminals (as in the Picture). Verify that the loop button is still down. Select the LogChirp Analysis. Basically everything should, for now, be left unchanged since the measure done to validate the calibration. Performing a new measure with the loudspeaker connected something like the following should appear on the screen:



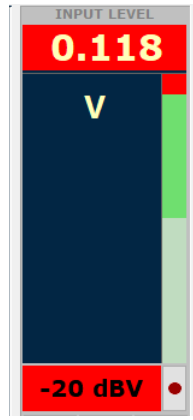
Actually this is not an Impedance Curve, but a Frequency Response showing the log scaled voltage division of CLIO's output impedance with the loudspeaker's input impedance. Open the LogChirp Settings and change both Size to 65536 and Units to Ohm.



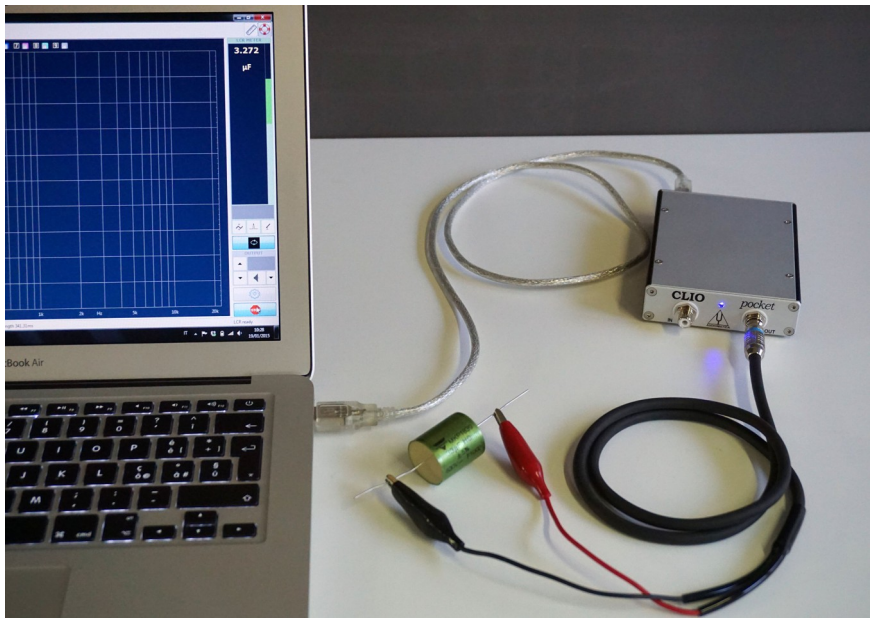
With the latter settings, perform the measure again. We finally get an impedance measurement:



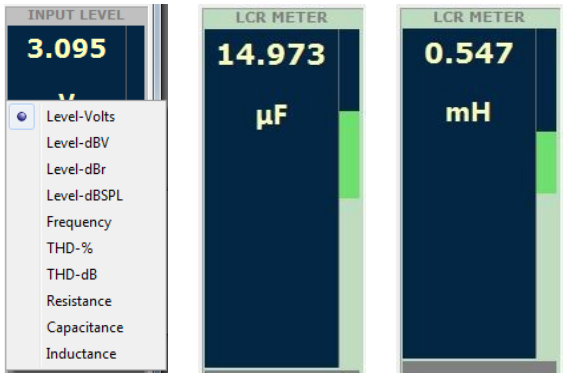
Obviously yours should be different with a similar shape. You will have to adjust the Y scale either manually or with the AutoScale Button. Why we changed Units to Ohm should be obvious. Increasing the Size of the Measurement and relative FFT brings enhanced low Frequency resolution. This is advisable measuring woofers and midranges. The default output level of 1.000V is fine in most cases, but can be increased with high impedance devices. Input level should be set to the maximum gain before overload occurs to. This maximize SN ratio. For 1.000V output 0dBV is a good starting point.



Before dealing with how to calculate T&S Parameters, which is a post-processing of Impedance Measurements, let's be sure that we have everything set by measuring Capacitors and Inductors. Just disconnect the Loudspeaker and replace it with either of the two.

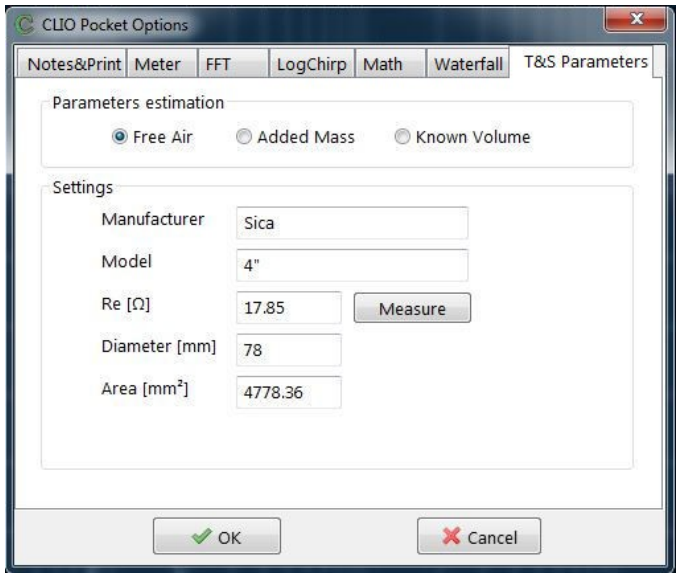


Click on the Units label within the Level Meter and select the correct measurement units for the component under test (Resistance, Capacitance, or Inductance). Then press the ▶ arrow that starts all measurements and you should see a real time measurement.



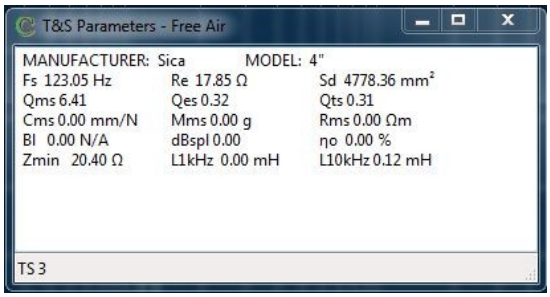
We end this chapter by covering T&S Parameters, because these are calculated by post-processing impedance measurements. One obtained in free air, which means with the Loudspeaker as is, the second acting a perturbation on the moving part that can be either an Added Mass or a Known Volume. In the first case the Resonance Frequency will decrease, in the second increase. Our example will be with Added Mass as it is usually easier to achieve.

While the whole procedure can be carried with Impedance present in memory but not saved, we strongly suggest that you carry out the two measurements and save them with meaningful names. It is a good idea to include the amount of Mass (or Volume) used in the name of the second file while "FreeAir" is a good choice for the first.

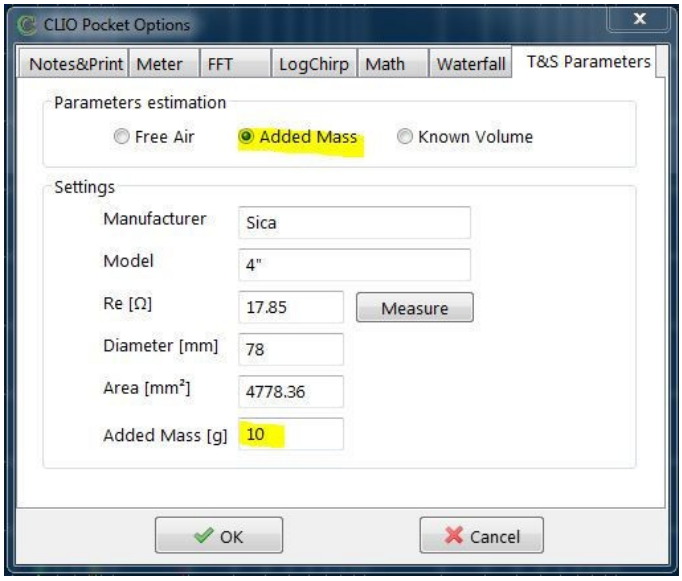


With the Free Air measurement in memory open the CLIO Pocket Option Dialog and choose T&S Parameters Tab. Check that Free Air Radio Button is selected and fill the required data.

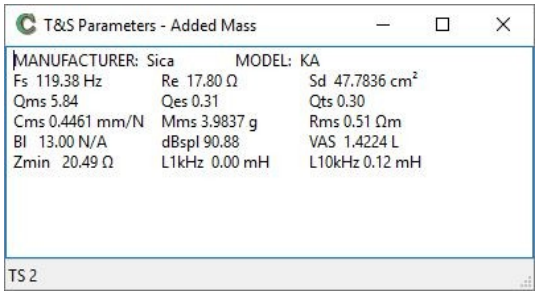
Note that if the Loudspeaker is connected the DC resistance Re can be directly measured by CLIO clicking on the Measure button. Also notice that Diameter and Area are either/or options. You may set one and the other will be set accordingly once the field is exited. Confirm and Close pressing OK. Now Clicking on the T&S Parameters Button the Free Air parameters should appear.



To get the complete set of Parameters load the Added Mass Impedance file and, again recall the CLIO Pocket Options, T&S Tab

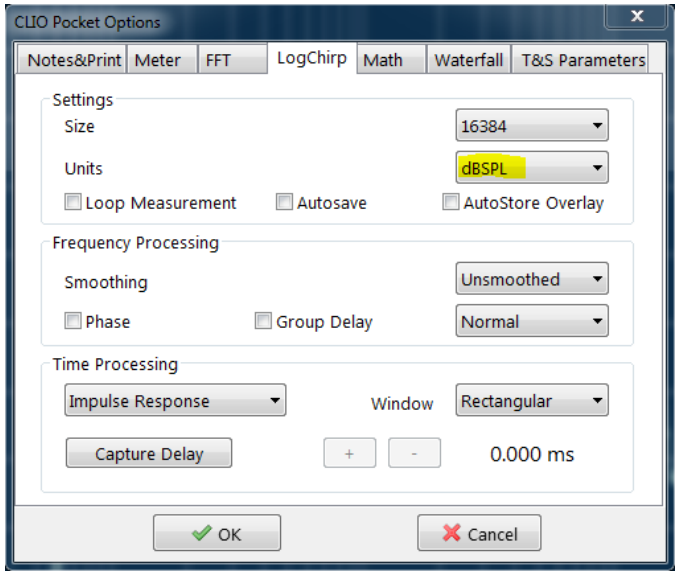


By selecting the Added mass Radio Button the Added Mass value input will appear. Input the weight of the used mass and confirm with the OK Button. By clicking the T&S Parameters Button again, the complete set of T&S Parameters should appear.



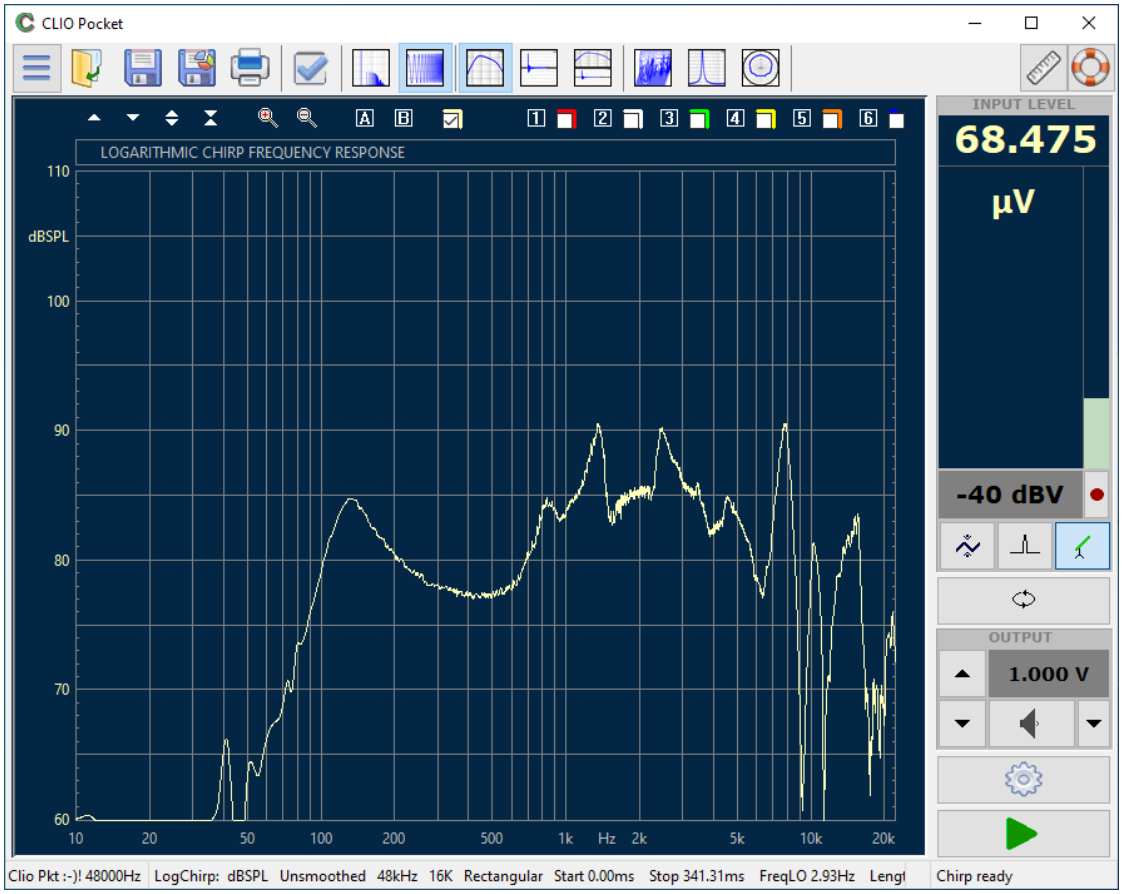
4.2 CONNECTING THE MICROPHONE

If, up to testing T&S Parameters, everything has worked as described, is now time to connect the microphone. Leave the loudspeaker connected as for impedance. Using the RCA to RCA 2.7m long microphone cable connect the MIC02 to the CLIO Input. Check you have set the correct Sensitivity as written in 2.3. Put the microphone in the Speaker Nearfield as shown in the picture above. Turn the Mic Power Supply on. Release the In-Out Loop button. This disconnects the CLIO input from its output, connecting the input only to the RCA socket and therefore to the microphone. Click on the LogChirp button and then the Measurement Settings button to invoke the Log Chirp Settings dialog:



Choose dBSPL as unit, set everything else as above confirm with the OK button and

perform the measurement .



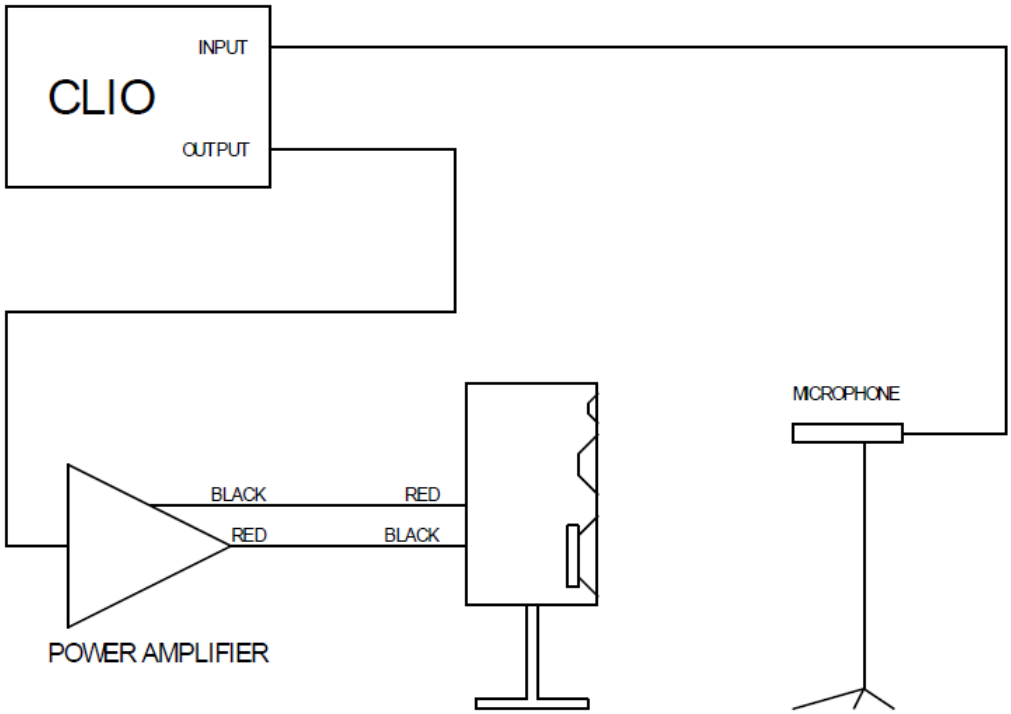
Repeat measuring and adjusting Input Gain until the maximum before overload. In the figure above we have it set at -40dBV (10mV) full scale which is the highest possible Input Gain. Depending on the speaker this might change. You can also safely increase or reduce the Output level to keep the response within 80 to 90 dBSPL. You should obtain a Pressure Frequency Response even if, for several reasons, **it is not the real one of the speaker**.

The response of a loudspeaker directly connected to the CLIO Pocket output **IS NOT** what is intended as the "Frequency Response" of the loudspeaker under test. The output voltage is feed to the loudspeaker through the 150 ohm CLIO Pocket output impedance, thus resulting in a voltage which is not constant as a function of frequency at loudspeaker terminals. Furthermore the CLIO output level is insufficient to carry out sound pressure level measurements at a distance higher than few centimeters. In order to get the "frequency response" you should connect a power amplifier between CLIO Pocket output and the loudspeaker under test as shown in the following section.

Try to get confident with this measurement, which is absolutely safe for the speaker because CLIO does not have a high power output. Even with Output set at its maximum 3.4V, it is unlikely that even a micro speaker would fail, because it is connected via a 150 ohm resistor. If you are confident so far, it is time to try to perform an anechoic Frequency Response of a loudspeaker system.

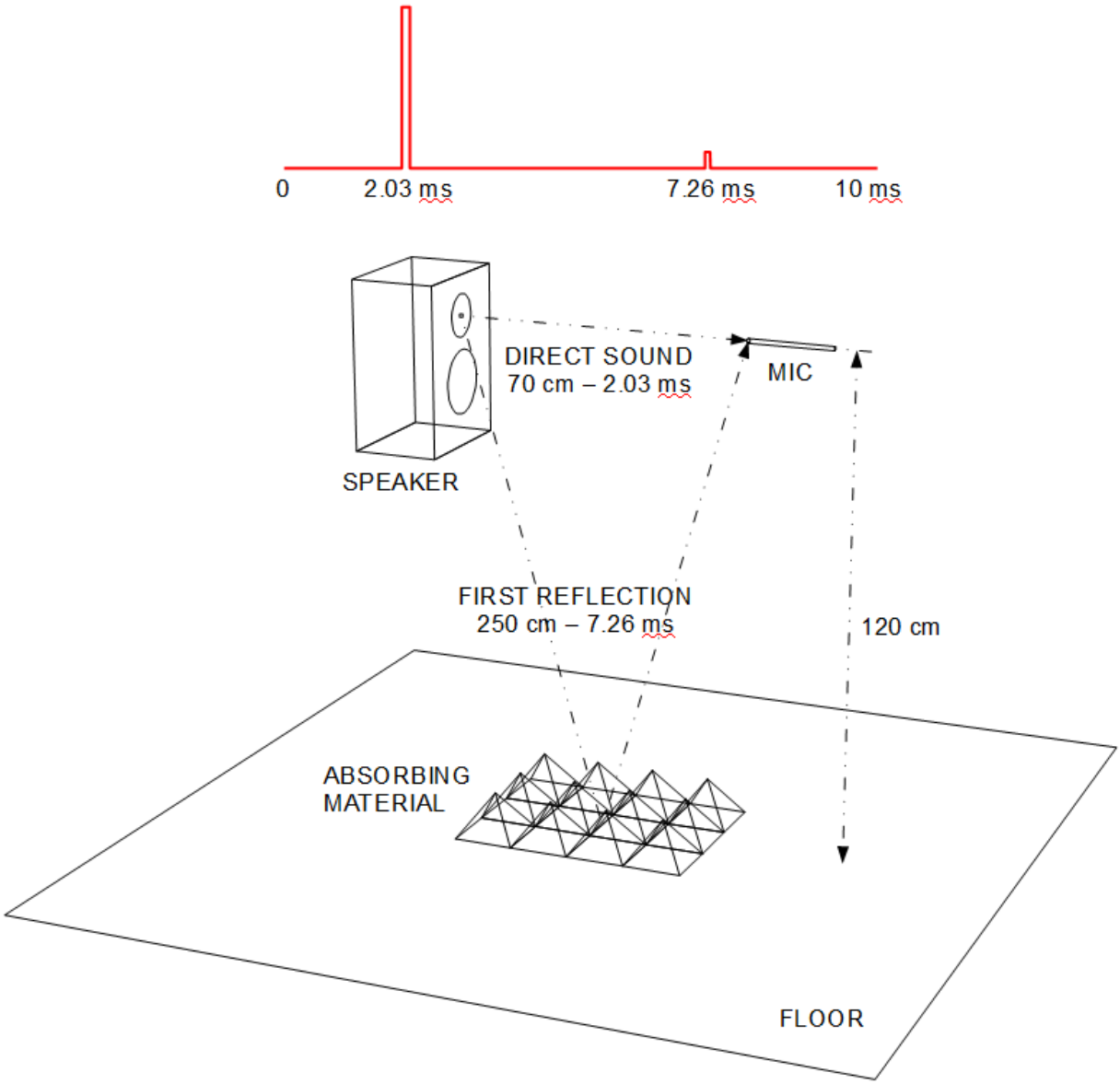
4.3 ANECHOIC FREQUENCY RESPONSE OF A LOUDSPEAKER SYSTEM

Up to now what was in the CLIO box was sufficient. To proceed now you have to connect your own audio power amplifier via an an RCA cable. The amplifier should possess a flat Frequency Response and a low output impedance. Check that the CLIO generator is turned OFF and that the amplifier is turned OFF. Connect CLIO's Output to the amplifier input and the amplifier's output to the speaker you are measuring. Refer both to the above picture and the schematic below



Note that the polarity of the cable from the amp to the loudspeaker is inverted. This

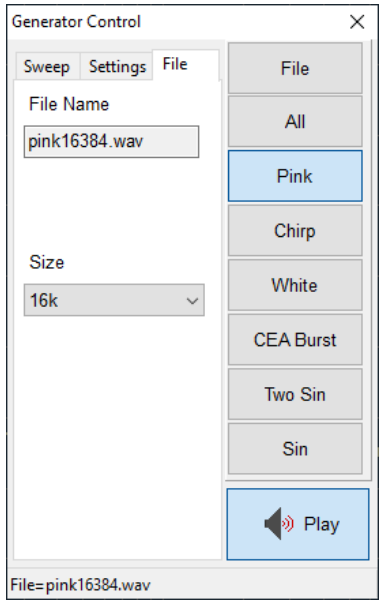
compensates for the fact that the supplied MIC02 is inverting the signal as do many measuring microphones. However, it is possible to correct this in a more elegant way using the Input Polarity button . In our example we will measure a relatively small two way loudspeaker. For a physical small speaker it is advisable to put the microphone at 50-70cm from the speaker, thus obtaining a longer reflection-free measurement than when testing at 1m. The greater the distance between both the speaker and the mic. from any reflecting surfaces, the better.



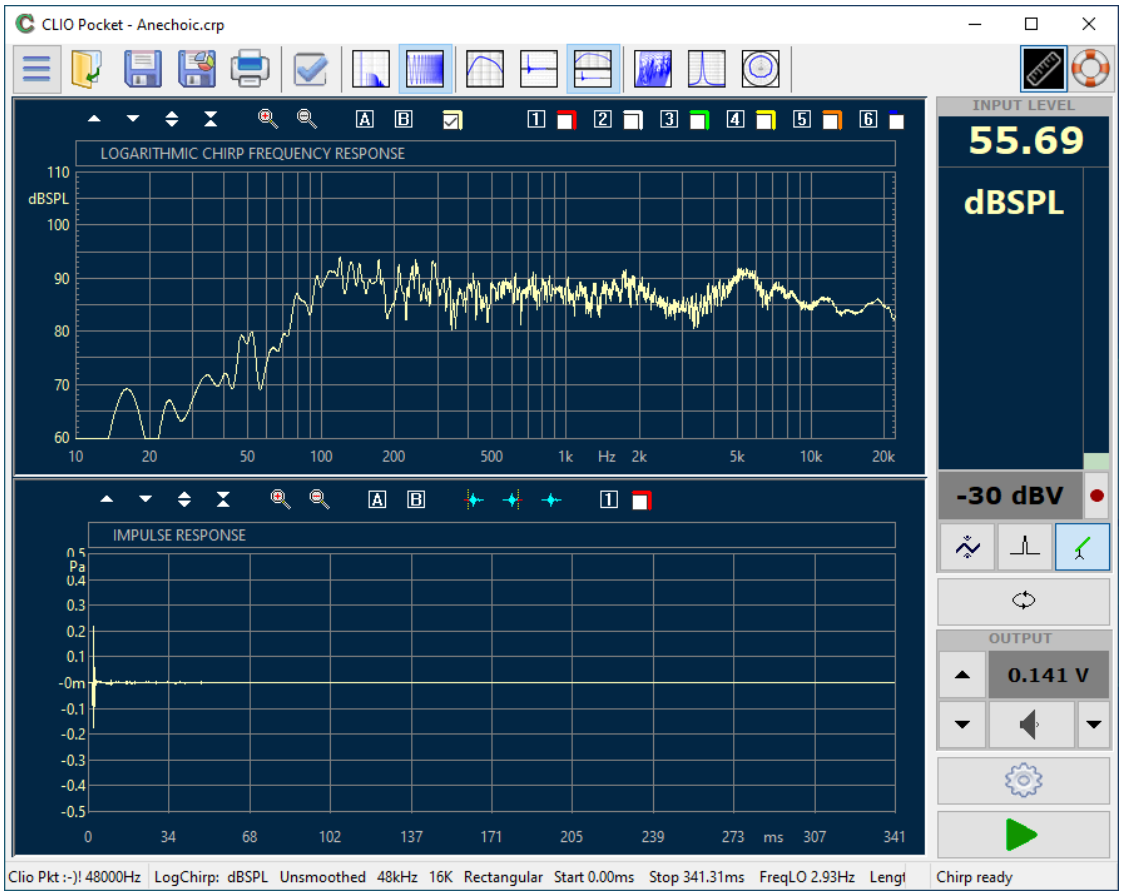
In the above figure you see the common practice of placing absorbing material to attenuate the first reflection. However be advised that, as long as this affects only high frequencies, it has the disadvantage of masking the exact arrival time by slowing the rise of the reflected impulse. Therefore, it is ideally better to delay the arrival time of the first reflection than to absorb it, if possible.

Once the set-up is ready, if there is a volume control turn it to the lowest position and switch the amplifier on. Check that the microphone power supply is on, set CLIO Input gain to -30dBV, and verify that the bar-graph on the right of the Level Meter responses to a hand clap. Set the latter to dBSPL.

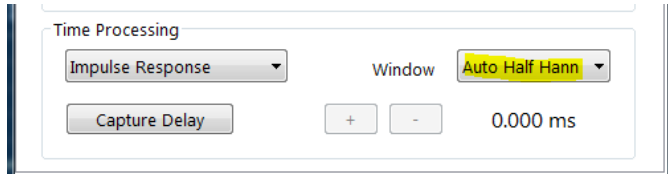
If there is a volume control on the amplifier it should have been already set counter-clockwise (to minimum). Therefore leave the CLIO Output level at its default 1.000V. In absence of a volume control on the amplifier set CLIO Output level at 0.01V or below. Open the Generator Control Panel and generate Pink Noise by clicking on Pink and then on Play. You can ignore the Size for now.



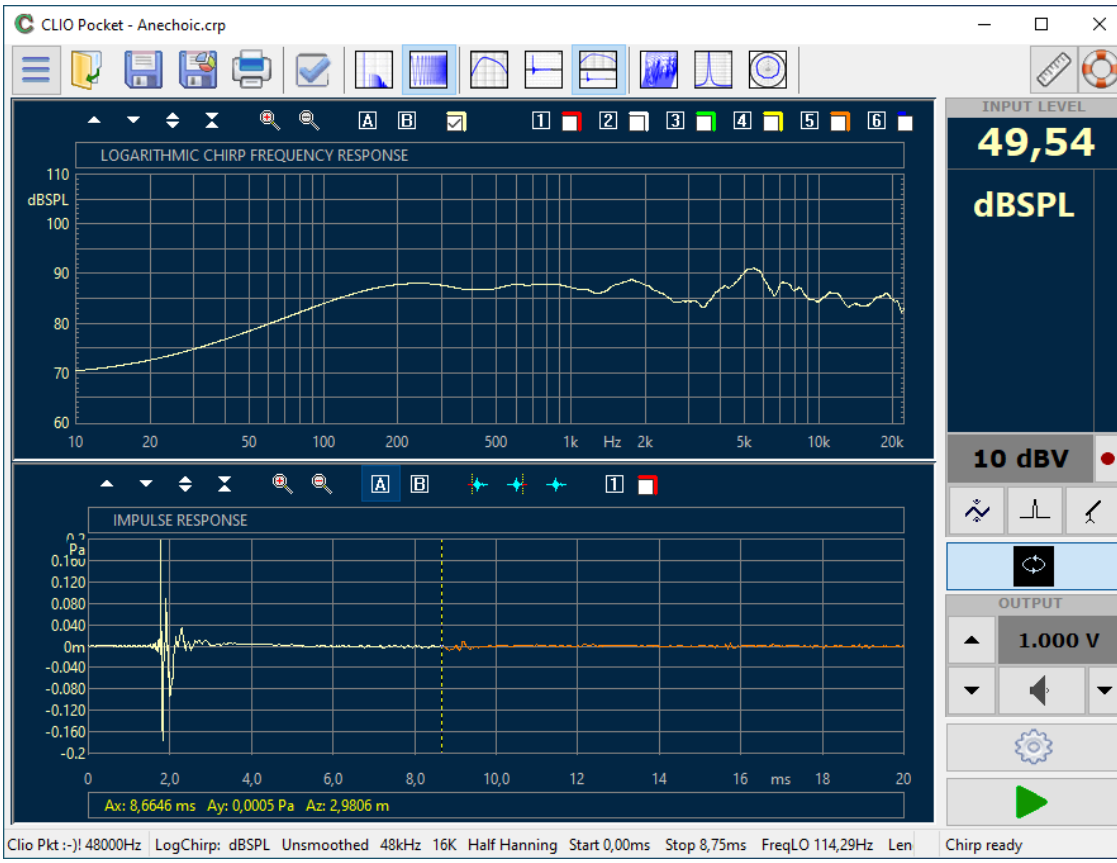
Either with the amplifier's volume control, or with the CLIO output level control arrows, increase the level(you should hear a sound like a waterfall, which is Pink Noise). Adjust the output to read around 80dBSPL on the Level Meter. Turn the Generator Off. Click on the LogChirp button to invoke the LogChirp panel and press the Frequency & Time Graph button so that you have Frequency and Time Domains visible at the same time. Press the Go button to execute a LogChirp Frequency Response measurement with exactly the same settings shown for the Nearfield measurement.



Here we have Frequency and Impulse responses. The Frequency Response is not Anechoic. In the Time Domain, Zoom both X and Y axes to fit your situation of impulse and reflections. Eventually temporarily select the Time Domain only Button for a bigger and more detailed Impulse. Activate Marker A, verify that the distance of the peak of the Impulse is what you expect, locate the first reflection, put the Marker A immediately before and click on the Set Stop Window Button . If you left both Domains visible, as suggested, you should see immediately how the Frequency Response changes. As a last refinement open the LogChirp Settings and in the Time Processing settings change the Window from Rectangular to Auto Half Hann.



Below is what we obtained. The Frequency Response is much smoother then before with less bass extension and a less steep high-pass behavior. The average level is in the 87dBSPL range, higher than what was measured using Pink noise. This is expected and correct.



In the status bar, information regarding the measurements and its processing are reported. With the stop window set at 8.75ms and an impulse arrival time of 1.8ms the low frequency reliability limit is around 150 Hz. We did not set the Start Window, because it does not change the Frequency Response. If you are interested in anechoic responses it is unlikely you need a bigger measurement size than 16k, but for room acoustics 64k is advisable.

4.4 HARMONIC DISTORTION OF A LOUDSPEAKER

Driving a loudspeaker at sufficiently high levels will always cause the system to exhibit a non-linear behavior. In the previous section we measured the anechoic frequency response of a loudspeaker, here we will use a similar setup to find out which is the driving level causing the loudspeaker to start to go outside its non linear domain and measure the level of the harmonic distortion.

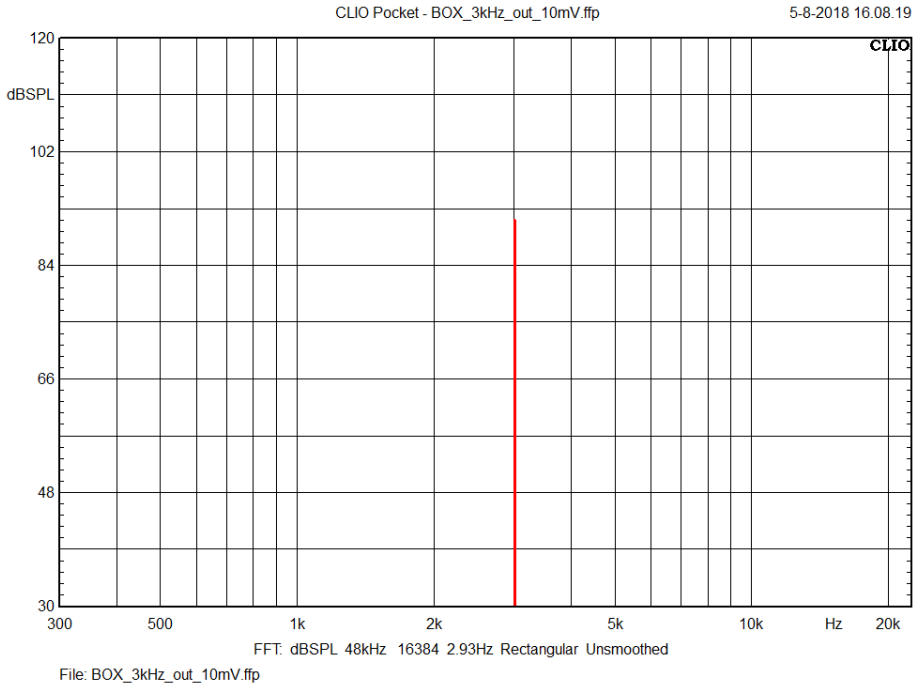
Harmonic distortion is a symptom of a non-linear behavior of a system.

A simple test of the non-linearity is sinusoidal testing. By sending a pure sinusoidal tone at the input of the system it is possible to look at the output FFT spectra.

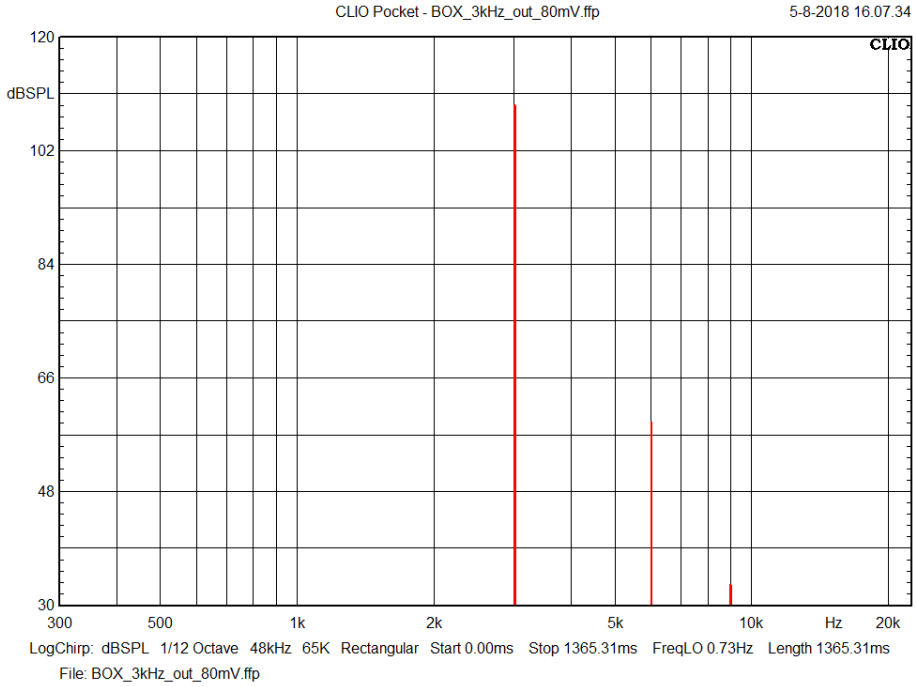
Without an anechoic chamber it is advisable to put the microphone near the source to minimize the effects of room reflections. Windowing of reflections is still possible but as we will see later a good SNR is really helpful.

We start by generating a simple pure sinusoidal tone at 3 kHz with Clio Pocket, which is sent to our loudspeaker through a power amplifier. Use round to bin option in the generator to get a nice single line FFT spectra reading.

We start with a low level signal, if the system is in its linear range we should see at the output the same but scaled version of the input pure tone.



We then increment the driving level at 1 dB steps. As soon as the system starts to go over its linear range, a set of harmonic components of the input tone will appear at the output.



The second and third harmonic components are clearly visible.

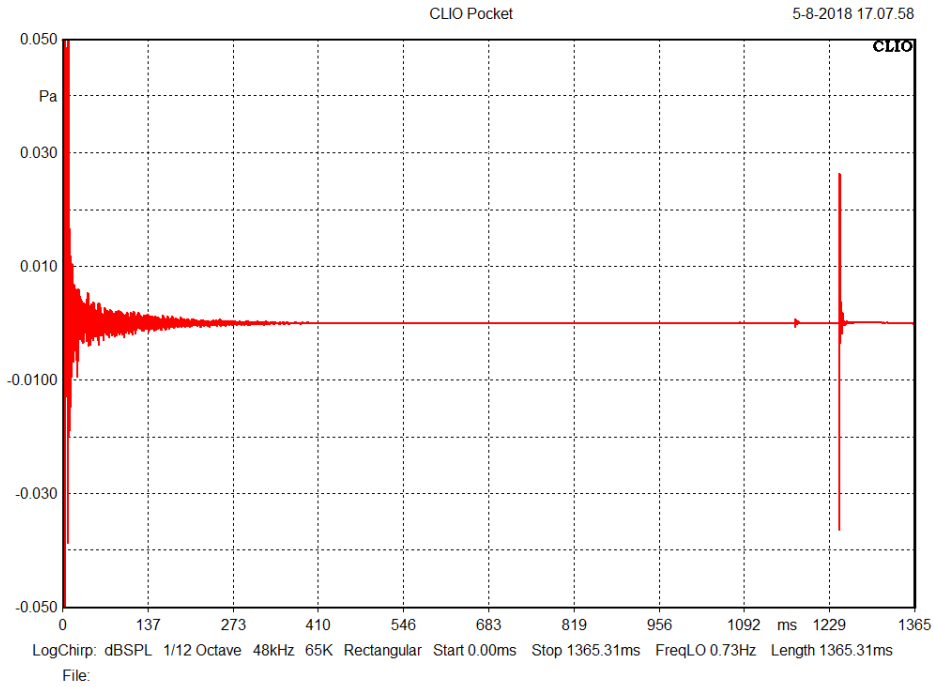
This FFT measurement process can be iterated on many frequency points and levels using the CLIO pocket generator controls.

Sometimes is desirable to plot the level of the harmonic components as a function of frequency, this will require with the above procedure many FFT measurements and could be impractical.

A nice property of the LogChirp analysis comes into our help: the Impulse Responses IRs of the harmonic distortion orders are showing up in separated time slots at the tail of the IR of the measured system.

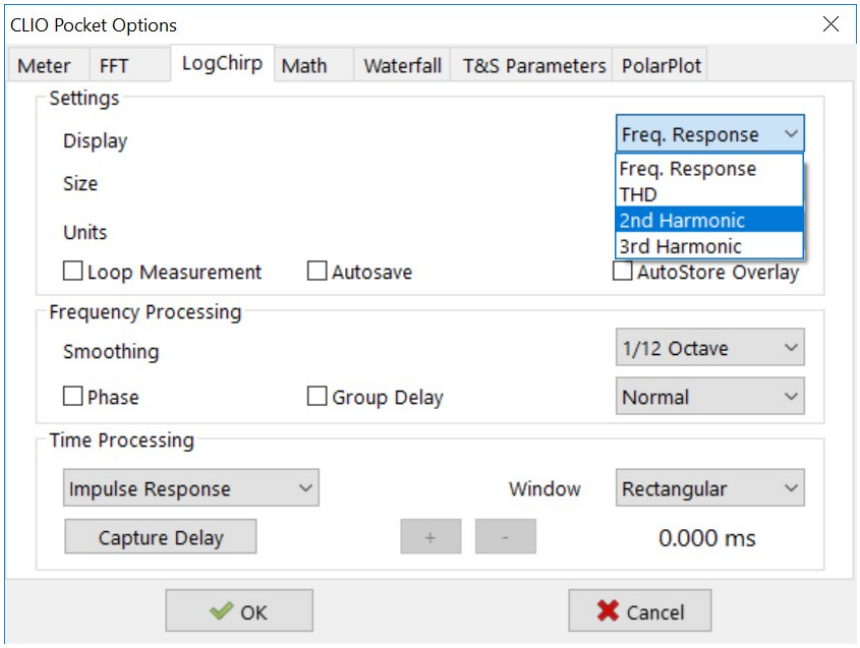
Clio Pocket software can separate the IR of each harmonic component and calculate the harmonic component spectra.

A 64k is mandatory to get the distortion components and THD readings. From the LogChirp Settings we can select the 64k size and run a measurement.

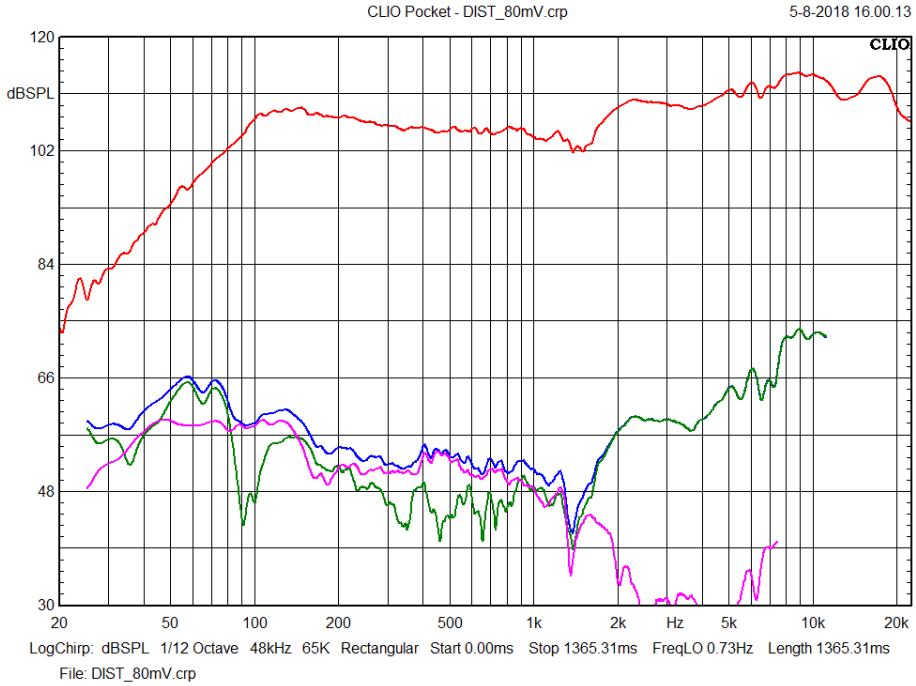


The harmonic distortion components impulse responses are clearly visible in the tail of the measured IR.

From the LogChirp Settings it is now possible to select between Fundamental Response, THD, 2nd or 3rd harmonic readings.



The result is shown in the next figure where the frequency response (red curve) is plot alongside THD (blue), 2nd Harmonic (green) and 3rd harmonic (purple) components.



The level of the harmonic components can be very low, if the system is linear the IR of the harmonic components tend to sink into the measurement noise, which is basically the environmental noise. Thus a short measurement distance is beneficial also in this respect.

If one's want to recover the linear response from an impulse response with substantial distortion components it is possible to use the Auto DistRemove time window. When dealing with acoustical responses, which are usually featuring a time-of-flight delay, the usual Rectangular or Auto HalfHann windows are effectively windowing out the distortion components together with the room reflections. But in case of devices without delay, such as when measuring a voltage from the port of an electrical network, like a loudspeaker or a power amplifier, the Rectangular and Auto HalfHann time windows cannot be used as the very late part of the impulse response retain important data which cannot be discarded.

The Auto DistRemove time window should be used in all cases where the linear response of a device without delay has to be shown. The Auto DistRemove time window behaves similarly to an Auto HalfHann window with the difference that data present in the very last part of the Impulse Response is not cut.

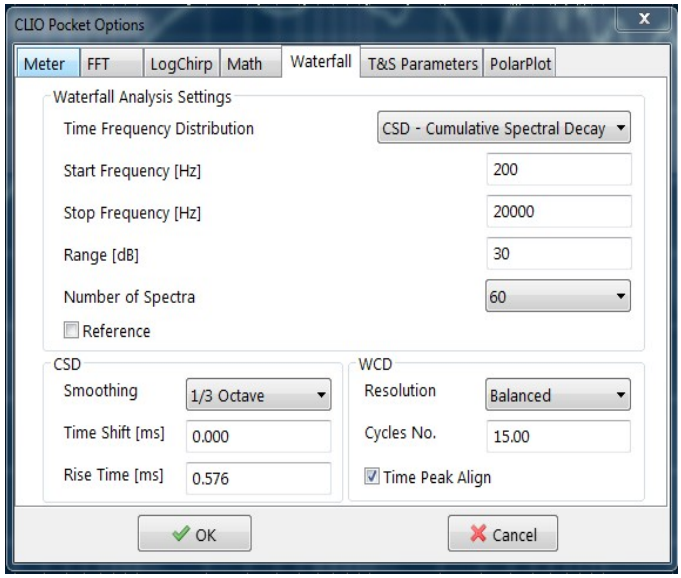
4.5 WATERFALL

The 3D decay of the anechoic response is achieved by the Waterfall post processing.

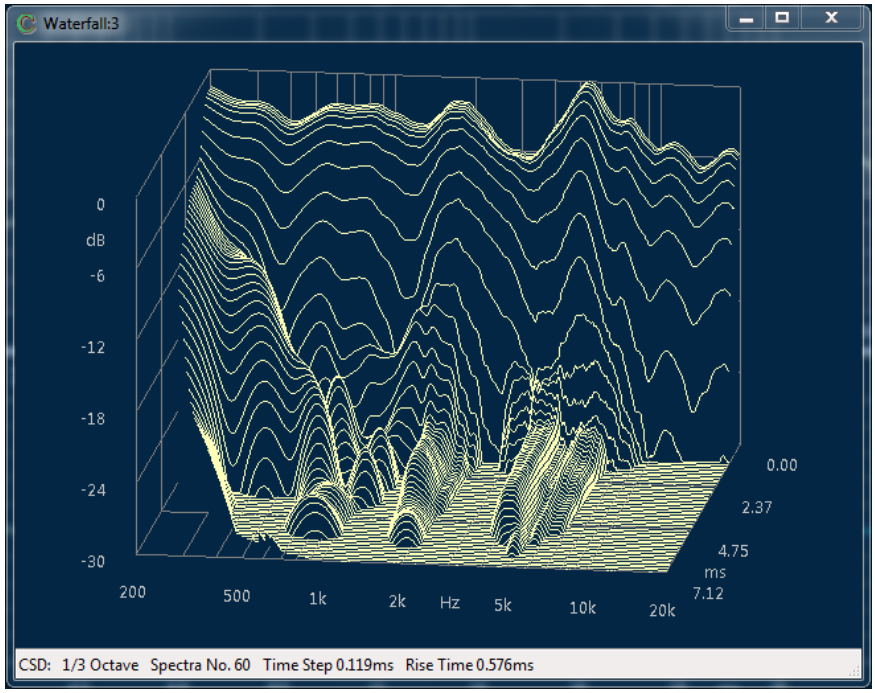
There are two time-frequency distributions available: classical Cumulative Spectral Decay and Wavelet Cycle Decay. The main difference between the two is the x-axis scale: time for the CSD and cycles for the WCD.

Let's start with the Cumulative Spectral Decay.

Open the measurement settings dialog and choose Waterfall. Select: Time Frequency Distribution CSD – Cumulative Spectral Decay, Input: Start Frequency 200Hz, Smoothing 1/3 Octave, Range 30dB.

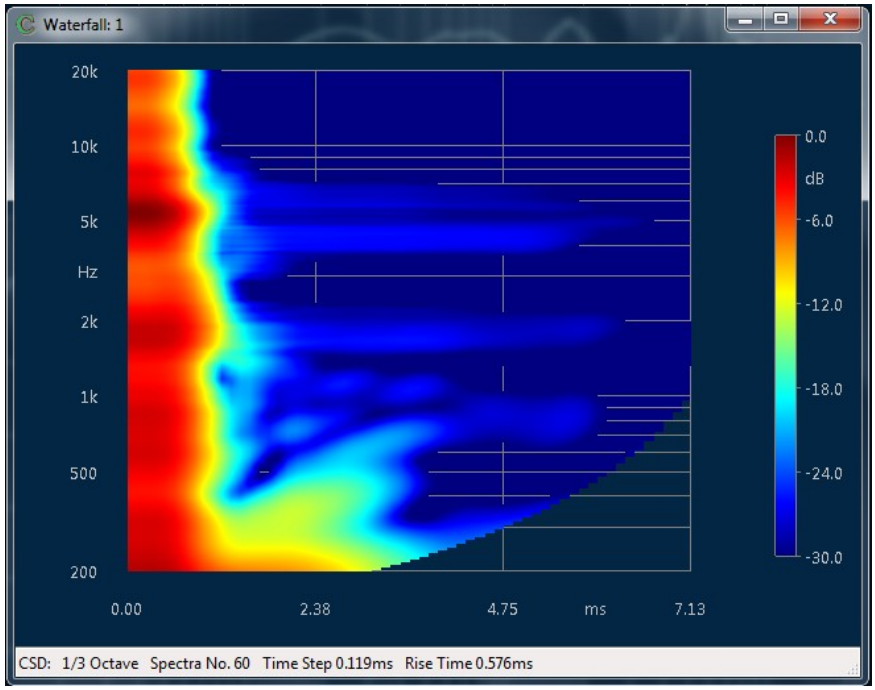


Click on the Waterfall button.

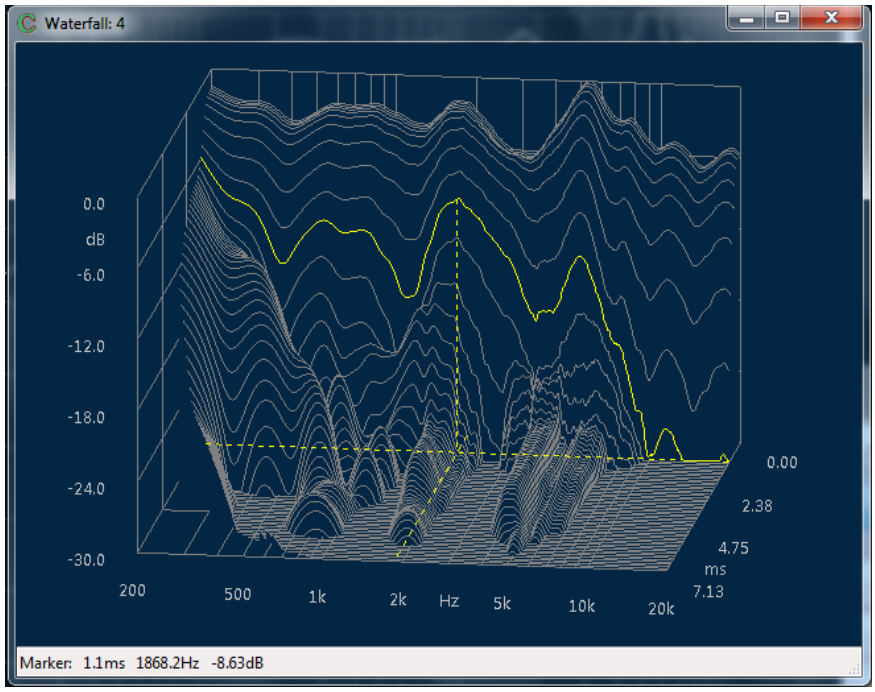


The CSD is a set of spectra calculated from progressively shorter sections of the measured impulse response. The idea is that by cutting the head of the impulse response, then the spectral analysis will reveal the frequency components that "holds" in the time response.

Click with the mouse over it and enjoy. A click+drag rotates the view. Double click on the graph switches between the waterfall view and the colored surface view. Left and right arrow keys iterates between point of view presets.



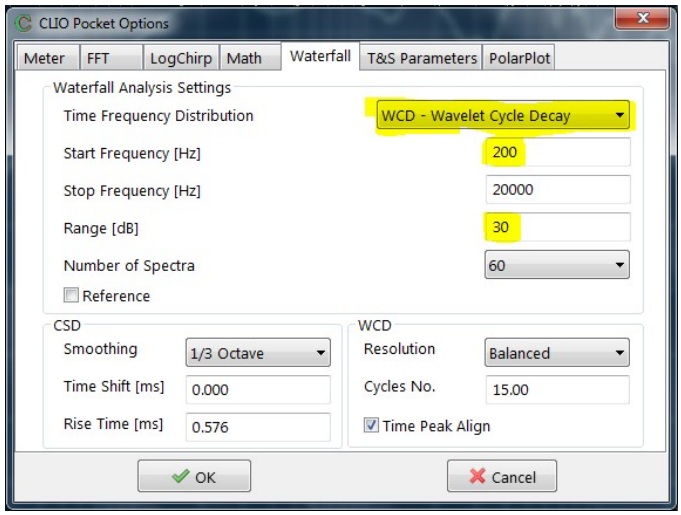
Pressing the M key activates the marker view. The marker position can be interactively set clicking with the mouse pointer on the graph. Using the A and S keys it is also possible to change the selected spectra.



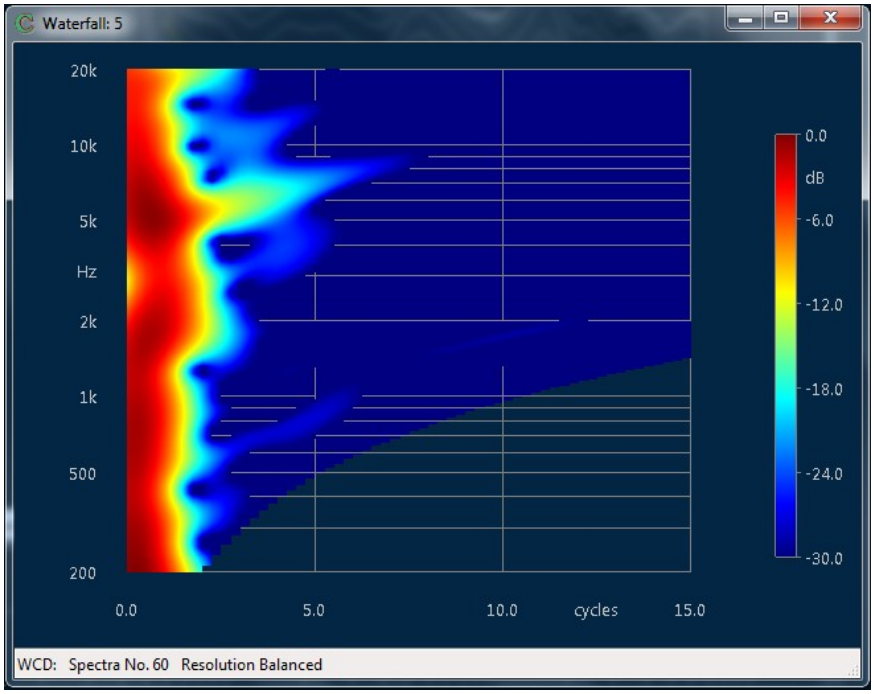
We might be interested in looking at resonances in terms of cycles instead of time.

This will better highlight resonances at high frequency, where the CSD could not reveal such short time artifacts. In the Wavelet Cycle Decay the energy decay of a system is analyzed using Wavelet Analysis. The result can be interpreted as running a bank of constant Q band-pass filters and then looking at the energy decay for each calculated band. The results are then plotted using cycles instead of time.

Open the measurement settings dialog and choose Waterfall. Select: Time Frequency Distribution WCD – Wavelet Cycle Decay, Input: Start Frequency 200Hz, Smoothing 1/3 Octave, Range 30dB.



Click of the Waterfall button and switch to the colored surface view.



4.6 COLLECT POLAR DATA

There are three ways to collect polar data of a loudspeaker using CLIO Pocket.

1) You can manually perform and save Log Chirp measurements taken at each angle with the proper file name.

Be sure that you have named each file following this rule:

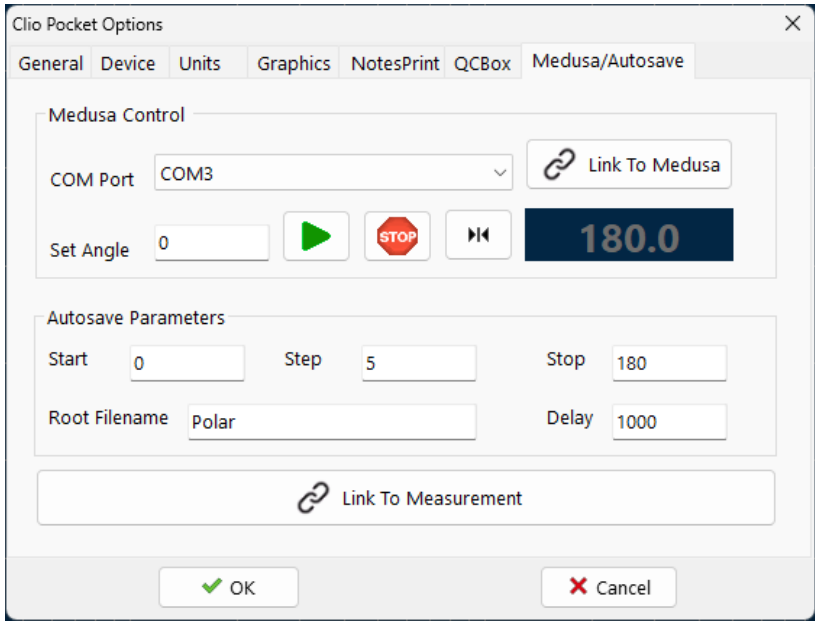
<NAME>space<ANGLE*100>.CRP

where NAME is a common file name and ANGLE is the rotation angle of the speaker separated by a space. In the following example ANGLE spans from 0 to 180 in 5 degrees intervals.

It is easier to use the aid provided by CLIO Pocket to automatically perform and save a set of Log Chirp measurements at specific angles. The loudspeaker movement (or the apparent movement of the microphone around the loudspeaker) can be manual or controlled by PC using our Audiomatica Open Source Turntable Medusa.

2) Let's start with the simpler case which does not involve the PC controlled turntable, the loudspeaker needs to be manually rotated between each Log Chirp measurement as instructed by the software.

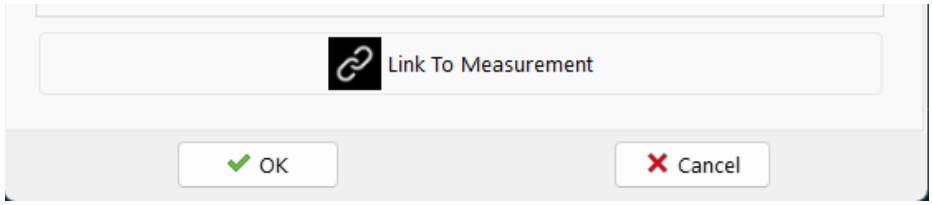
To setup a Log Chirp automated run of measurements you should open the CLIO Pocket Options form and select the Medusa/Autosave tab:



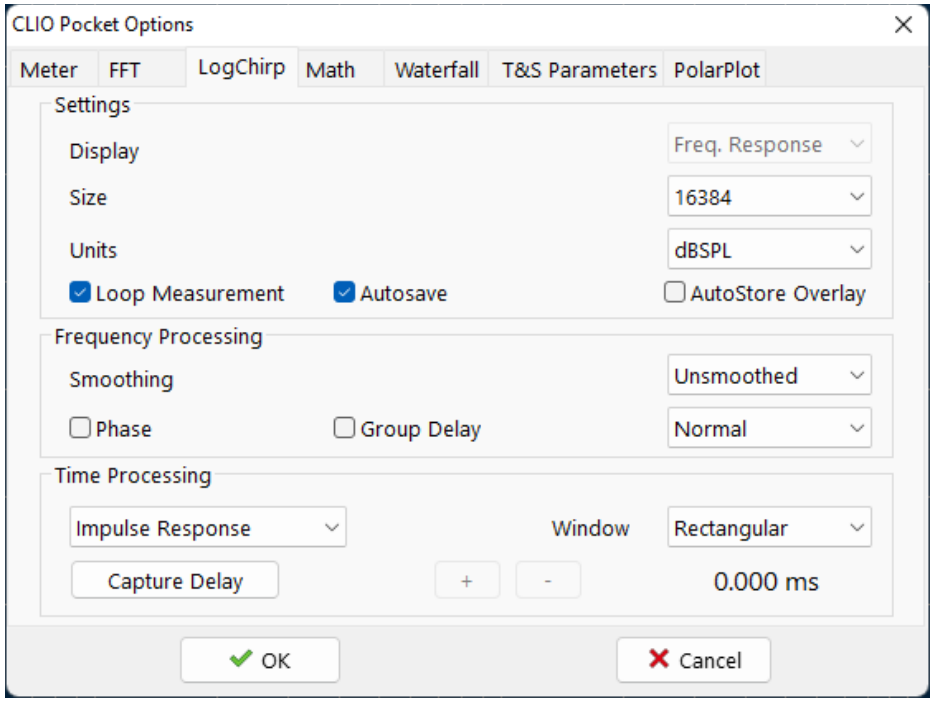
Here we can set up our autosave procedure. In this first example we should focus on the last part of the form which holds the polar settings. By default the parameters are set to collect a half polar scan line with 5 degrees resolution, but you might want to change these values at your own will.

Start, step and stop settings are self explanatory, the files will be saved in the CLIO Pocket active directory, which can be simply set by opening or having saved a measurement. The file names will follow the rule described earlier.

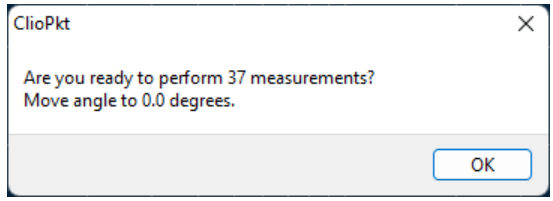
Remember to press the Link To Measurement button before pressing the OK button, this will instruct the software to link the Log Chirp measurements to angles and the file name structure.



We should now move to the Log Chirp settings, and select both "Loop Measurement" and "Autosave" options:



If we now press the GO button, the software will instruct us that it will take a set of measurements and to which angle to rotate the loudspeaker.

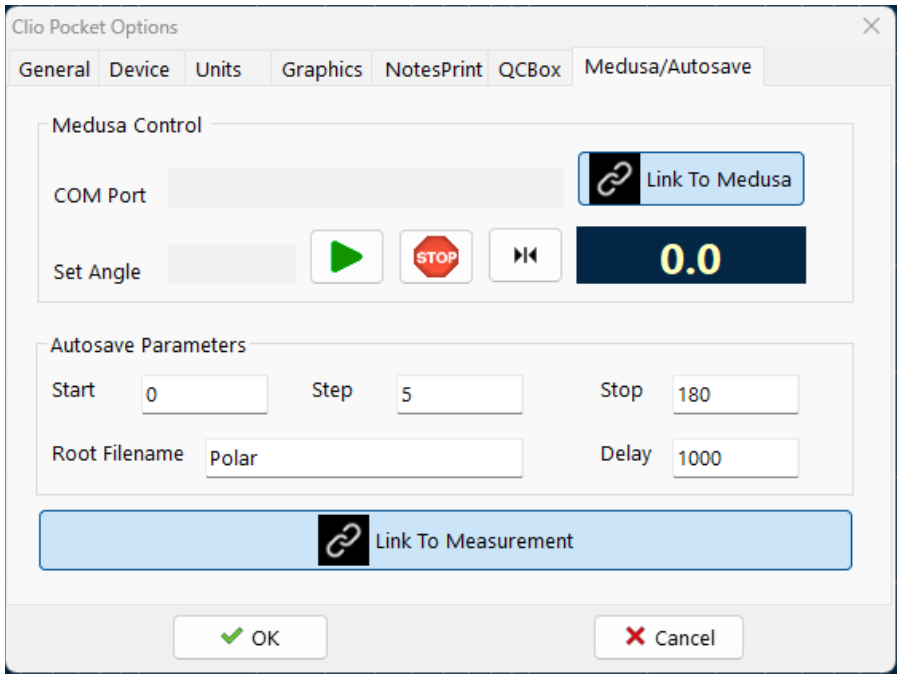


After each measurement we will be instructed where to rotate the loudspeaker and the system will wait for user confirmation before collecting and saving a new measurement.

At the end of the process you should get a folder with all the measurements with correct naming scheme ready to be analyzed with the Polar Plot tool.

3) Loudspeaker rotation can be automated using the Audiomatica Open Source Turntable: Medusa. This project is fully described and freely available on our website https://www.audiomatica.com/wp/?page_id=3024.

The turntable controller shall be connected on a USB port of the PC. The used port can be selected using the Medusa/Autosave tab of the CLIO Pocket Options form:

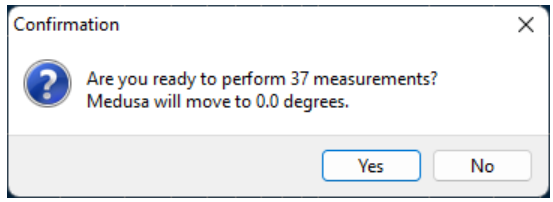


Once the "Link To Medusa" button is pressed the turntable is connected to the software and the current angle is displayed.

Using the form buttons it is possible to move the turntable to any desired angle, halt the rotation and set the current position to the reference value of 0 degrees (on-axis). This is helpful when trying to exactly align the device under test to the on-axis microphone.

Following the same steps as in the previous example, we can select both "Loop Measurement" and "Autosave" options in Log Chirp settings. In this case the Delay value is also used by waiting a given amount of ms before carrying out a measurement.

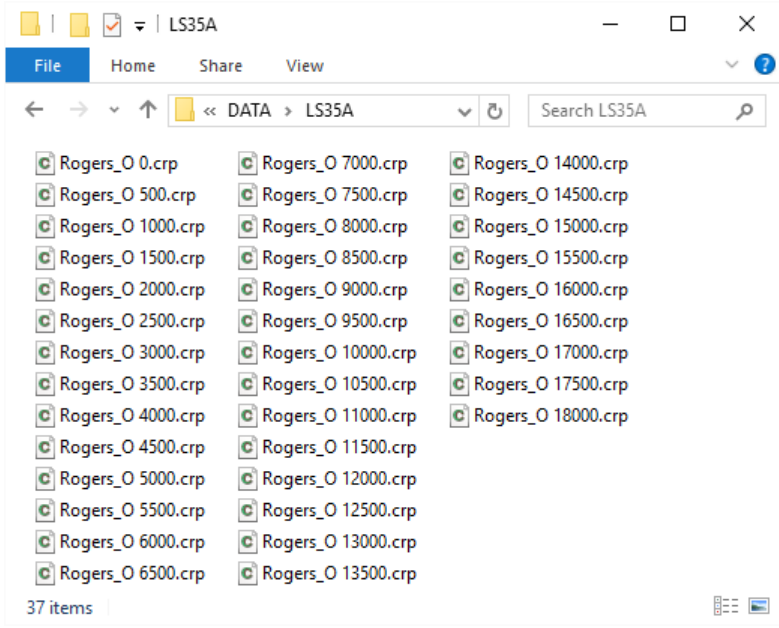
Now clicking on the GO button will result in the following message:



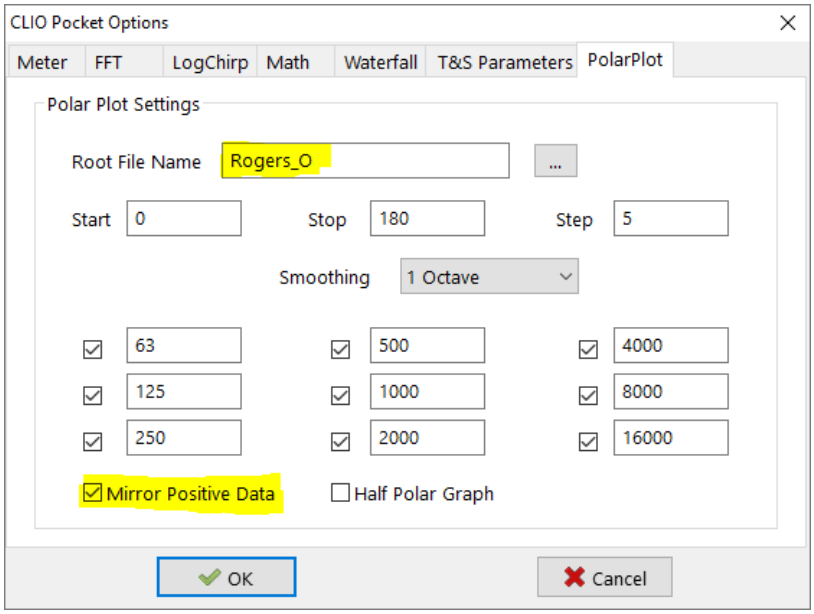
In this case no other prompt will be shown until the end of the autosave process, which should end again with the same folder with a set of polar measurements.

4.7 POLAR PLOTS

Following the instruction shown on previous section you should have now a folder with a set of measurements of your speaker taken at regular angle intervals like:

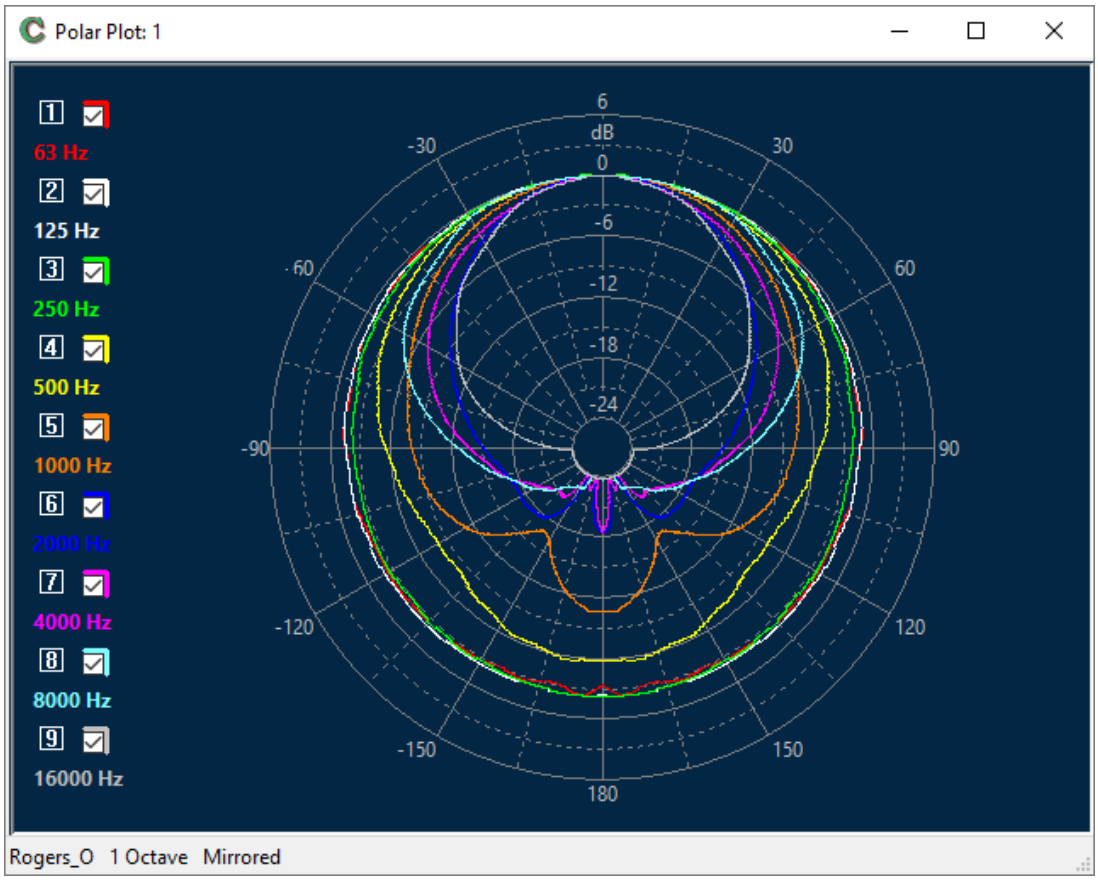


Open the Measurement Settings dialog and select the PolarPlot tab:

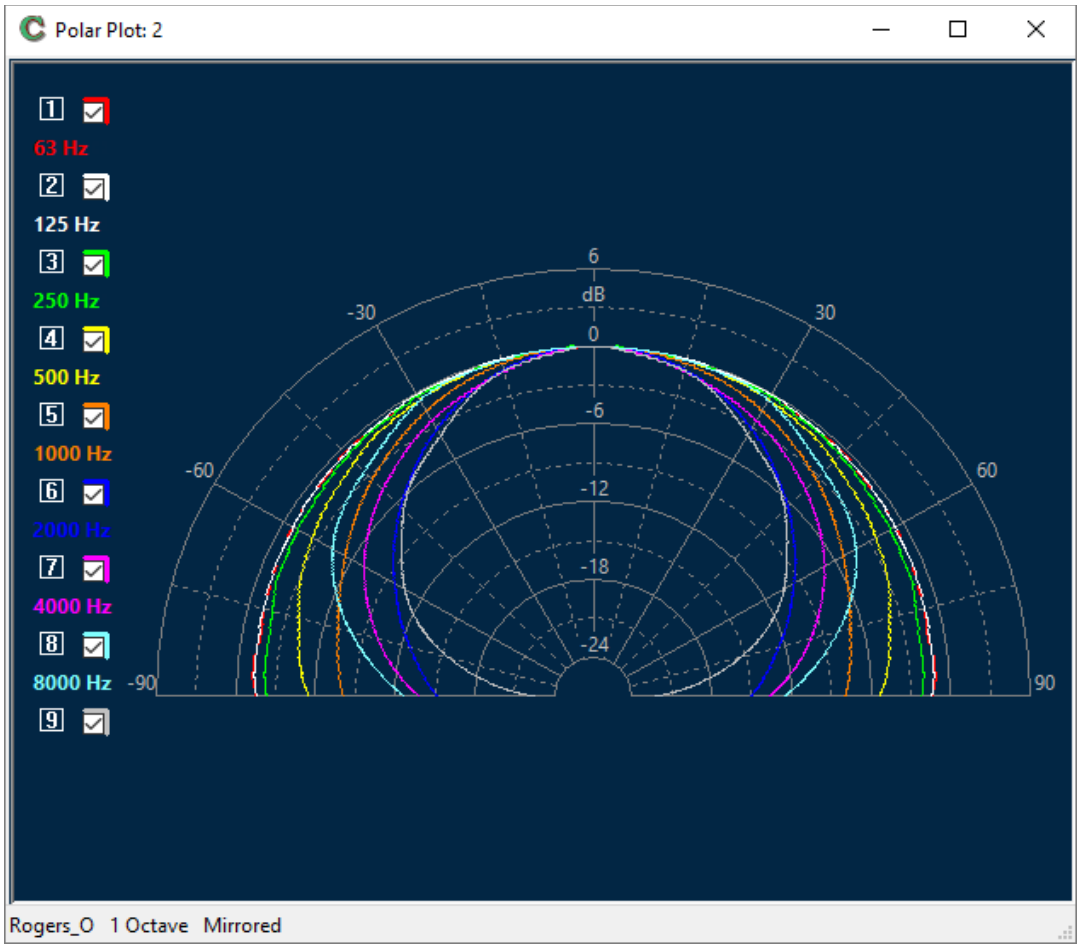


Click on the Root file name button, open the folder you prepared and select one among the files with the same NAME; as you measured only positive angle data click on the Mirror Positive Data check box.

You will obtain the following Polar Plot:



If you selected the half polar graph instead:

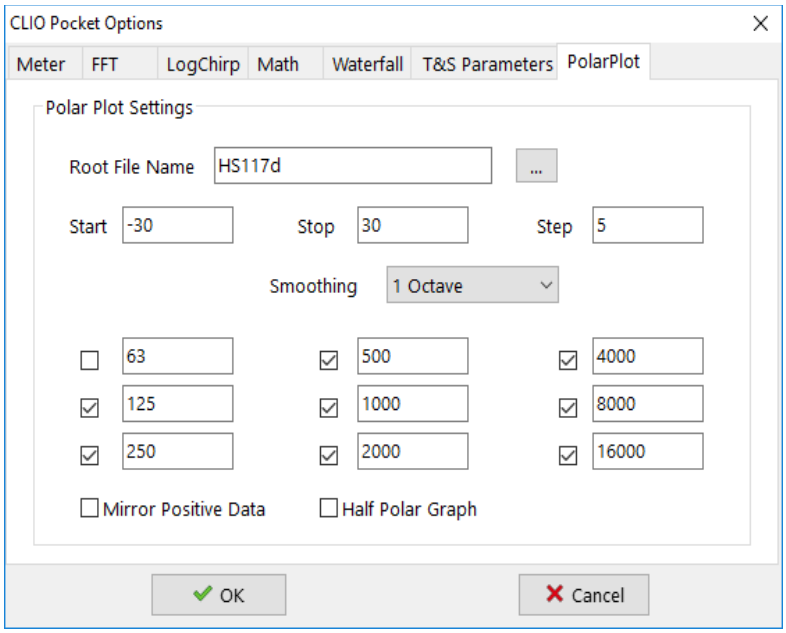


To help you better understand the polar plot process you may download a set of files from our dedicated website page.

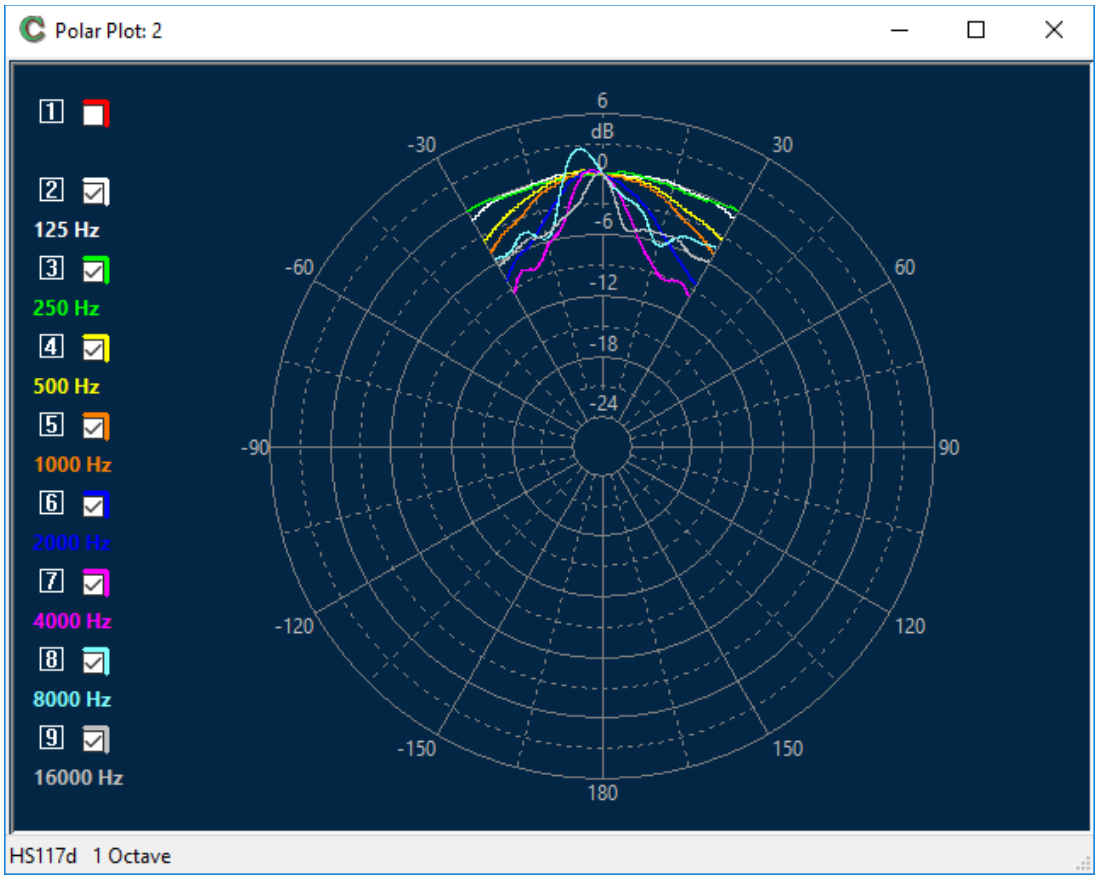
Click on: **MainMenu>Help>OnLineResourcesDownload.**

Once loaded the proper web page download the *HS117d.zip* file containing the set of files to analyze.

Unzip the folder and use the following settings:



You will obtain the following Polar Plot:



4.8 IN-ROOM MEASUREMENTS

We are going to execute two acoustical FFT measurements that characterize the quality of perceived sound and the room environment surrounding us.

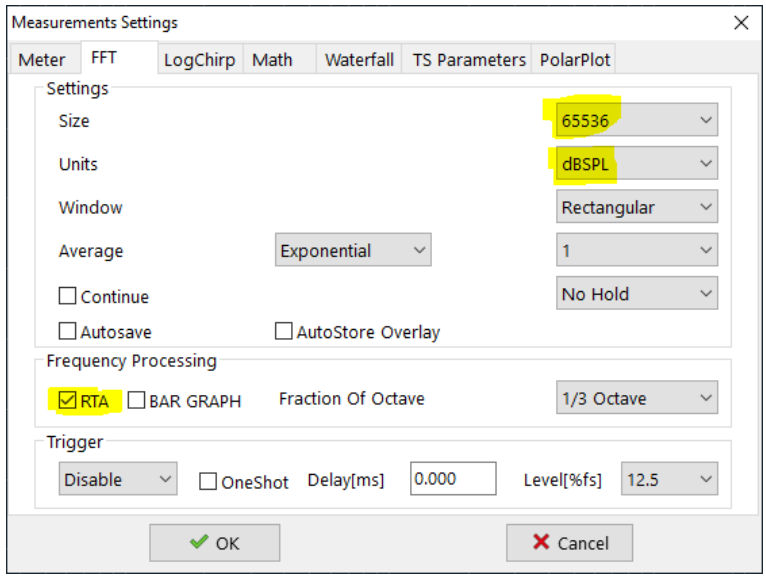
Both measurements are done at a listening position; the first tells us about the overall tonal balance and is done with third-octave RTA analysis; the second aims to give us an idea of room behavior with respect to decay of sound.

Unlike Log Chirp measurements, FFT and RTA are interactive; the user can chose either to generate a particular stimulus signal or simply analyze what is present at the mic input. When possible, when using a stimulus, it is advisable to use CLIO's internally generated signals because they lead to more precise and powerful analyses. Here we describe two examples exploiting both methods.

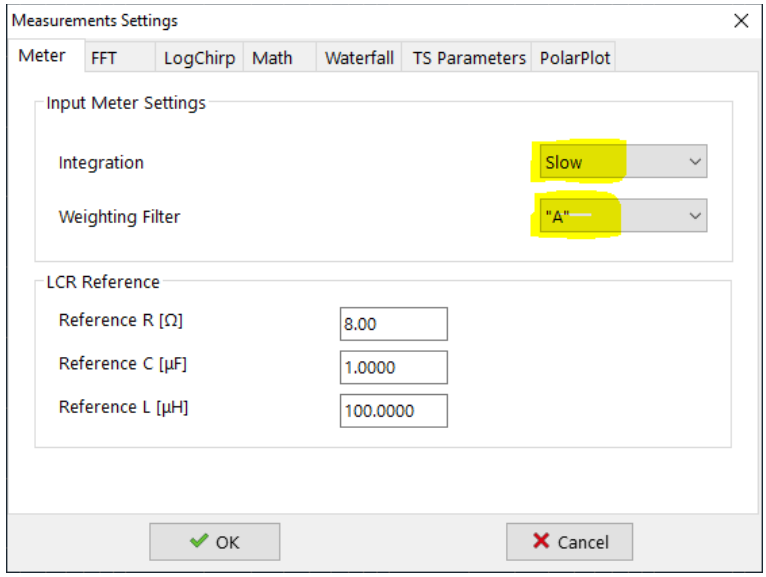
Let's prepare for our RTA measurement with an example. As seen in the photo above, we have placed a Rogers-like loudspeaker in our listening room for measuring.

To measure a loudspeaker in a similar situation, place the microphone at a listening position and connect the mic. cable to the CLIO input. Set the Mic Power Supply to ON ; In-Out Loop to open (i.e. button released); Input Sensitivity to -20dBV. Set CLIO's Output Level starting low, say 0.1V, and the CLIO generator to OFF . With the power amplifier turned OFF, and the volume control to minimum, connect the CLIO output to the power amplifier line input and then you may turn the power amplifier on.

Press the FFT button, then enter FFT Options and set Size to 65536, Units to dBSPL and check the RTA box.



Close the dialog, open the Meter Options dialog.

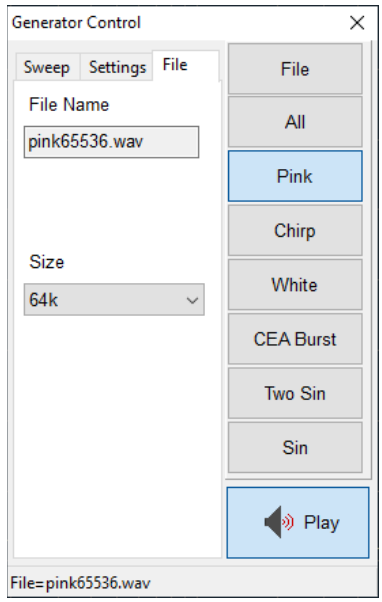


Set Integration to Slow and Weighting Filter to "A"; close the dialog and select the Meter units to dBSPL, press the FFT Go button to start the analysis. Because the generator is still OFF you should be analyzing only the fluctuating noise of the room. The reading of the Meter, now working as a Sound Level Meter gives you reading in dBA (SPL, A Weighted).

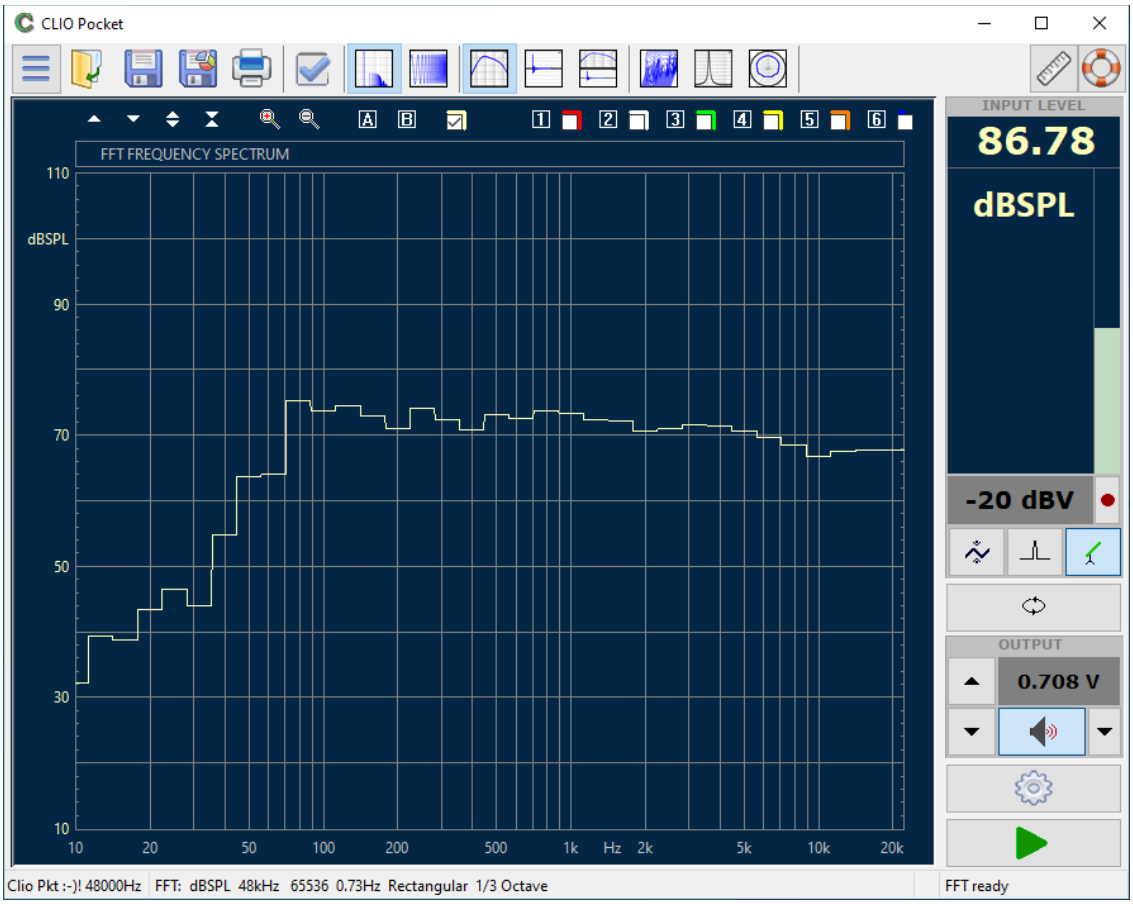
Before proceeding further, open again the Meter Options dialog and select Integration Impulse and Weighting Filter None, thus preparing for the next reading of the loudspeaker.

Now prepare the generator; click on the Generator Control Panel button aside the Generator ON/OFF one

a new window should pop up, from here it is possible to generate the required signal for our analysis; choose Pink and select 64k Size from the drop down.



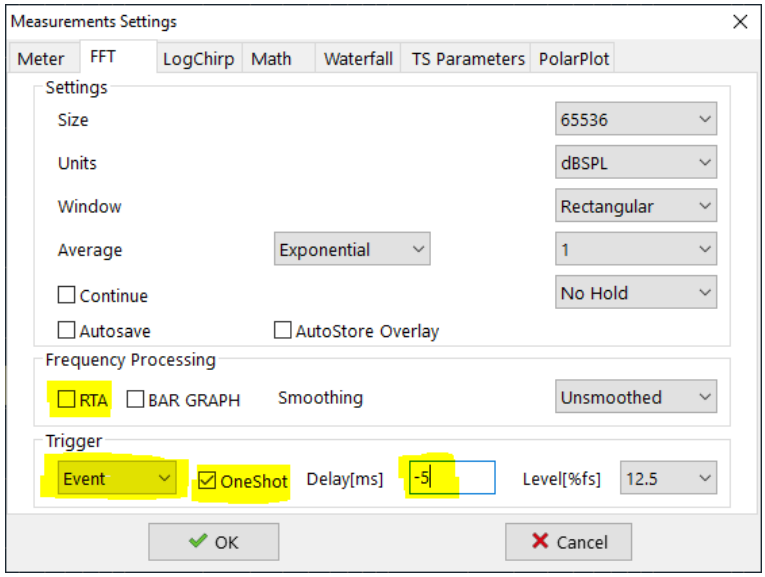
Note that we left Averaging equal to 1 in the FFT settings because we are using a pseudo-random pink-noise stimulus of same length as the FFT size. Press Play; you should hear Pink Noise out of the speaker and view the RTA Frequency Response on screen, with the average level of the signal shown in the Meter box. Now carefully increase the Output until you reach a realistic listening level, for these speakers say 87 dBSPL. You may then capture your Frequency Response by pressing STOP.



Switch Generator OFF (or simply press **ESC**).

We are now ready for the second FFT acquisition. You may disconnect the power amplifier because now we will rely on an external stimulus by means of an inflated balloon.

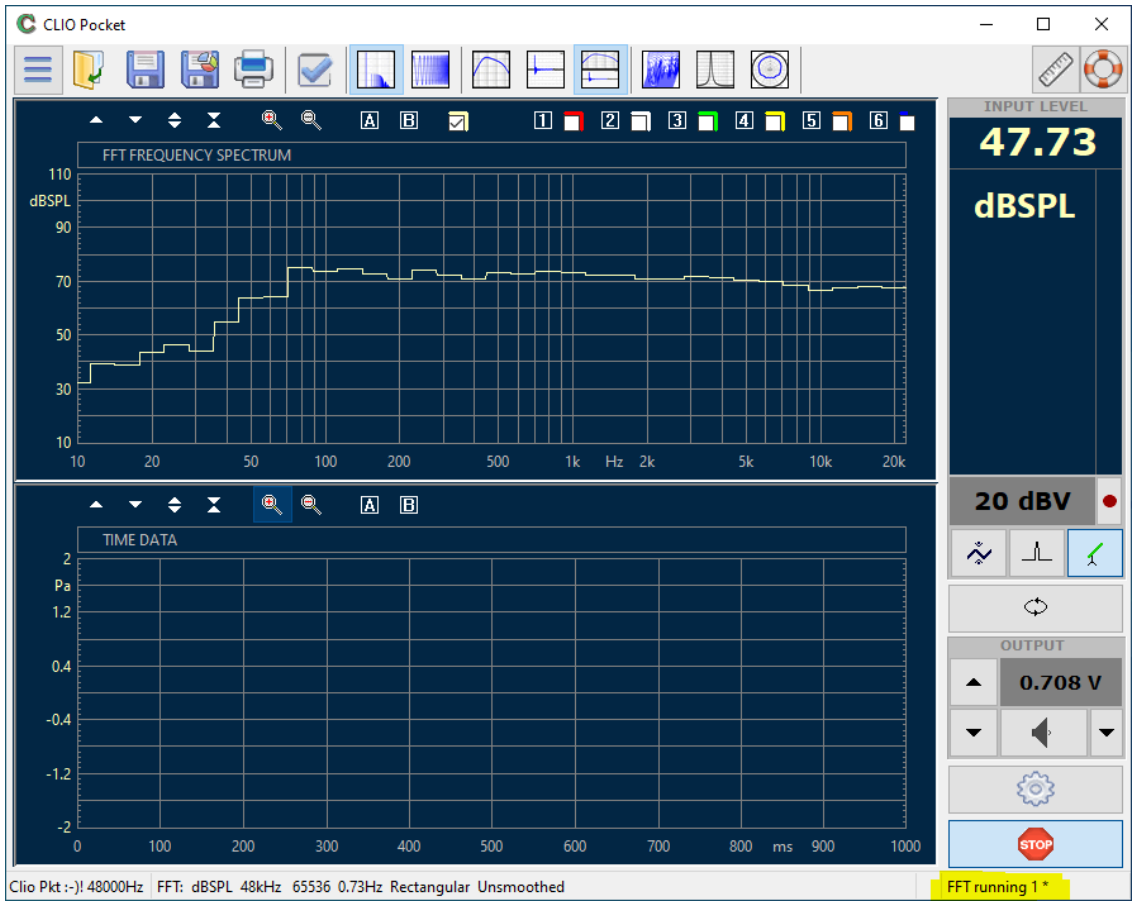
We are going to analyze the explosion of the balloon, which will give us a measure of the impulse response of our room. Open the FFT Option dialog and uncheck the RTA box, set the Event Trigger to Enable and One Shot, and input -5ms into the Delay edit box.



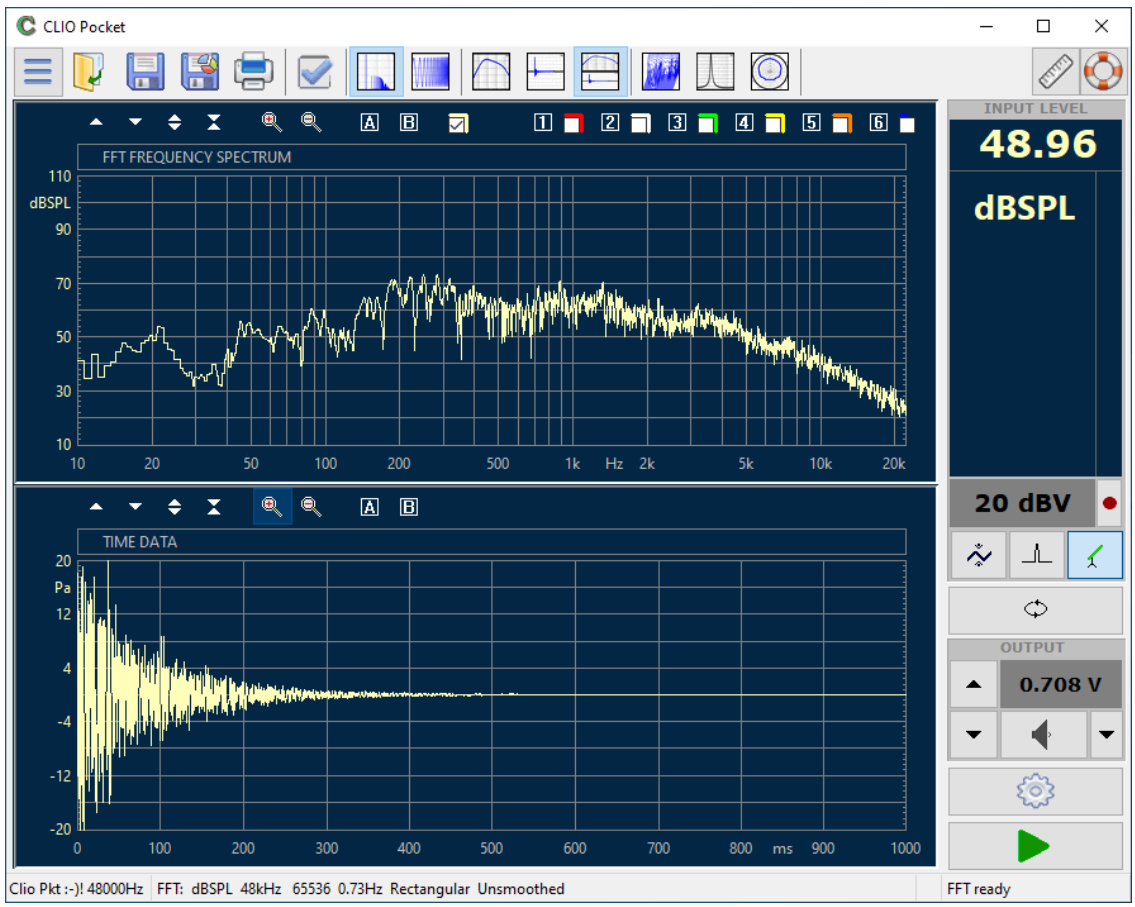
Close the dialog. Now set Input sensitivity to +20dBV to avoid overload, because the balloon explosion, even for small balloons, provokes high peak pressures.

Press the Frequency&Time Graphs button; go into the lower time graph and press the Zoom Out button until the right time scale reaches 1000ms. In this way we will see most of FFT acquisition (which is 1.37s @ 64k samples @ 48kHz).

Start FFT acquisition; the FFT is set in Event Trigger mode therefore, with only a small signal at microphone, the display should be frozen, with CLIO waiting for an event able to trigger acquisition. The **FFT running** display and a blinking cursor indicates this.

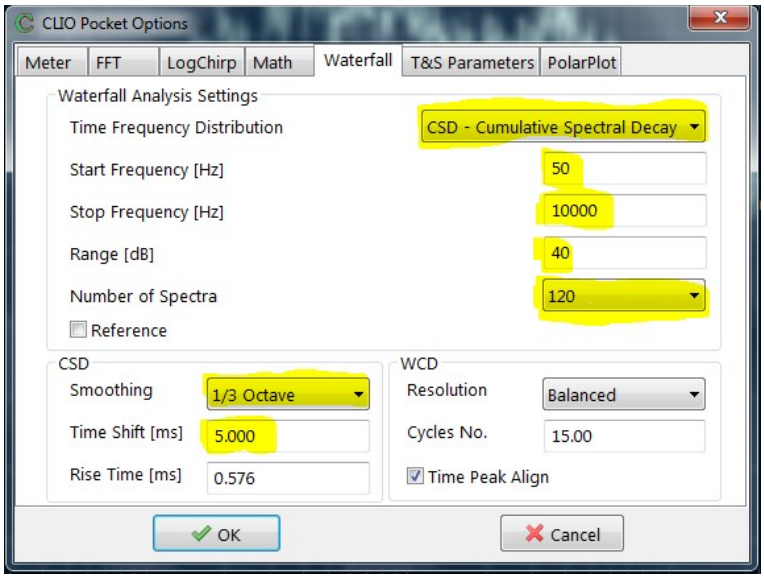


Now take the balloon, handle it in a location as in photo, explode it. If you are lucky here is what you get:

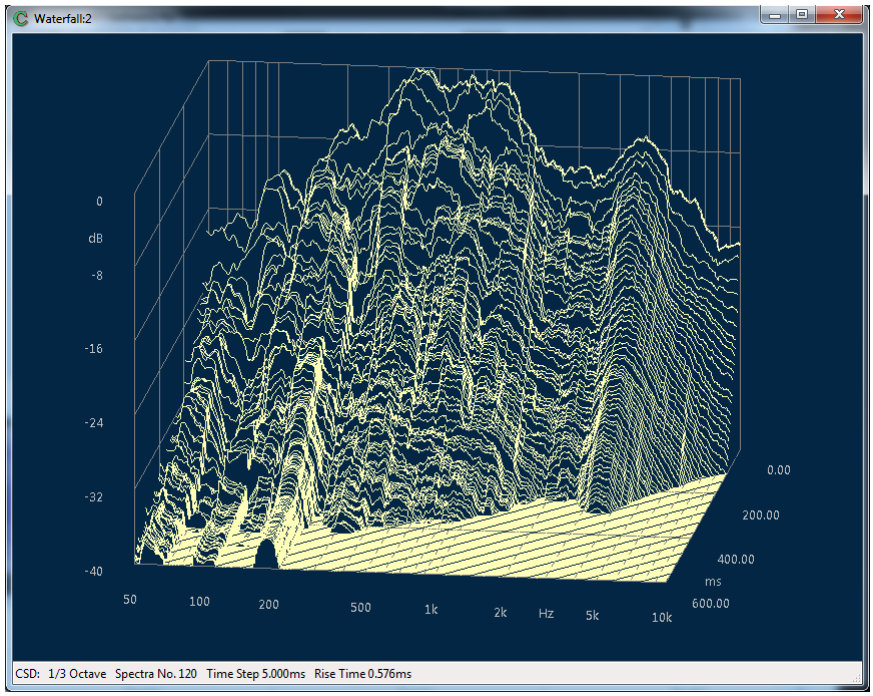


As shown in the lowest curve above, you should see the impulse and its decay, with the acquisition stopped, because it was set to One Shot only. Above the impulse response is displayed the corresponding narrow-band FFT response.

It is interesting to perform some decay processing on this acquired response. Open measurement Options again and choose the Waterfall tab. Set Time Frequency Distribution as CSD, Start Frequency 50Hz, Stop Frequency 10000Hz, Smoothing 1/3 Octave, Range 40dB, Number of Spectra 120, Time Shift 5ms.

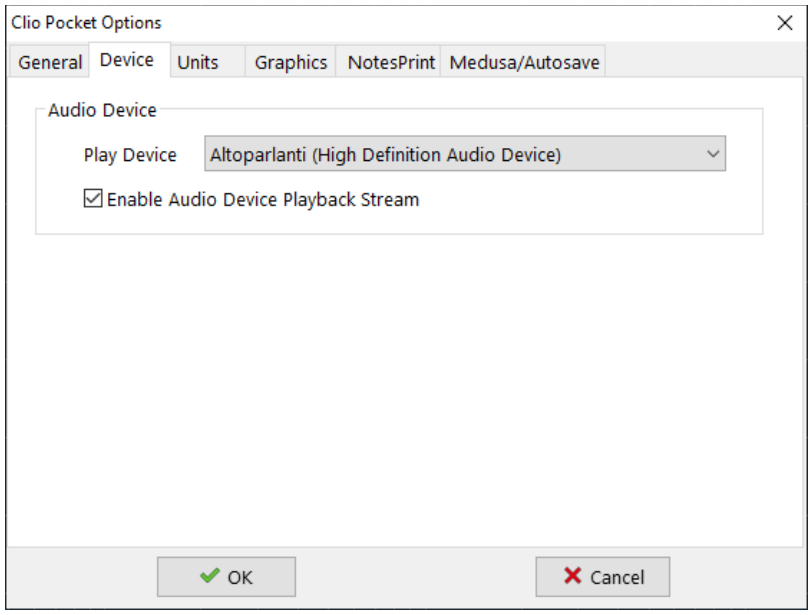


Click on the Waterfall button; the resulting graph tells you how sound decays in the room.



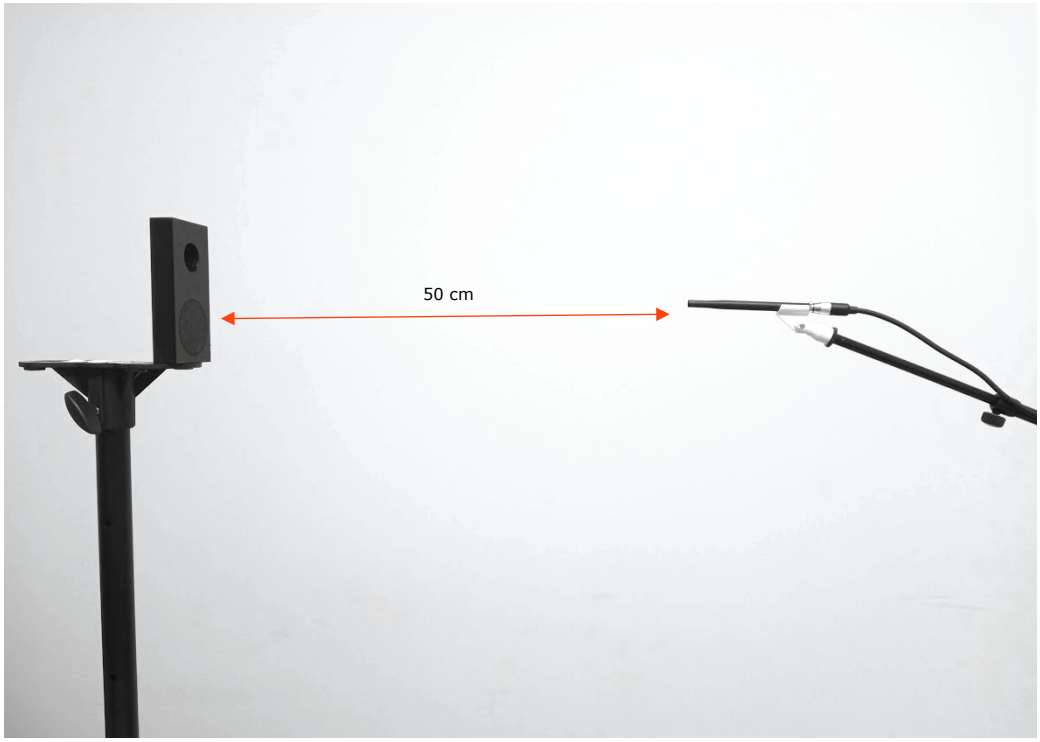
4.9 MEASUREMENTS WITH COMPUTER AUDIO PLAYBACK

Checking Enable Audio Device Playback Stream option from Clio Pocket Options menu allows to send the signals generated by CLIO Pocket to the selected Play Device (only default device under macOS).



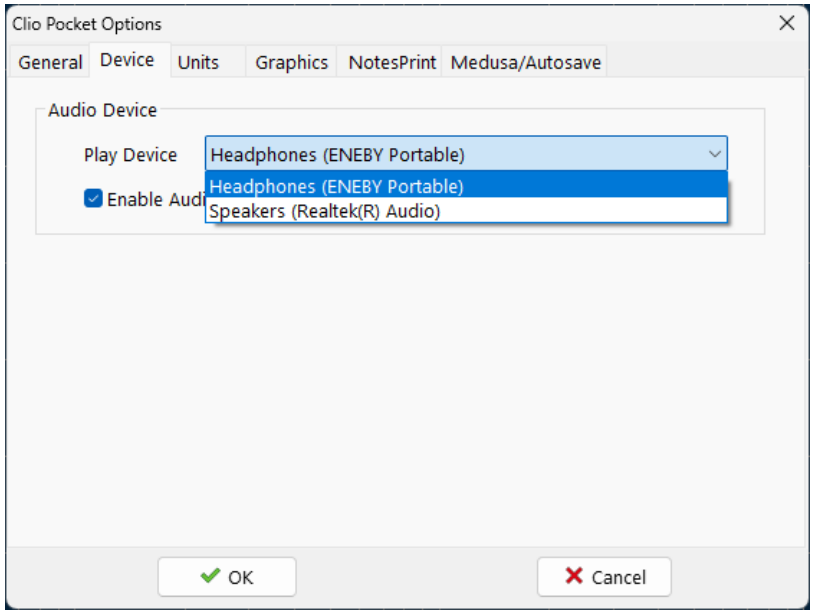
This option enables the routing of signal generation to any audio device connected to the computer on which CLIO Pocket is operating. For instance, this allows to connect a Bluetooth speaker or headset to the computer's audio output and measure its response using CLIO Pocket.

We show here the measurement of a simple Bluetooth loudspeaker. As a test setup we put the loudspeaker on a stand with the microphone at 50 cm distance from the speaker on-axis, in a similar fashion to what has been previously described at section "4.3 ANECHOIC FREQUENCY RESPONSE OF A LOUDSPEAKER SYSTEM".



We should start by pairing the loudspeaker to the computer. Once the device is

paired and seen as a sound output device from the computer we can open CLIO Pocket software and check Enable Audio Device Playback Stream under CLIO Pocket Options–Device. Finally select the Bluetooth device under the Play Device list items.

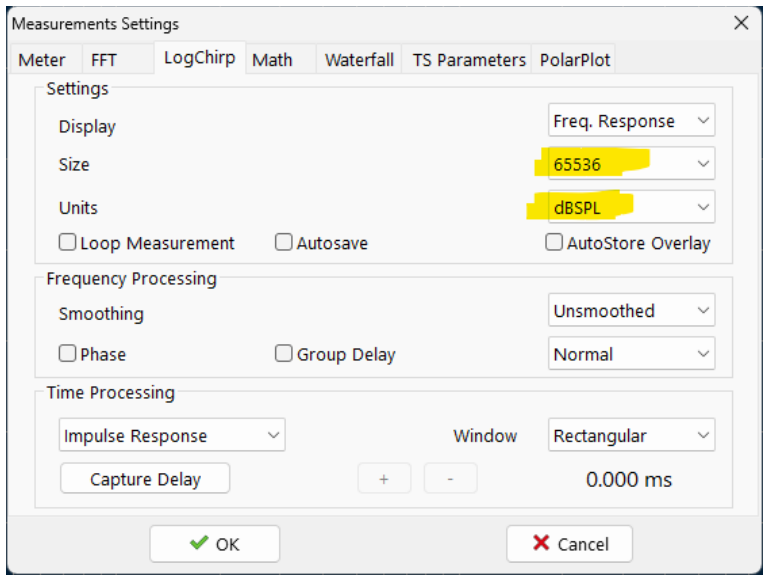


Now any signal generated by CLIO Pocket are send to the Bluetooth device.

The reproduced sound level shall be controlled from hardware controls on the device and/or from OS audio controls, as the waveform is generated at 0 dBFS peak level by CLIO Pocket. We can try to generate a sinusoidal tone to check the output level of the device.

In this case the device has no hardware controls, we can set the output to the desired level using Windows Volume Mixer (depending on Windows version the interface might differ as also under macOS, but should be straightforward).

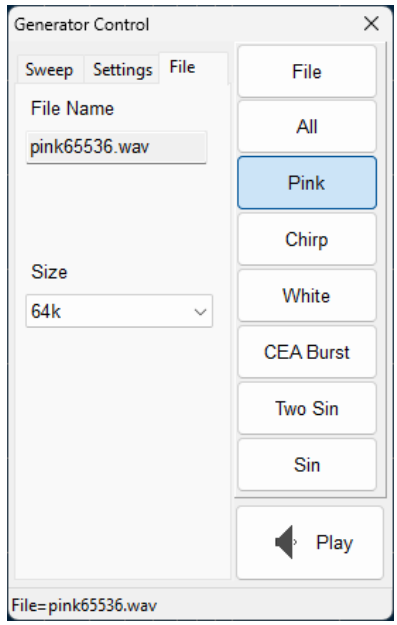
We are now ready to measure the device. We can apply the techniques already shown in the previous examples, here we measure the impulse response using LogChirp with the following settings:



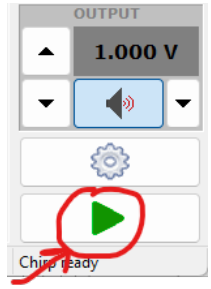
In order to make the reproduction via Bluetooth stable and time invariant, at least for the time needed to perform an LogChirp measurement, a pilot signal should be played right before the measurement stimuli.

As an example this can be done reproducing a pink noise through the speaker, this will wake the device from its low power state, then after a couple of seconds of pink noise it is possible to perform the measurement.

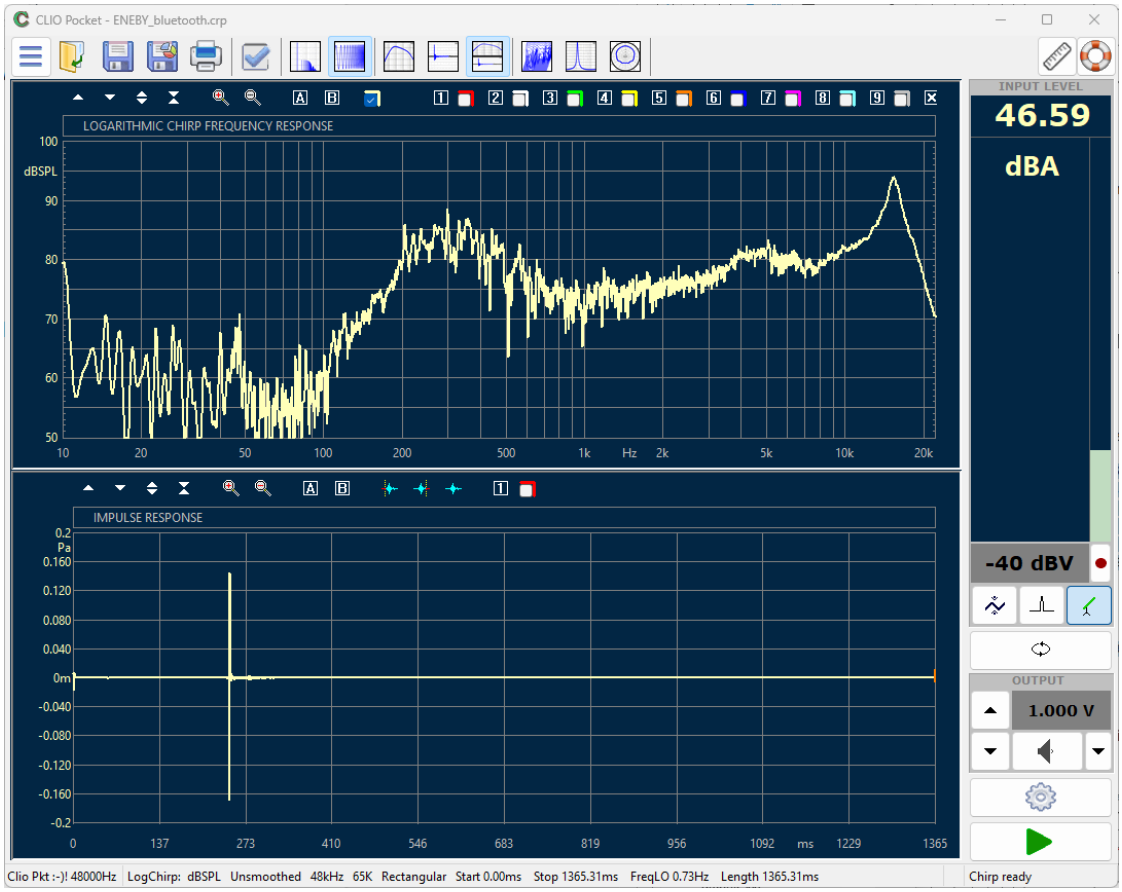
The pink noise can be activated from the CLIO Pocket generator, selecting Pink button and 64k size from item list.



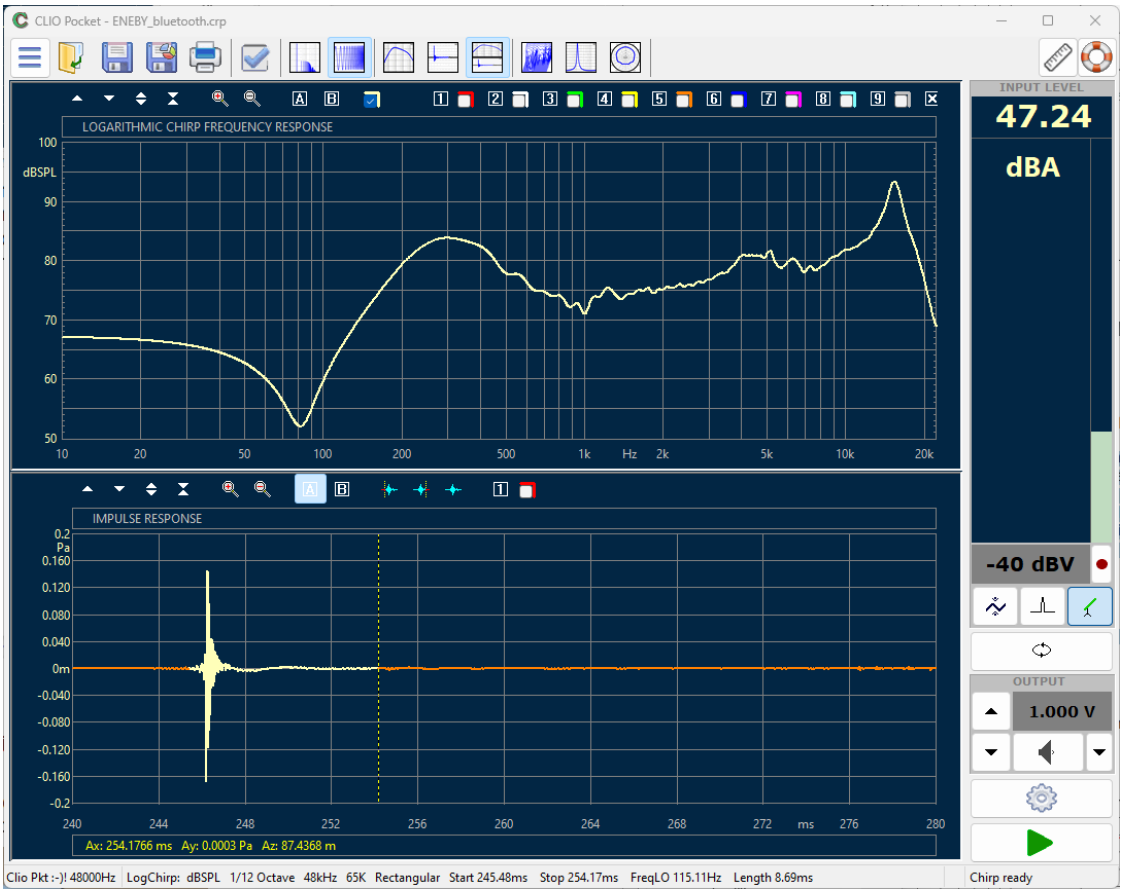
Let’s play the Pink Noise for about 2 seconds, then without turning off the noise we can press the GO button:



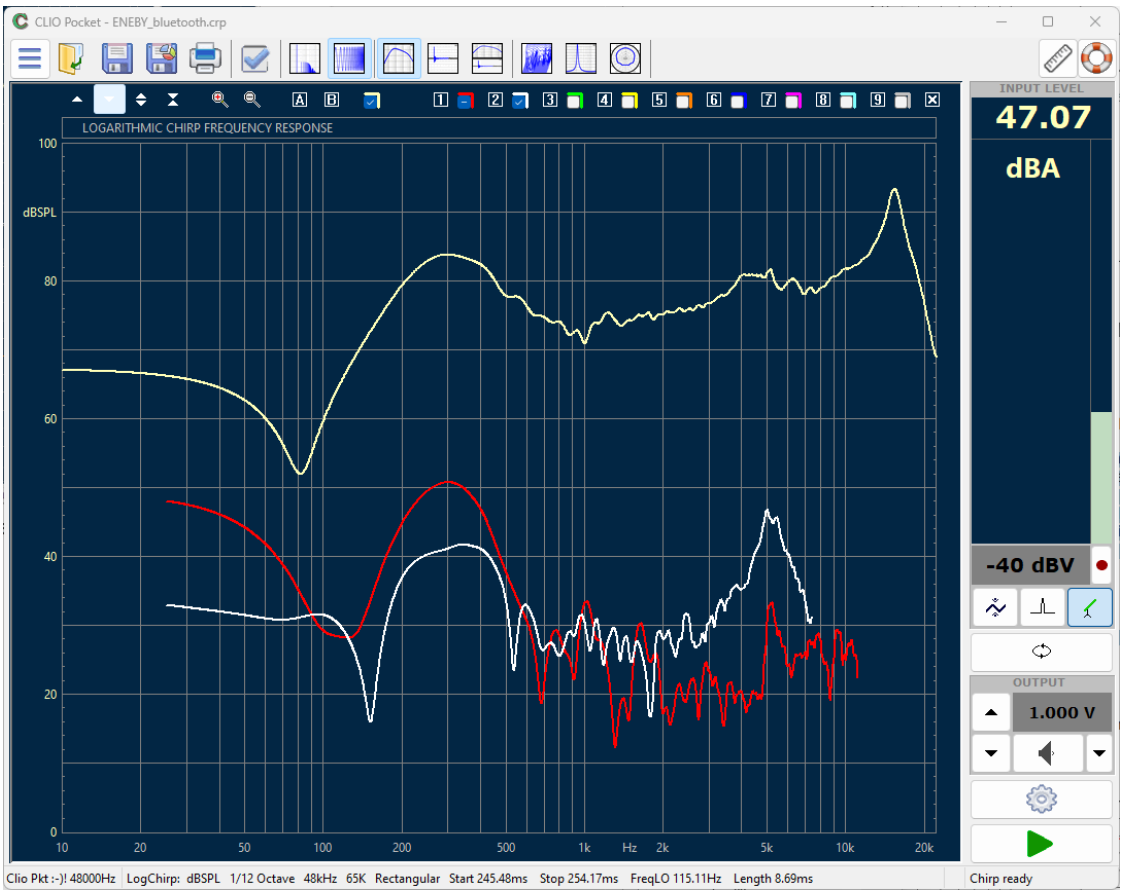
We should now see the device impulse and frequency response.



Please note that the delay of the arrival of the impulse response contains an unknown component due to the Bluetooth transmission, nevertheless this impulse response can be windowed to cut out room reflections and get the quasi-anechoic response of the Bluetooth loudspeaker.



From the LogChirp measurement we can also evaluate the distortion:

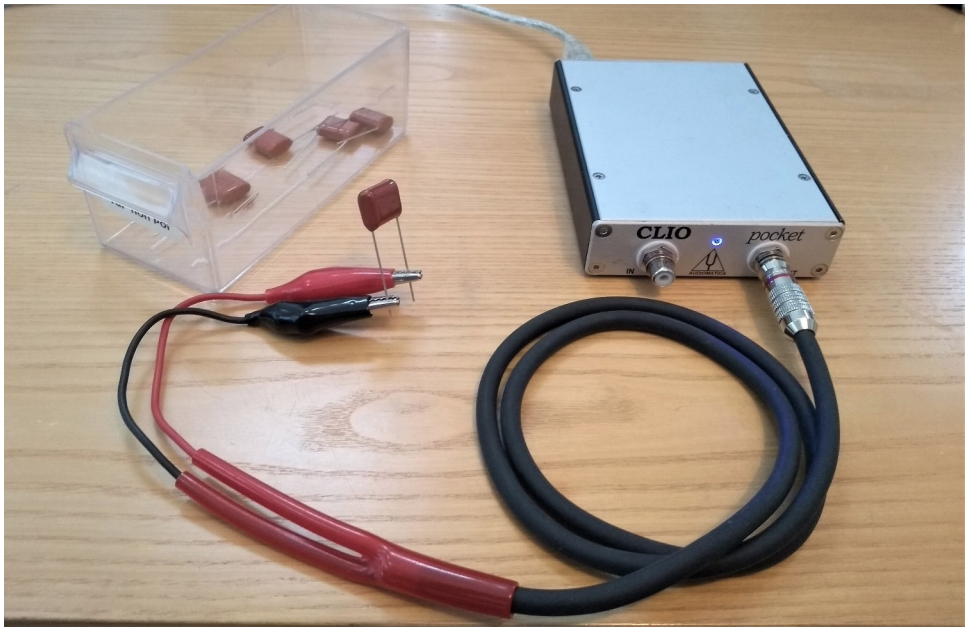


(Yellow: linear response, Red: 2nd harmonic, White: 3rd harmonic).

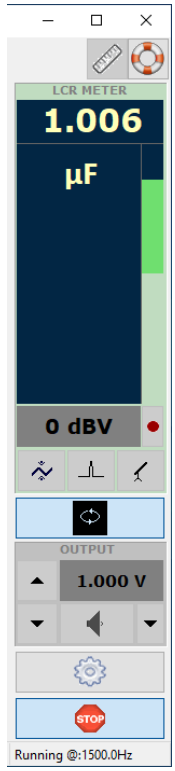
4.10 SELECTING PASSIVE COMPONENTS

As shown in a previous section the CLIO pocket multimeter can measure Resistors, Capacitors and Inductors.

The multimeter measurement is simply carried out using the supplied RCA-to-alligators cable connected to the CLIO CP-01 box output.



Pressing the ▶ arrow you should see a real time measurement of the component value.

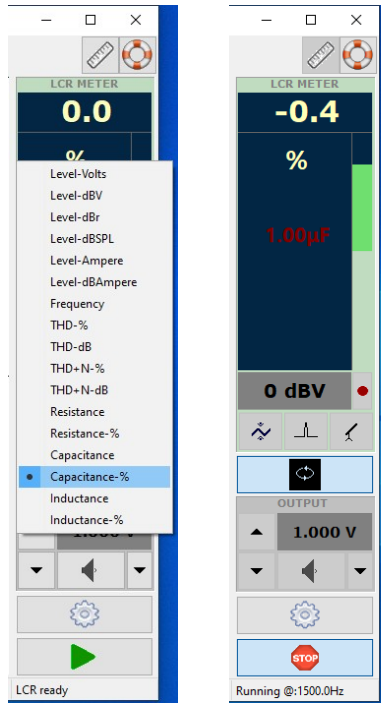


When building a crossover or any other frequency selective device the selection of components within a given tolerance range could guarantee the correct performance of the device.

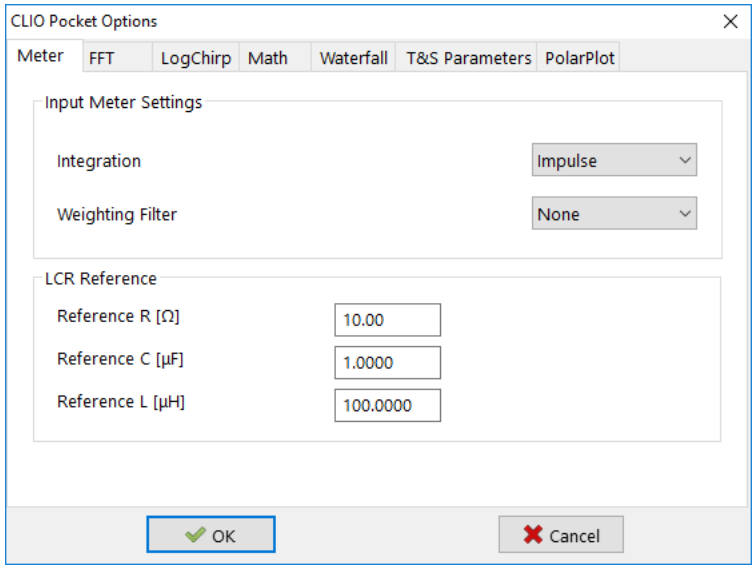
Suppose we are trying to select a 1 uF capacitor from a set of components with a

1% tolerance.

We can select the relative reading of the capacitance by selecting the Capacitance-% option:



In this mode the multimeter shows the deviation from a reference value. The reference value can be set directly from the multimeter by clicking on the current reading, in our case 1.006 uF or the value can be set from the CLIO Pocket Options under the Meter tab:

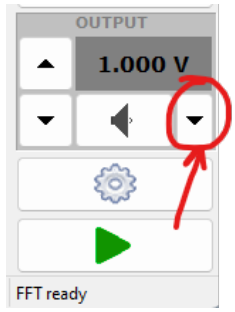


Once the multimeter is set and running, the LCR components can be rapidly tested and selected according to the deviation from the reference value.

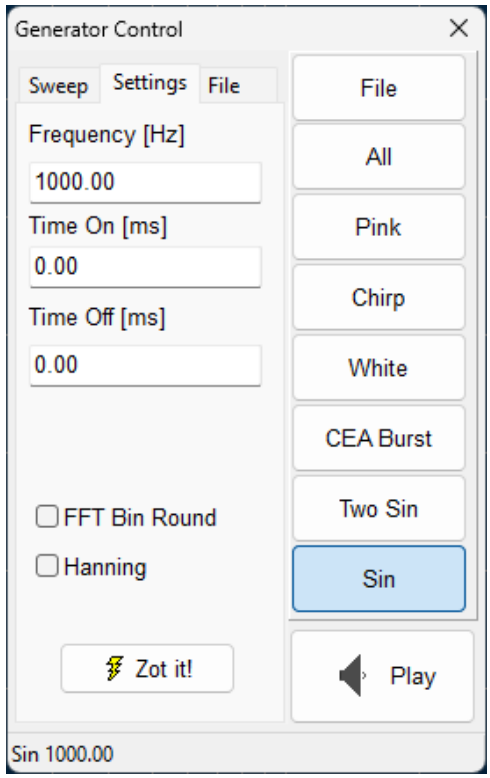
4.11 USING GENERATOR ADVANCED FEATURES

While using the CLIO Pocket generator is generally straightforward, there are a few specific functions that might benefit from a more comprehensive explanation.

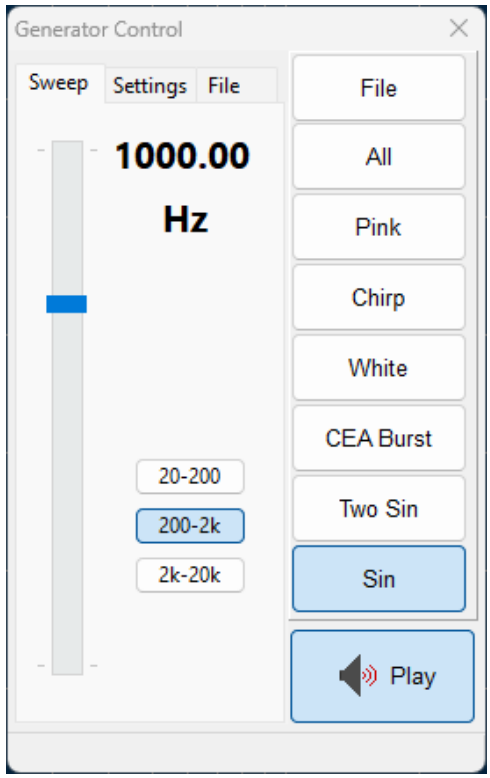
To open the generator settings use the button “Generator Control Panel”:



This will open the following control panel:



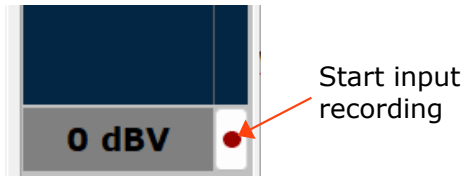
Selecting the tab “sweep” you have the control of an interactive real time sinusoidal sweep generator:



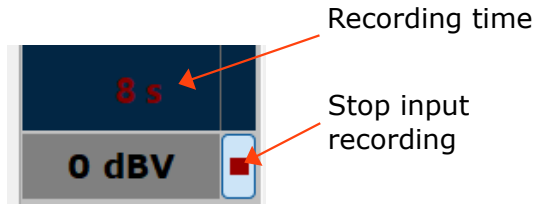
The three bands continuous sweeper that can be operated with the associated slider. The normal Coarse control (over the entire frequency band) can be changed (pressing Ctrl) to a Fine tuning of ±1% centered around actual frequency.

4.12 RECORDING WAV AUDIO FILES

There are instances where one might need to capture the input from CLIO Pocket and save it as a WAV file for future analysis. This functionality can be conveniently activated by pressing the 'record' button located on the side toolbar.



The usage is straightforward: press the button to initiate recording and press it again to conclude. Recording time is shown in the lower part of the multimeter window:



Once the recording is stopped, a save dialog will promptly appear and the acquisition can be saved as a .WAV file.

5 REFERENCES AND ON-LINE RESOURCES

5.1 VIDEO TUTORIALS

Tutorial videos are available on our YouTube channel “Audiomatica Labs”:

https://www.youtube.com/channel/UCw8dEpk1df797pwx0t7DI2Q

5.2 REFERENCES

[1] Joseph D'Appolito, “Testing Loudspeakers”, Audio Amateur Press, 1998.
https://www.amazon.com/Testing-Loudspeakers-Joseph-DAppolito/dp/1882580176

[2] Joseph D'Appolito, “CLIO Pocket Review”

[3] Joseph D'Appolito, “Testing Loudspeakers at low Frequencies with CLIO”

[4] Audiomatica Knowledge Base

[5] Audiomatica Products Literature

[5.1] CLIO 12 User's Manual

[5.2] CLIO 11 User's Manual

[5.3] CLIO 10 User's Manual