

Setting up the UMI-1 with REW

Is there an easier way? Sure. There are lots of options for a single purpose device that will allow you to make frequency response measurements of audio systems. The benefit of a closed system (a hand-held) is that it's already calibrated. You turn it on and you're ready to go. That's an attractive option, but it often comes at a much higher cost.

The benefit of using a PC is that the software available is often much more powerful and can display the information in several formats. Once you have some experience, you'll

find that being able to store and analyze measurements is a valuable feature, especially if tuning audio systems is part of your profession.

We've designed this kit to be a convenient way to get all the parts you need to make accurate frequency response measurements of car audio systems without the hassle of

figuring out what to buy, how it works together and how to calibrate all of it for use with your favorite analysis program.

How this works.

Another benefit of PC test gear is that instead of the accuracy of measurements being dependent on the perfect accuracy of a microphone or a soundcard, we can use the processing power of the PC to remove the frequency response of our test rig and to compensate for the frequency response of the microphone, so

long as we know what that frequency response is. That's what the microphone calibration file is for.

If you follow these instructions, you'll be able to make frequency response measurements that are just as accurate as the ones you might make with a lab-grade measurement tool costing much more.

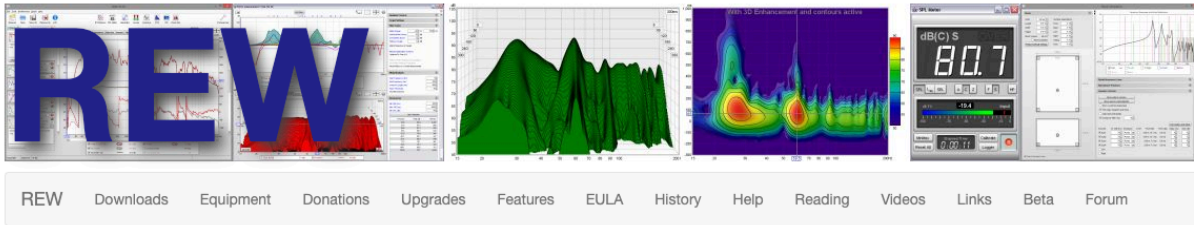
The frequency response of the sound card that's included should be removed from the measurement. Room EQ Wizard makes this simple. Using a calibration routine, you'll make a measurement of the sound card with its input connected directly to its output. Then, the program will store that measurement as a "calibration" file and subtract that frequency response from every measurement you make. If you perform the calibration correctly, your measurements will be super accurate.

The frequency response of the microphone can also be removed from the measurement in the same way. Both Room EQ Wizard and True RTA provide a way to store the frequency response curve of the microphone (your calibration file) and also subtract it from each measurement you make.

So, if accuracy is important, then it's a good idea to follow these instructions to set up your kit. You'll only have to do this once.

This guide is for version 5.20.13

Step 1. Download Room EQ Wizard at www.roomeqwizard.com and follow the instructions to install the program. It is recommended to restart your computer after install.



Room Acoustics Software

REW is free software for room acoustic measurement, loudspeaker measurement and audio device measurement. The audio measurement and analysis features of REW help you optimise the acoustics of your listening room, studio or home theater and find the best locations for your speakers, subwoofers and listening position. It includes tools for generating audio test signals; measuring SPL and impedance; measuring frequency and impulse responses; measuring distortion; generating phase, group delay and spectral decay plots, waterfalls, spectrograms and energy-time curves; generating real time analyser (RTA) plots; calculating reverberation times; calculating Thiele-Small parameters; determining the frequencies and decay times of modal resonances; displaying equaliser responses and automatically adjusting the settings of parametric equalisers to counter the effects of room modes and adjust responses to match a target curve.

The [Pro upgrade](#) offers simultaneous measurement of multiple inputs with rms averaging, adjustable weighting for each input, level alignment, and up to 16 input traces on the RTA in addition to the rms average.

Downloads

The current version is V5.20.13, revised 26th September 2022. If you are looking for V5.19 it is [here](#). **V5.19 cannot open V5.20 mdat files**

Beta version downloads are hosted at [AV Nirvana](#), home of the [REW support forum](#). To view the REW revision history click [here](#).

OS	Downloads
Win 11/10/8/7 Vista XP Pro x64	Windows 64-bit installer (42.9 MB, includes private 64-bit Java 8 runtime)
	Windows 32-bit installer (43.3 MB, includes private 32-bit Java 8 runtime)
10.11 - 12	macOS DMG (51.3 MB, includes private Java 8 runtime) Notarized universal binary for Intel and M1 Macs. On Ventura set the theme to Light (not Dark) to run the installer. Mic access is included in the code signature and will be requested if necessary. A mic access prompt for REW can be forced using <code>tcctl reset Microphone</code> from a terminal before starting REW then using a feature that requires mic access, such as the SPL meter
AMD64	Linux AMD64 installer (42.7 MB, includes private Java 8 AMD64 runtime)
All	Linux installer (22.4 MB, requires a Java 8 runtime)
	Sampledata.mdat (8.0 MB) Sample measurement data

Equipment

The simplest configuration for most acoustic measurement purposes is a calibrated USB microphone (miniDSP's UMIK-1 is recommended) and your computer's headphone or HDMI output. An analog measurement microphone (Dayton Audio's EMM-6, for example) will need a suitable interface with a mic preamp and phantom power, such as Steinberg's UR22 MkII or the Focusrite Scarlett Solo.

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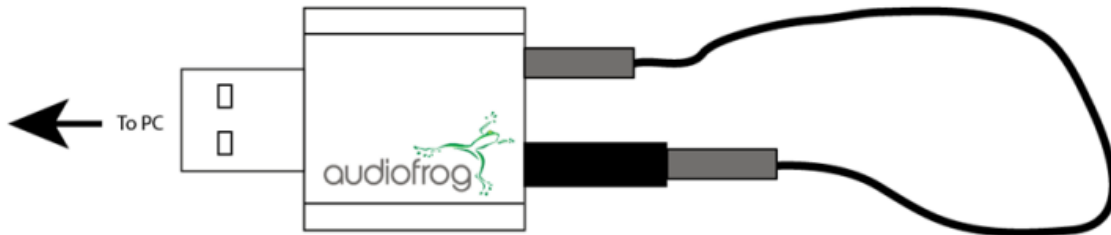
miniDSP UMIK-1 calibrated USB measurement microphone



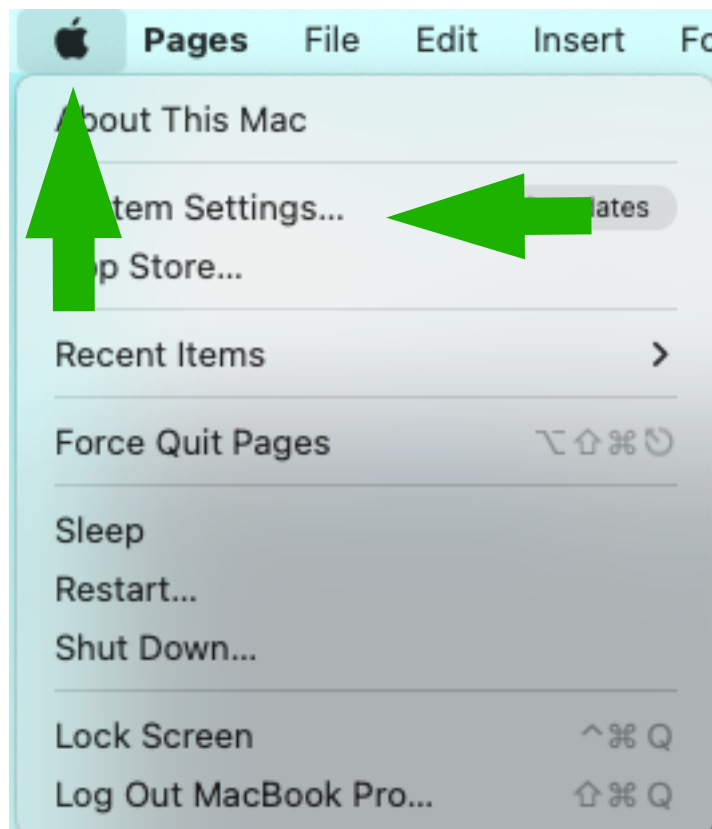
Dayton Audio EMM-6 calibrated analog measurement microphone



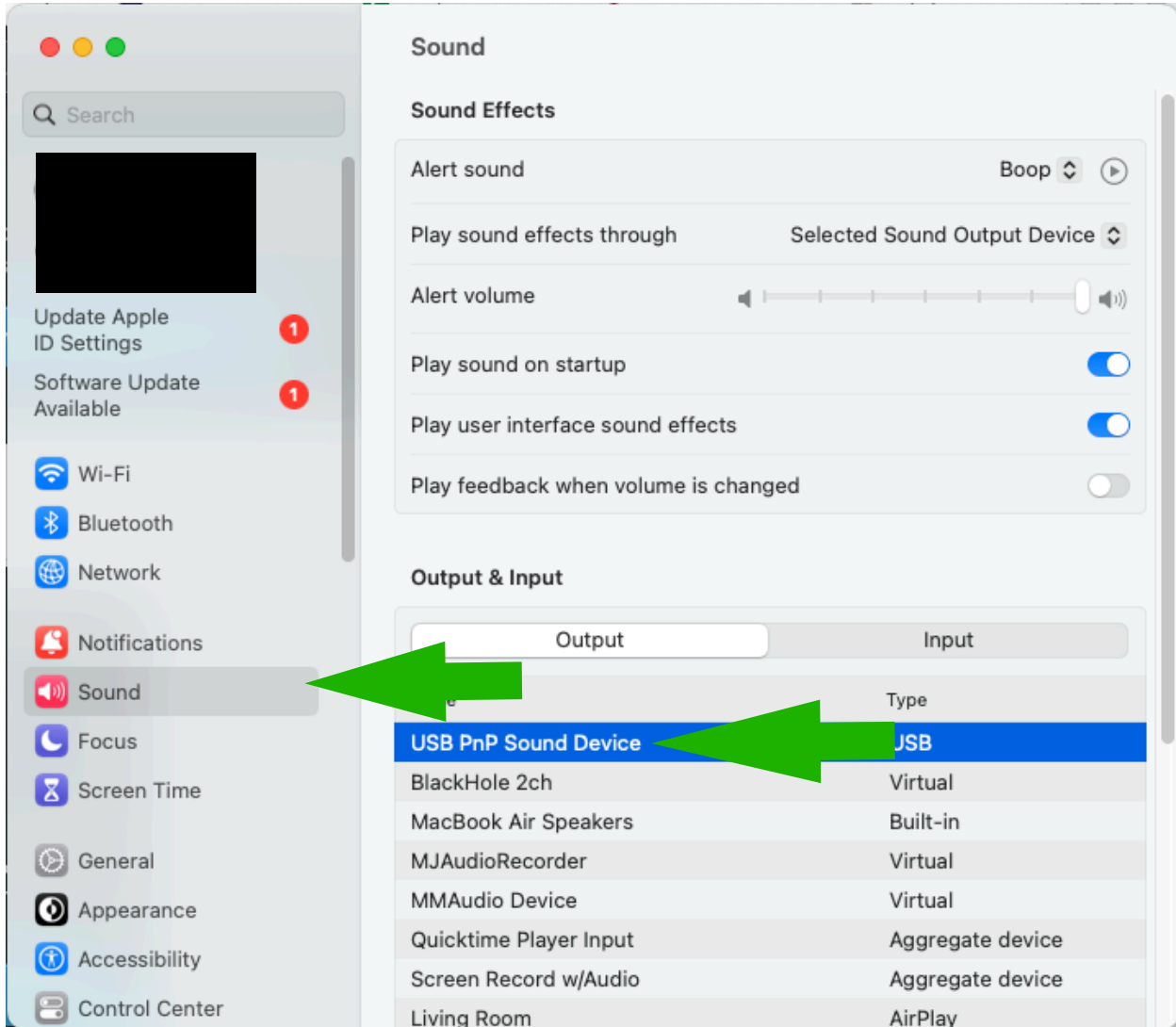
Step 2. Using the extension cable and the 3.5mm male to male adapter, plug the soundcard input into its output. Plug the soundcard into an open USB port on your PC.

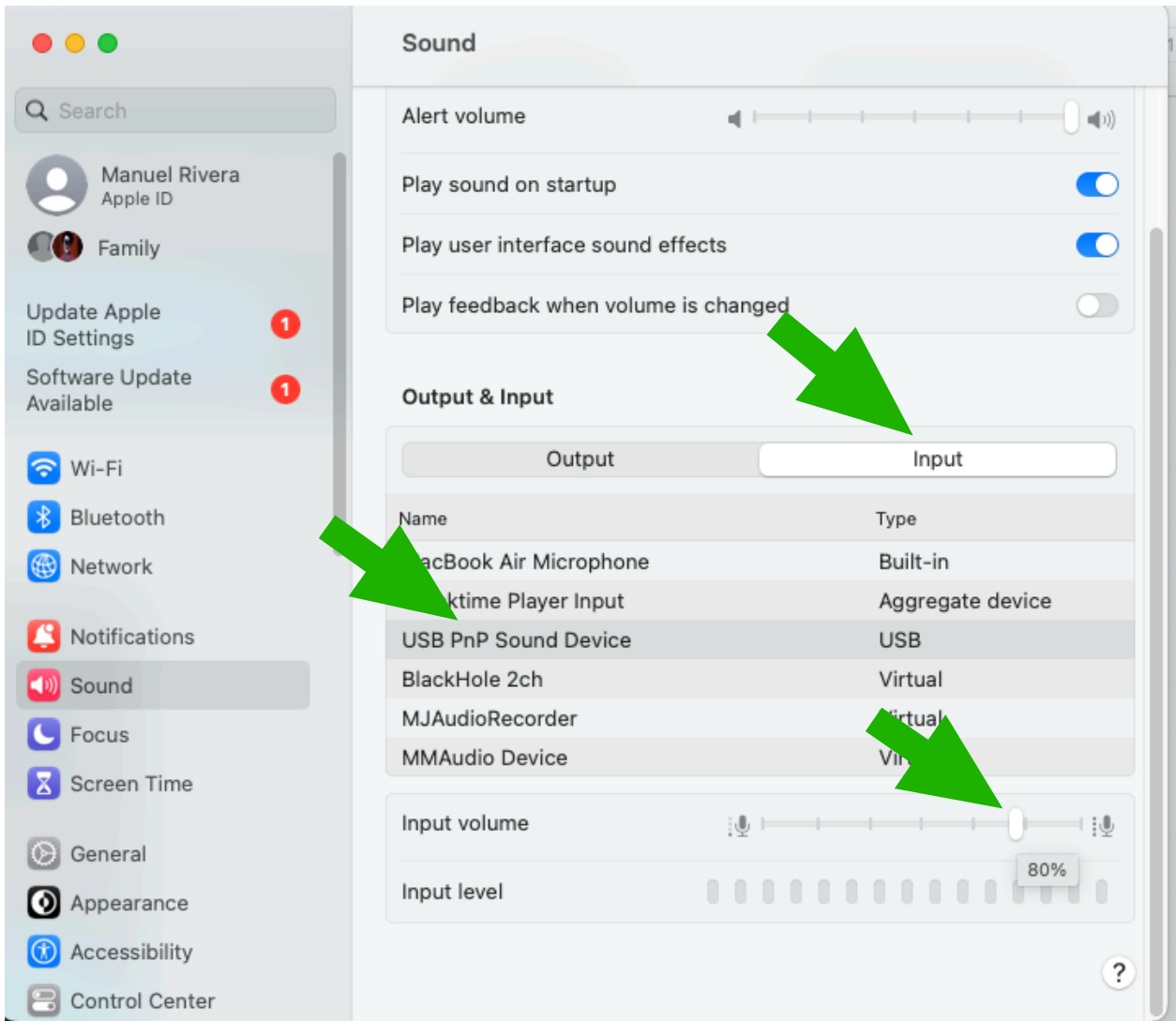


Step 3. Click the apple in the upper right corner then select "System Settings".

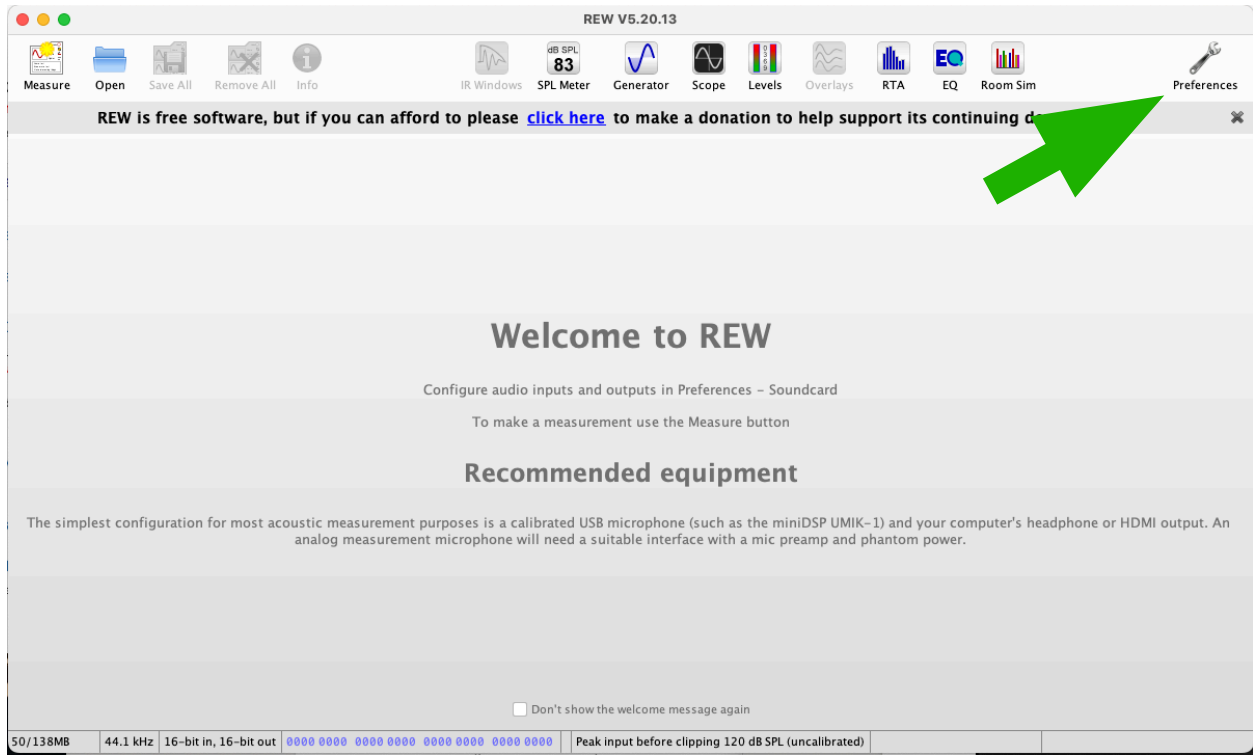


Step 4. Next select “Sound” then select “USB PnP Sound Device” as your output device. Select Input, select “USB PnP Sound Device” then scroll down to the bottom and set the level to 80.

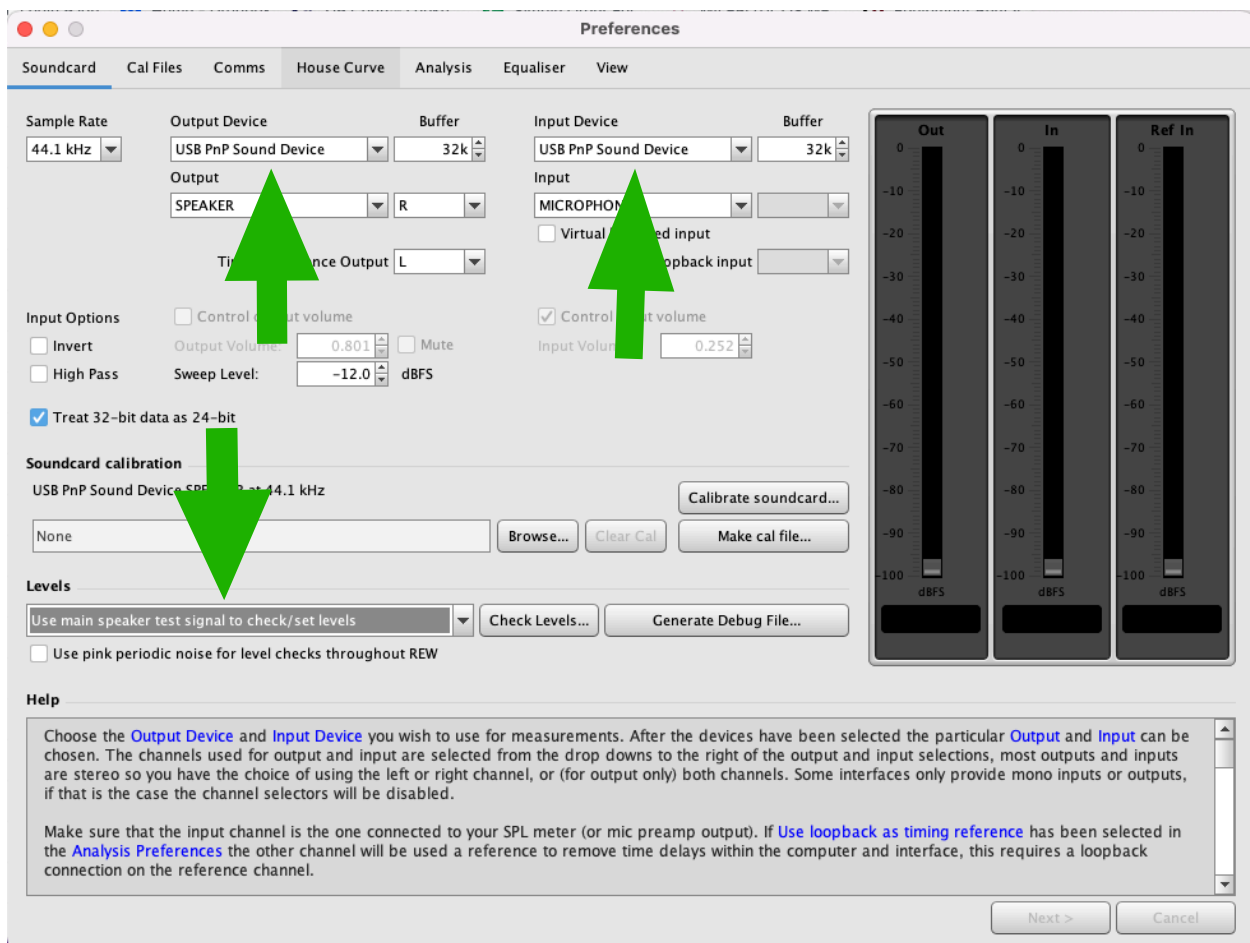




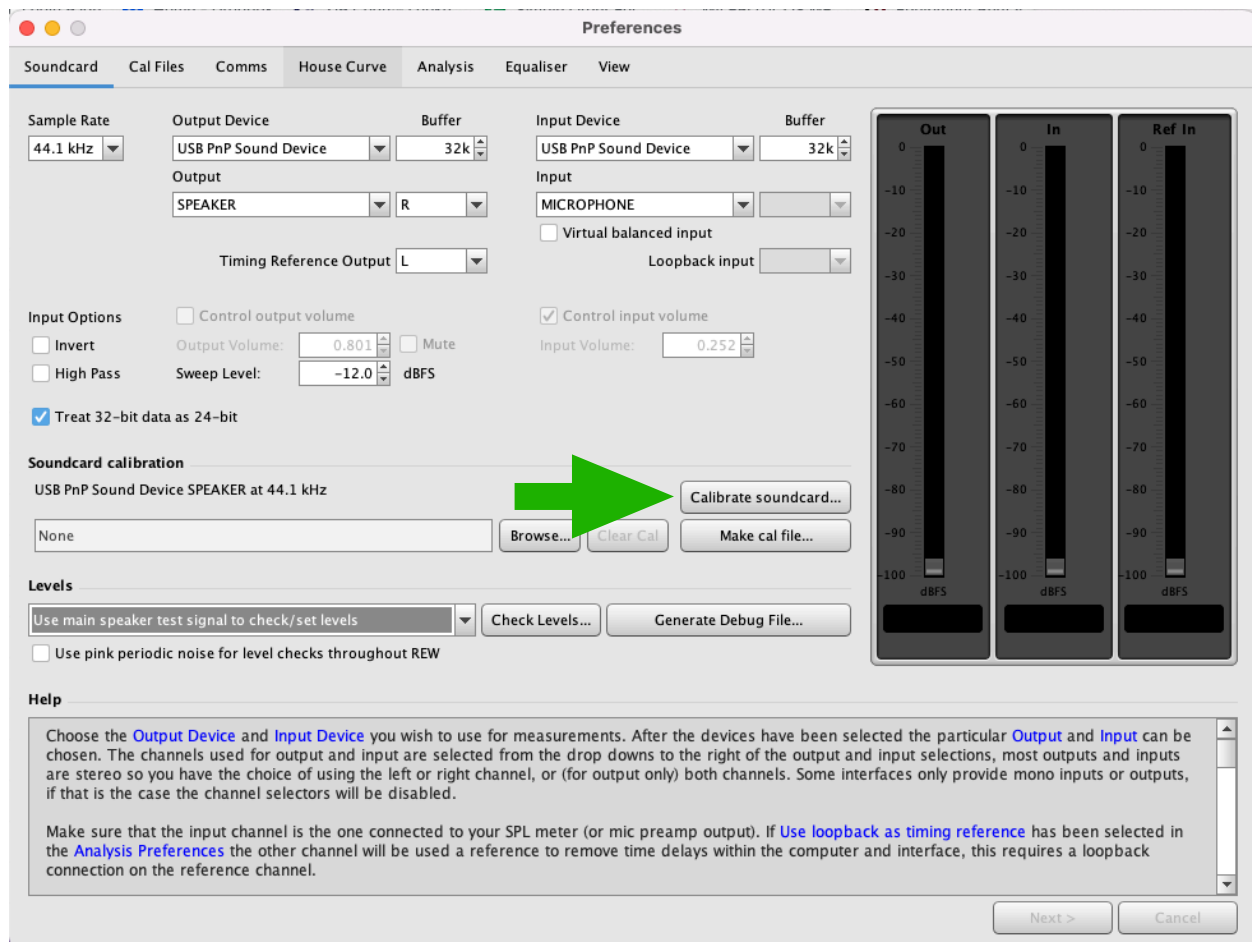
Step 5. Run Room EQ Wizard and Click Preferences.



Step 6. Use the down arrows and the drop down menus to select the USB device in the “Input” and “Output” selection boxes. Also, choose “Use main speaker signal to check/set levels”. Double check that all of the other boxes in the “Soundcard” panel match the settings shown below.



Step 7. Click “Calibrate”. After you click “Calibrate”, the information in the “Help” box will change to indicate the next steps. Read it if you want. If not, click “Next” and then click “Next” again.



Preferences

Soundcard Cal Files Comms House Curve Analysis Equaliser View

Sample Rate: 44.1 kHz

Output Device: USB PnP Sound Device Buffer: 32k

Output: SPEAKER R

Timing Reference Output: L

Input Device: USB PnP Sound Device Buffer: 32k

Input: MICROPHONE

Virtual balanced input

Loopback input:

Input Options

Control output volume

Invert

Output Volume: 0.801

Mute

High Pass

Sweep Level: -12.0 dBFS

Control input volume

Input Volume: 0.252

Treat 32-bit data as 24-bit

Soundcard calibration

USB PnP Sound Device SPEAKER at 44.1 kHz

Calibrate soundcard...

None

Browse... Clear Cal Make cal file...

Levels

Use main speaker test signal to check/set levels

Check Levels... Generate Debug File...

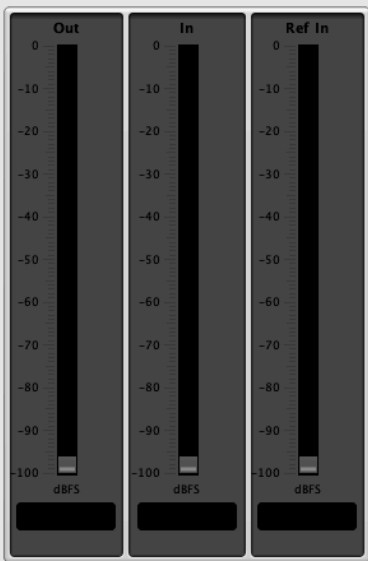
Use pink periodic noise for level checks throughout REW

Help

The audio interface is measured with an external loopback connected to allow its frequency response to be determined and saved as a calibration file. This response is subtracted when subsequent measurements are made, eliminating the interface's own response. The loopback connects the output channel that will be used for measurement (usually the Right channel of the Line output) to the input channel that will be used (usually the Left channel of the line input).

Please connect the loopback now and press **Next** when it has been connected or **Cancel** to quit.

Out In Ref In



Next > Cancel

Step 8. After you've clicked "Next" twice, the analyzer will send a signal out through the soundcard and receive the signal through the sound card. The three level bars indicate the output level (left), the input level (center) and the reference input level (in this configuration, (the In and Ref In are the same). Check the level meters. The inputs should be within about one dB of the output level. If they aren't, In the upper right corner click the apple then select sound, In the sound section select input. Adjust the level of the microphone while watching the level bars. When they are within one dB of the output, click OK in the microphone panel.

The screenshot shows the 'Preferences' dialog box in REW, specifically the 'Soundcard' tab. The settings are as follows:

- Sample Rate:** 44.1 kHz
- Output Device:** USB PnP Sound Device
- Output:** SPEAKER
- Input Device:** USB PnP Sound Device
- Input:** MICROPHONE
- Output Level:** -12.0 dBFS
- Input Level:** -11.74 dBFS
- Ref In Level:** -11.74 dBFS

The level meters are located on the right side of the dialog. The 'Out' meter shows a peak level of -12.00 dBFS. The 'In' and 'Ref In' meters show a peak level of -11.74 dBFS. Two green arrows point to the 'In' and 'Ref In' meters, indicating the target levels for adjustment.

The 'Help' section at the bottom of the dialog provides the following instructions:

The 1kHz tone is now playing. Adjust the **Input Volume** using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls so that the input level is close to the output level, ideally within 6dB, and the peak level (the red line on the meter) is no lower than -1dB.

If the input level control is at its maximum but the input level is still more than 6dB below the output level try increasing the **Output Volume** using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls.

Press **Next** when the input volume has been set or **Cancel** to quit.

Preferences

Sound

Alert volume

Play sound on startup

Play user interface sound effects

Play feedback when volume is changed

Output & Input

Output Input

Name	Type
MacBook Air Microphone	Built-in
Quicktime Player Input	Aggregate device
USB PnP Sound Device	USB
BlackHole 2ch	Virtual
MJAudioRecorder	Virtual
MMAudio Device	Virtual

Input volume

Input level

Out

-12.00

In

-11.74

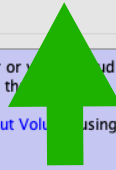
Ref In

-11.74

If the input level control is at its maximum but the input level is still more than 10 dB below the output level try increasing the Output Volume using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls.

Press **Next** when the input volume has been set or **Cancel** to quit.

Next > Cancel



Step 9. Click “Next” in REW’s Soundcard panel. Then click “Next” again.

The screenshot shows the REW Preferences dialog box, specifically the Soundcard tab. The dialog is titled "Preferences" and has several tabs: Soundcard, Cal Files, Comms, House Curve, Analysis, Equaliser, and View. The Soundcard tab is active.

The Soundcard tab is divided into several sections:

- Sample Rate:** 44.1 kHz
- Output Device:** USB PnP Sound Device
- Buffer:** 32k
- Input Device:** USB PnP Sound Device
- Buffer:** 32k
- Output:** SPEAKER, R
- Input:** MICROPHONE
- Virtual balanced input
- Timing Reference Output:** L
- Loopback input:** (empty)
- Input Options:**
 - Invert
 - High Pass
 - Treat 32-bit data as 24-bit
- Control output volume
- Output Volume:** 0.801
- Mute
- Sweep Level:** -12.0 dBFS
- Control input volume
- Input Volume:** 0.504

Soundcard calibration

USB PnP Sound Device SPEAKER at 44.1 kHz

None [Browse...] [Clear Cal] [Make cal file...] [Calibrate soundcard...]

Levels

Use main speaker test signal to check/set levels [Check Levels...] [Generate Debug File...]

Use pink periodic noise for level checks throughout REW

Help

The 1kHz tone is now playing. Adjust the **Input Volume** using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls so that the input level is close to the output level, ideally within 6dB, and the peak level (the red line on the bar) is lower than 10dB.

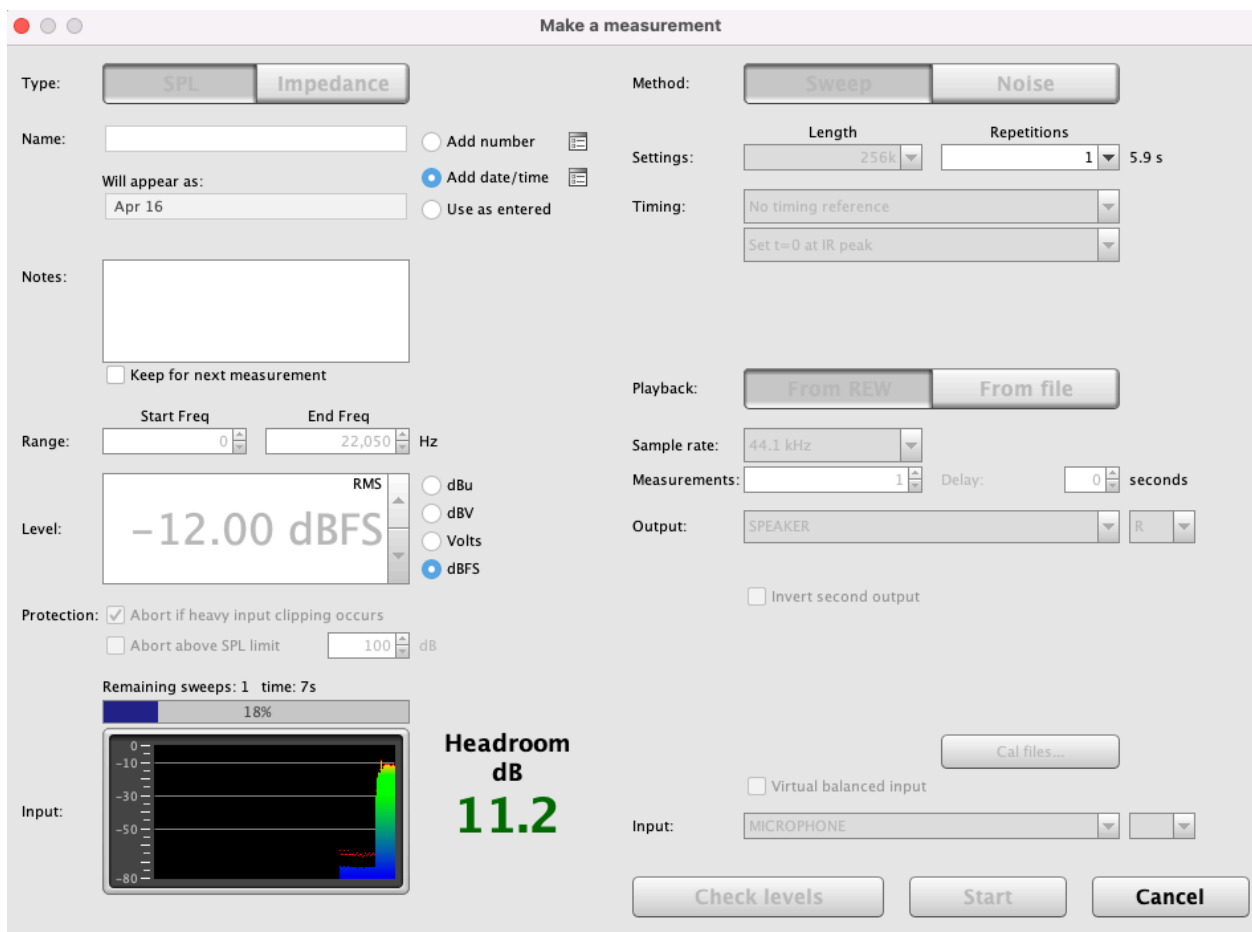
If the input level control is at its maximum but the input level is still more than 6dB below the output level try increasing the **Output Volume** using the REW control (if enabled and available) or your interface's mixer or your OS audio level controls.

Press **Next** when the input volume has been set or **Cancel** to quit.

At the bottom right, there are two buttons: "Next >" and "Cancel". A large green arrow points to the "Next >" button.

On the right side of the dialog, there are three level meters labeled "Out", "In", and "Ref In". Each meter has a scale from 0 to -100 dBFS. The "Out" meter shows a peak level of -12.00 dBFS. The "In" meter shows a peak level of -11.73 dBFS. The "Ref In" meter shows a peak level of -11.73 dBFS.

Step 10. REW will start a measurement, which will take a few seconds. Once the measurement is complete, it will be displayed in the measurement panel. Ignore that, for now.



Step 11. Click “Make Cal” to store the measurement.

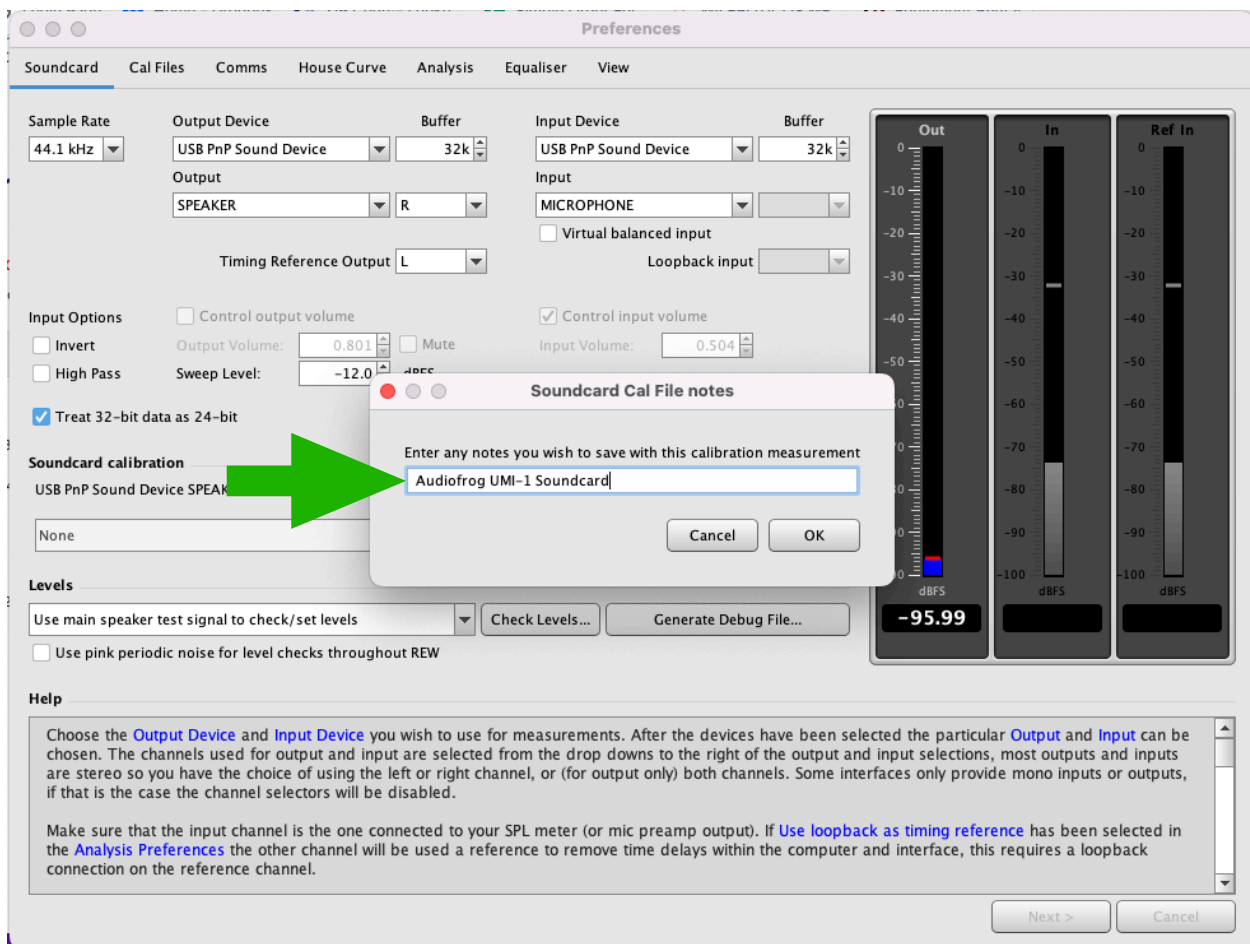
The screenshot shows the 'Preferences' window with the 'Soundcard' tab selected. The window is divided into several sections:

- Soundcard:** Contains settings for Sample Rate (44.1 kHz), Output Device (USB PnP Sound Device), Buffer (32k), Output (SPEAKER), Input Device (USB PnP Sound Device), Buffer (32k), Input (MICROPHONE), and Timing Reference Output (L). There are also checkboxes for 'Virtual balanced input' and 'Loopback input'.
- Input Options:** Includes checkboxes for 'Invert', 'High Pass', and 'Treat 32-bit data as 24-bit'. It also has 'Control output volume' and 'Control input volume' checkboxes, along with 'Output Volume' (0.801) and 'Input Volume' (0.504) sliders, and a 'Mute' checkbox.
- Soundcard calibration:** Shows 'USB PnP Sound Device SPEAKER at 44.1 kHz'. It features a 'Calibrate soundcard...' button (highlighted by a green arrow), a 'Browse...' button, a 'Clear Cal' button, and a 'Make cal file...' button.
- Levels:** Includes a dropdown menu set to 'Use main speaker test signal to check/set levels', a 'Check Levels...' button, and a 'Generate Debug File...' button. There is also an unchecked checkbox for 'Use pink periodic noise for level checks throughout REW'.
- Help:** Contains two paragraphs of text explaining device selection and calibration procedures.

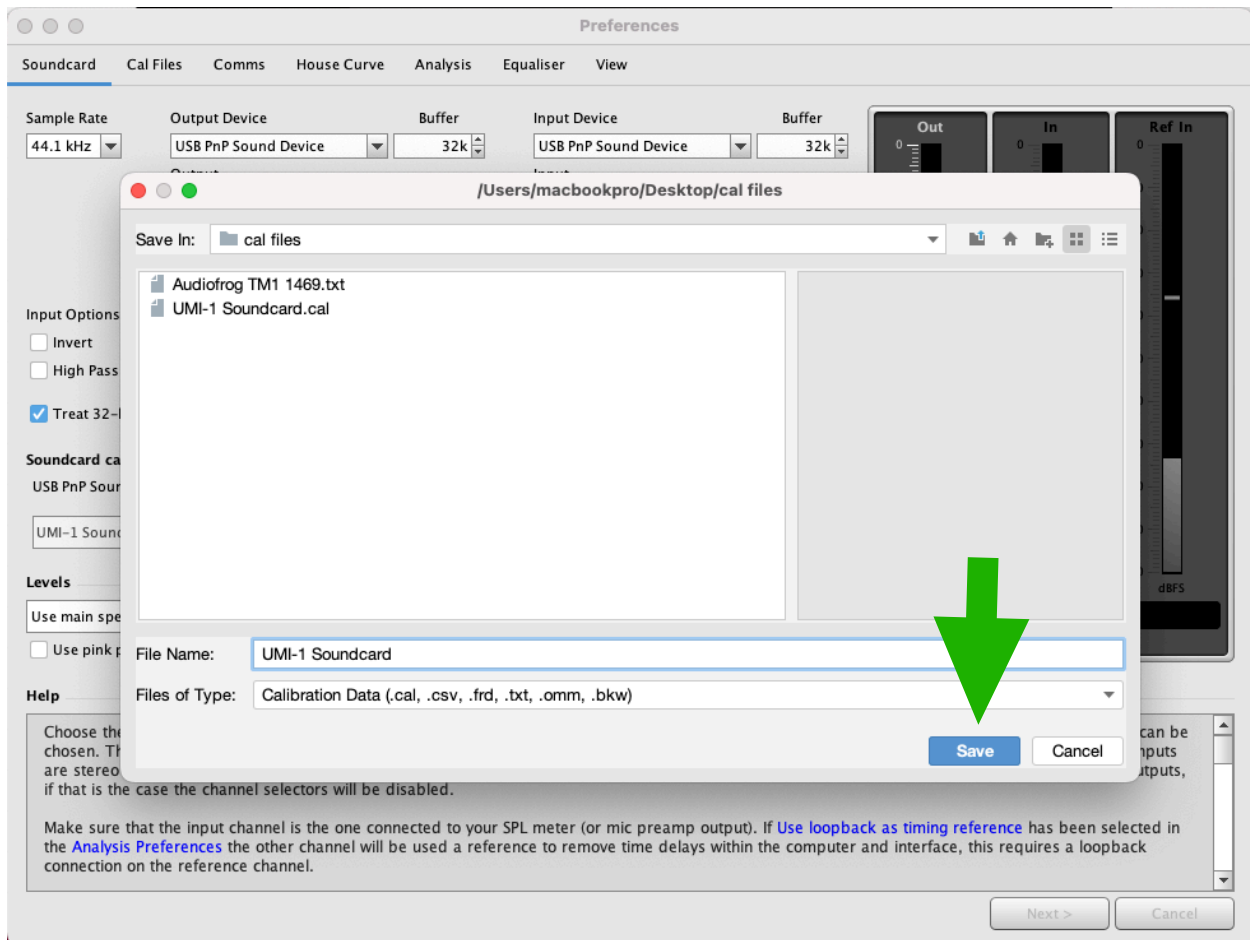
On the right side of the window, there are three vertical level meters labeled 'Out', 'In', and 'Ref In'. The 'Out' meter shows a reading of -95.99 dBFS. The 'In' and 'Ref In' meters show readings around -30 dBFS.

At the bottom right of the window, there are 'Next >' and 'Cancel' buttons.

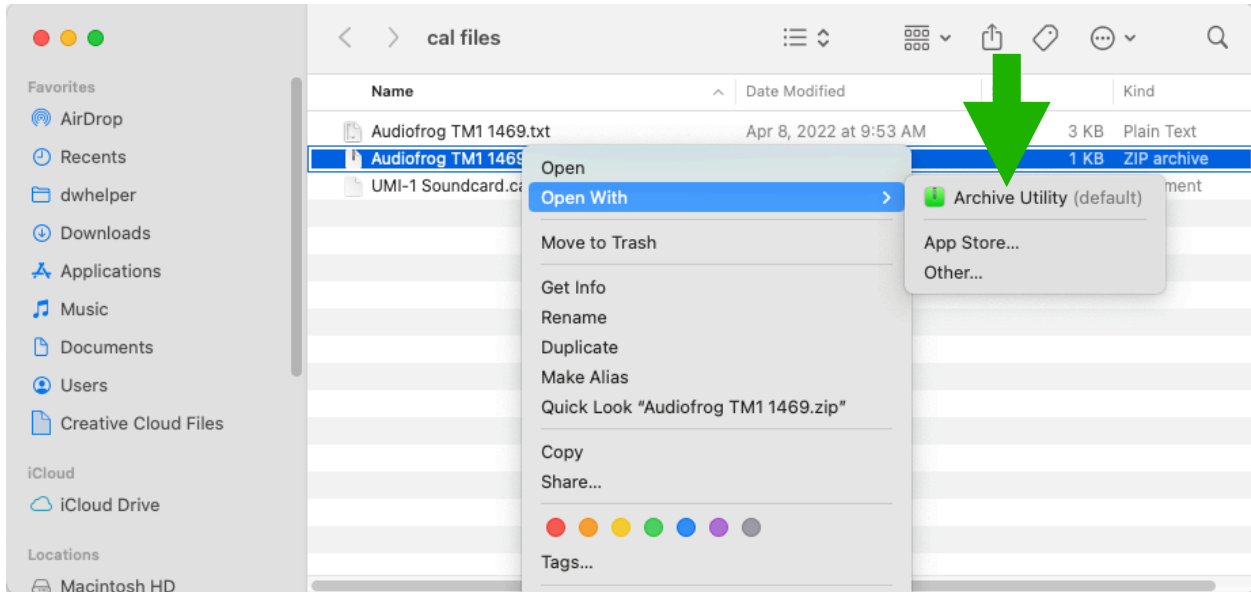
Step 12. In the “Notes” box, type “Audiofrog UMI-1 Soundcard”.
Click OK



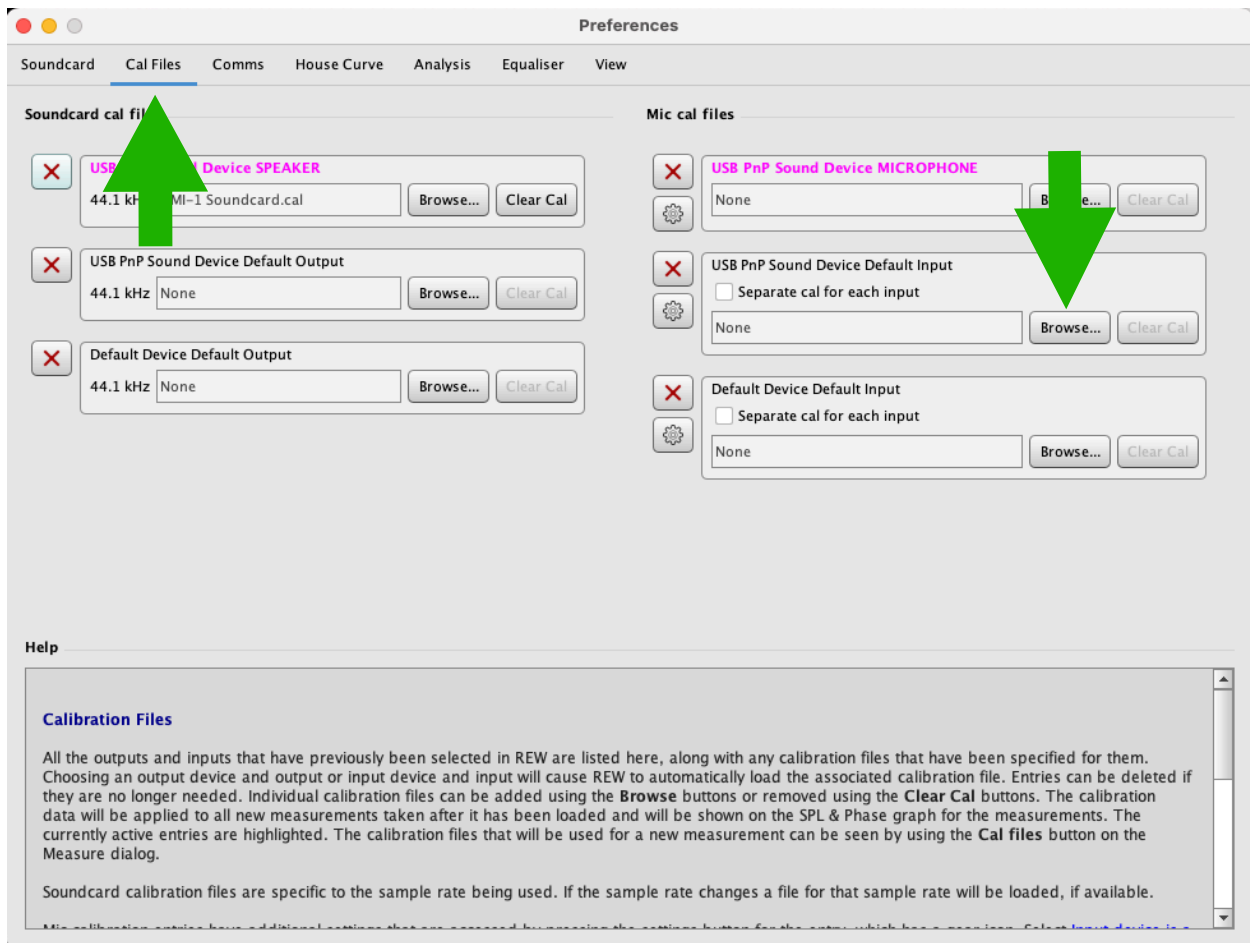
Step 13. Then, choose a location to store the soundcard calibration file in your computer, name the file “UMI-1 Soundcard” and click “Save”.



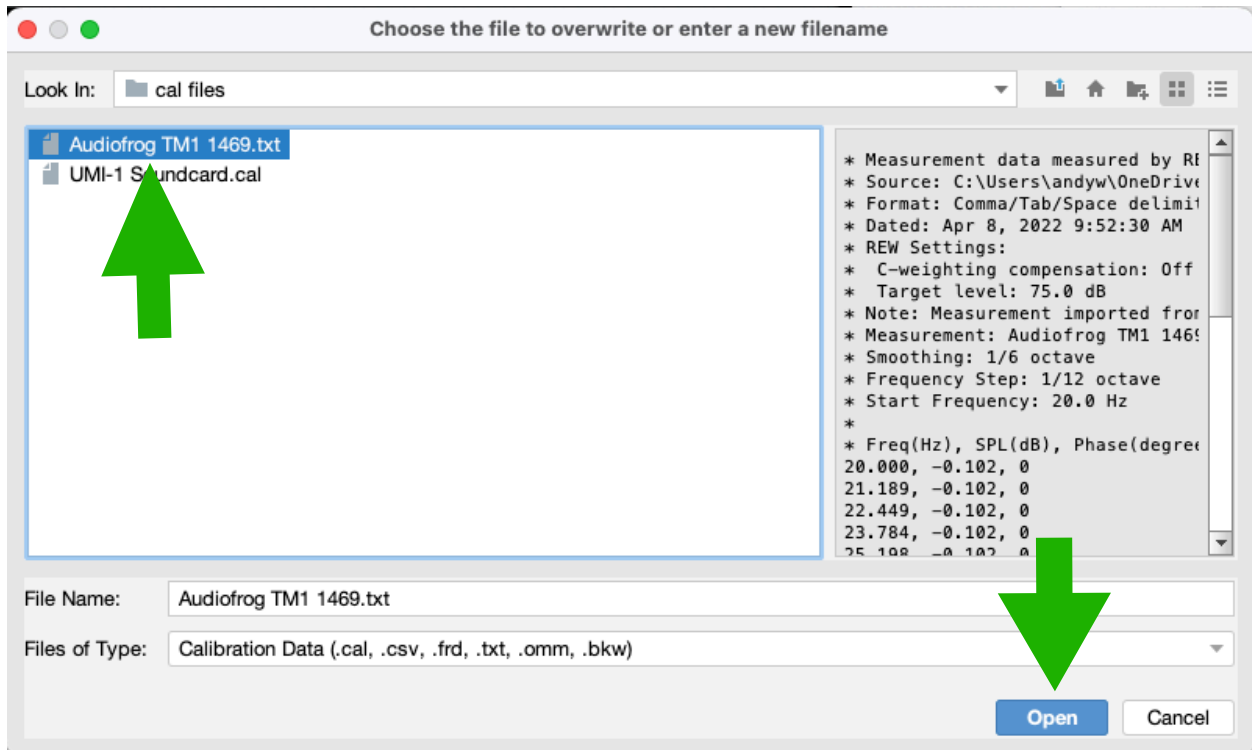
Step 14. Save the Mic Calibration file you received in an email from Audiofrog in the same place where you saved the soundcard calibration file. Right click on the .zip file and choose “Open with” then select archive utility to extract the text file to the same folder in which the zip file and the soundcard calibration file are stored.



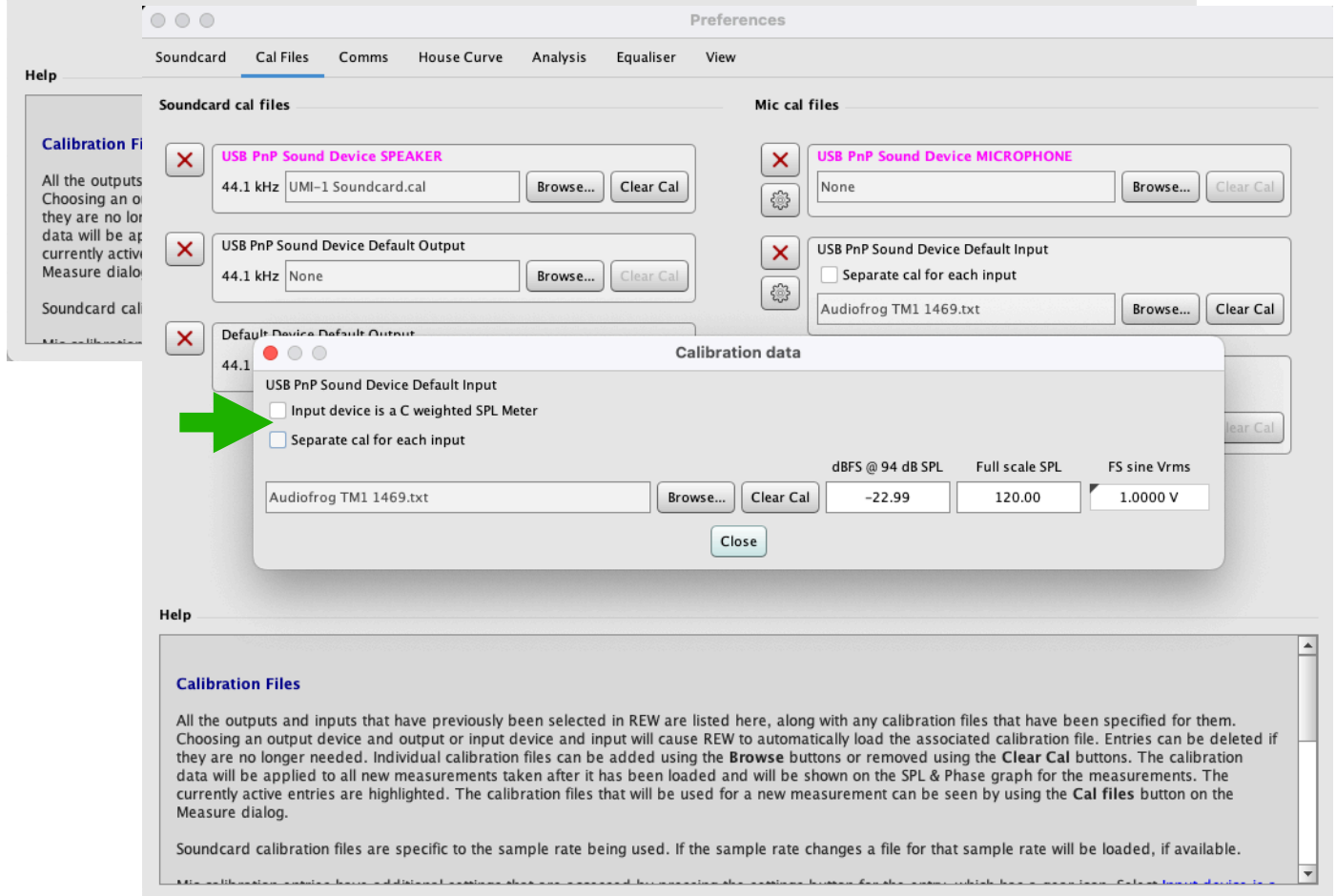
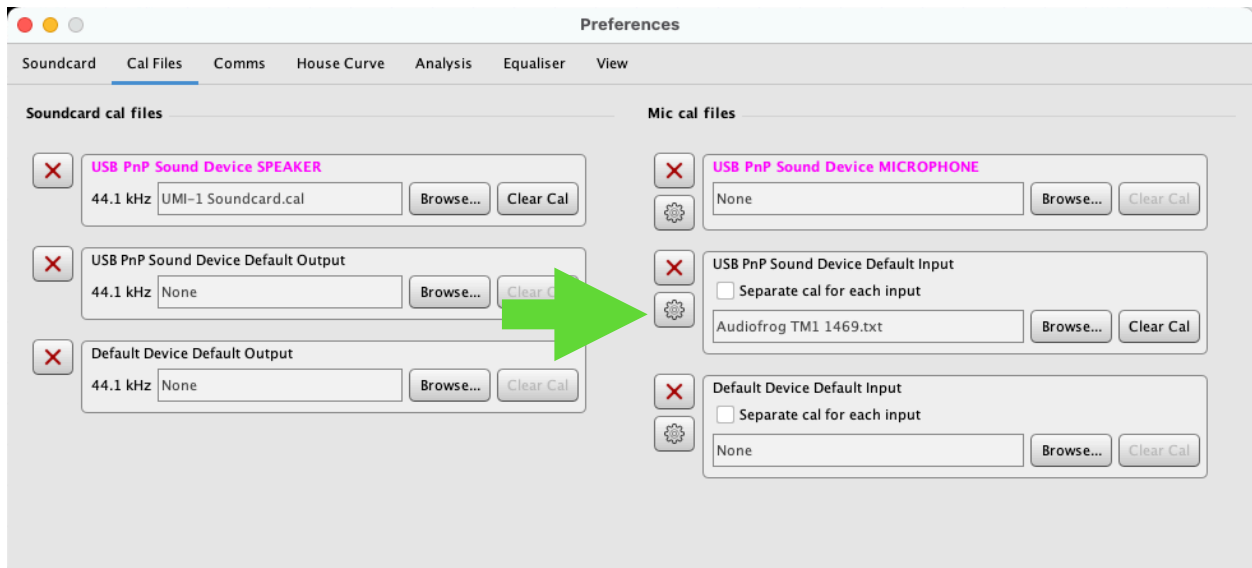
Step 15. In REW, Click on the “Cal Files ” tab in the Preferences panel. Click “browse” next to the usb device under the “Mic cal files” column.



Step 16. Find the Audiofrog TM-1 calibration file. Double click on the file to choose it or click once to highlight it and click “Open”



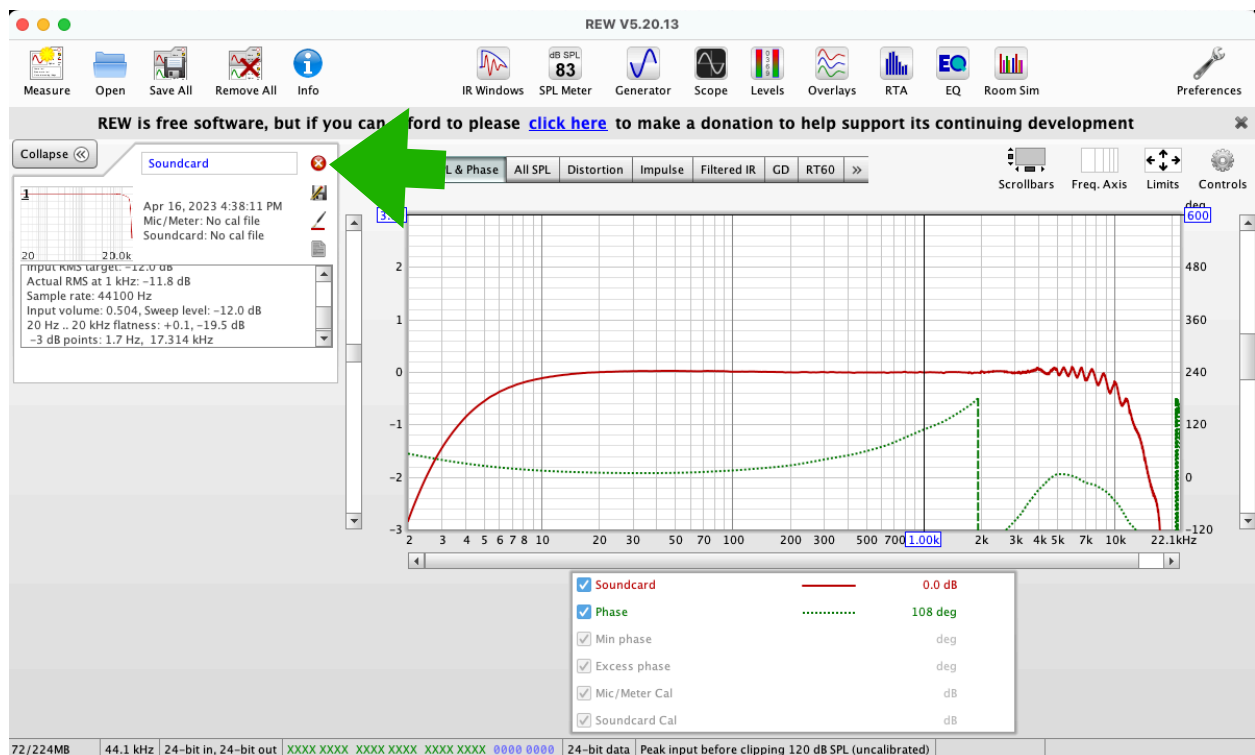
Step 17. Click the settings wheel next to the usb device under the “Mic cal files column”. Make sure both boxes are unchecked.



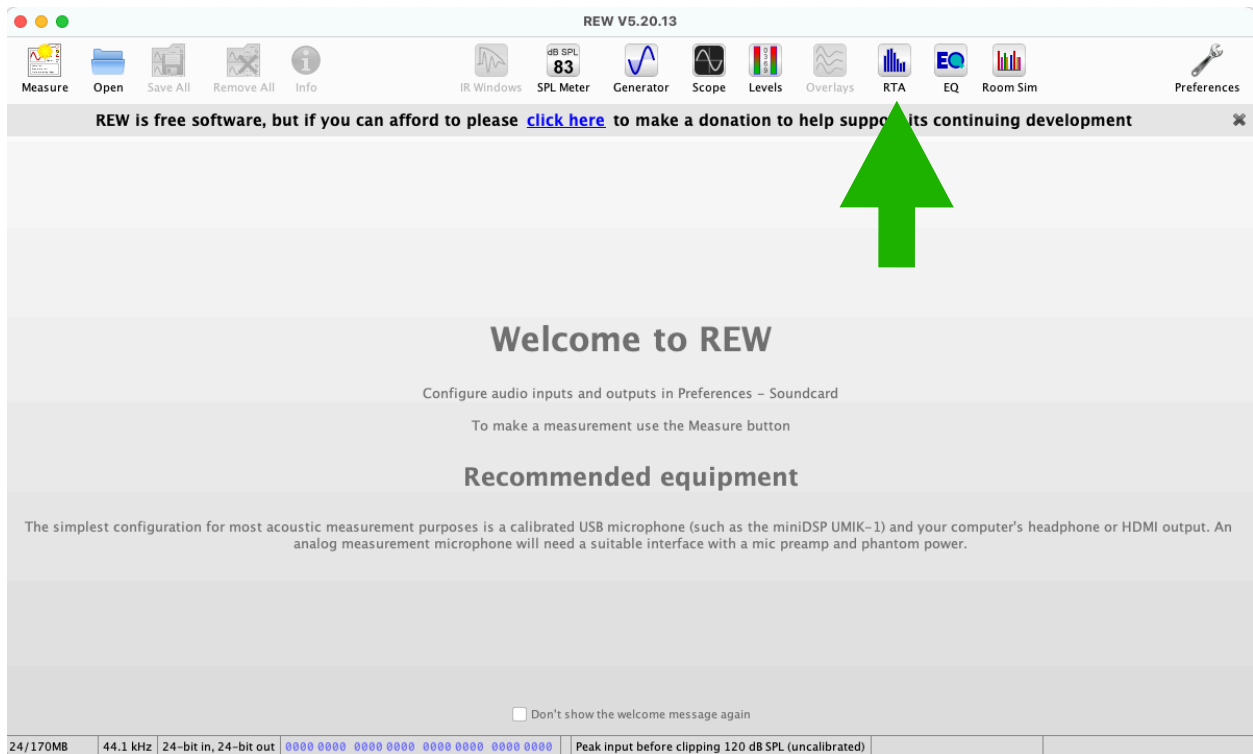
That's it. You only have to do this once. So long as you plug the USB soundcard into your computer before starting REW, you'll won't have to do this again. **Be sure to remember or to write down the settings you chose in the Windows mixer if you'll use this computer for other stuff. If you adjust those, you'll need to set them back the values you chose during the setup process the next time you use your UMI-1.**

Using RTA in REW

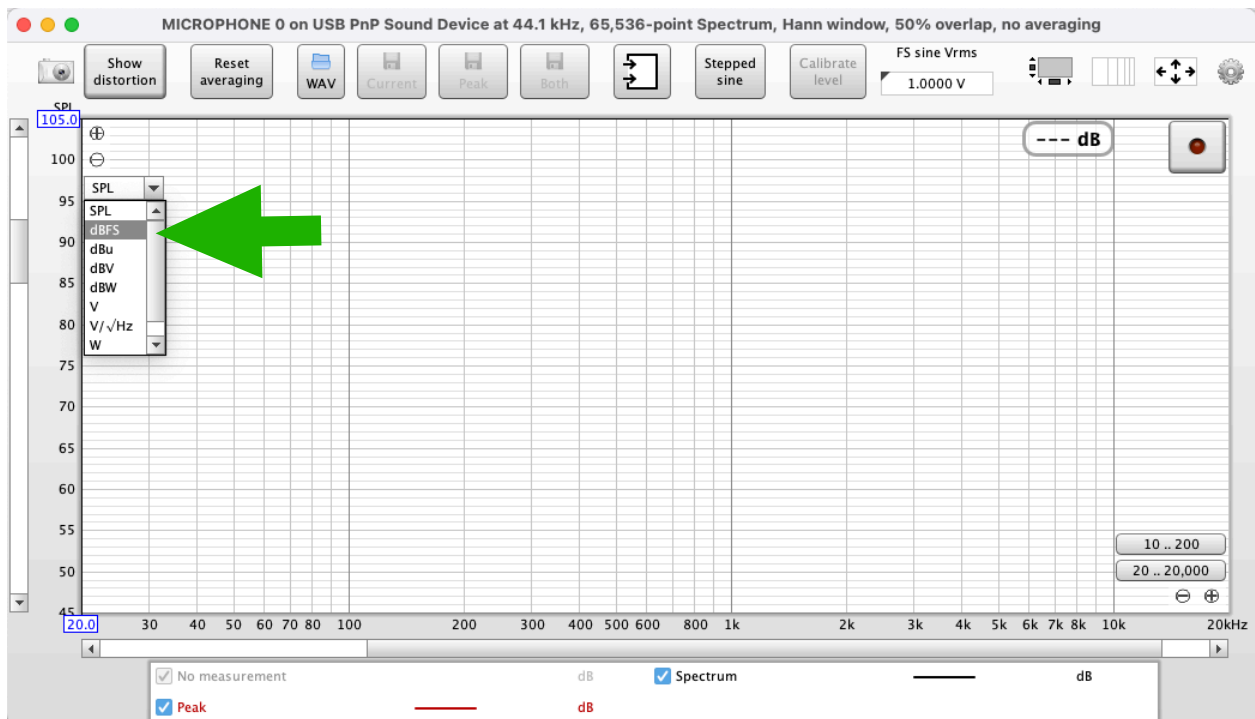
Step 1. In REW's main panel, click here to close your soundcard measurement. There's no need to save it because it's already been saved and loaded as a calibration file.(if java error occurs click don't send.)



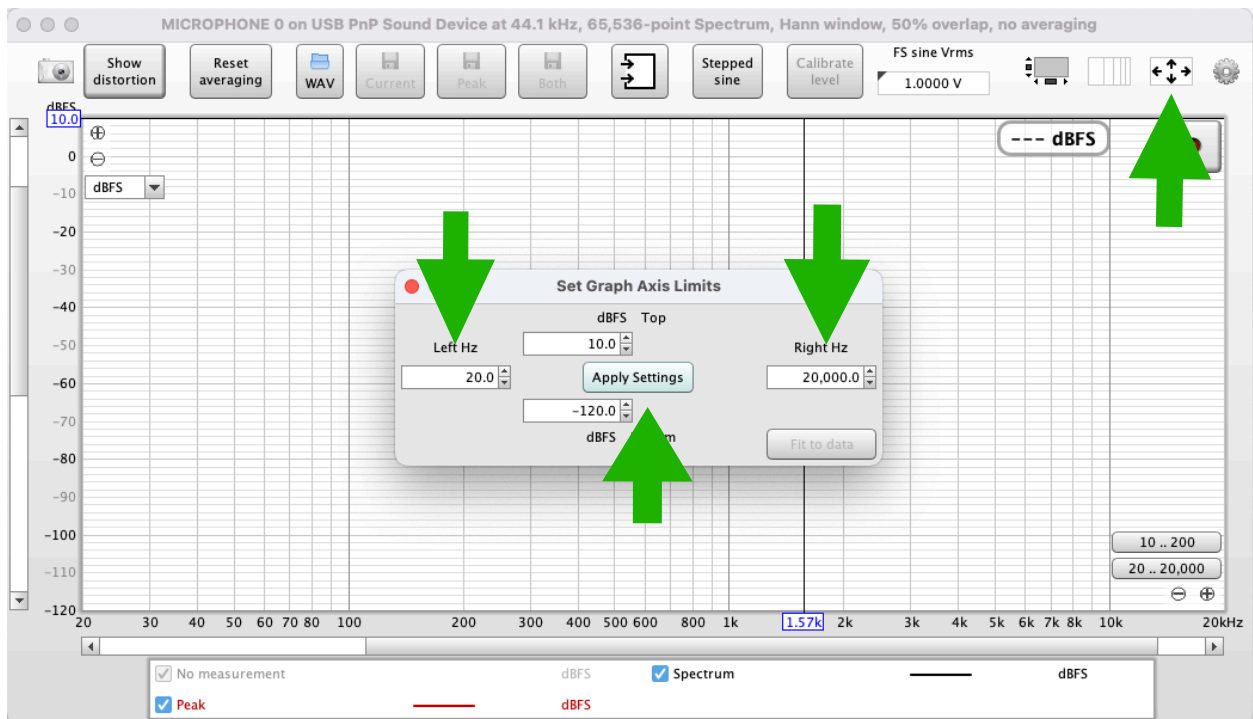
Step 2. Click on RTA at the top of the screen.



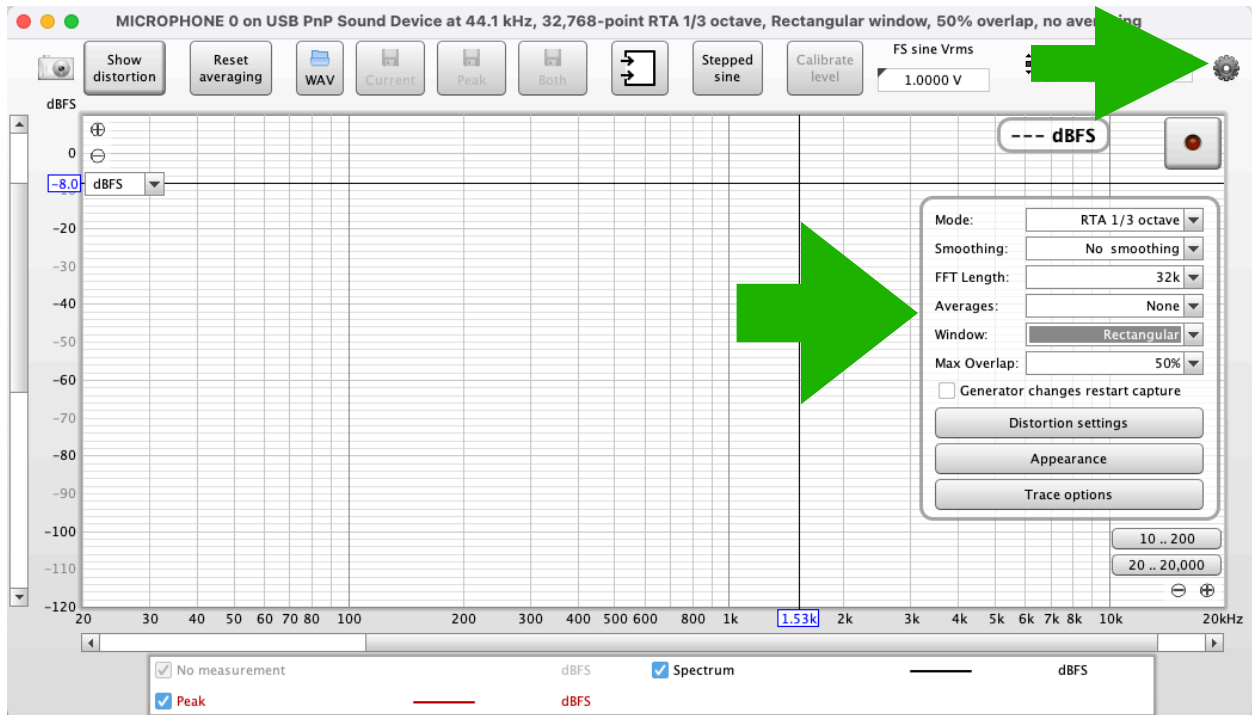
Step 3. In the small drop down menu on the left, choose “dBFS” instead of “dB”.



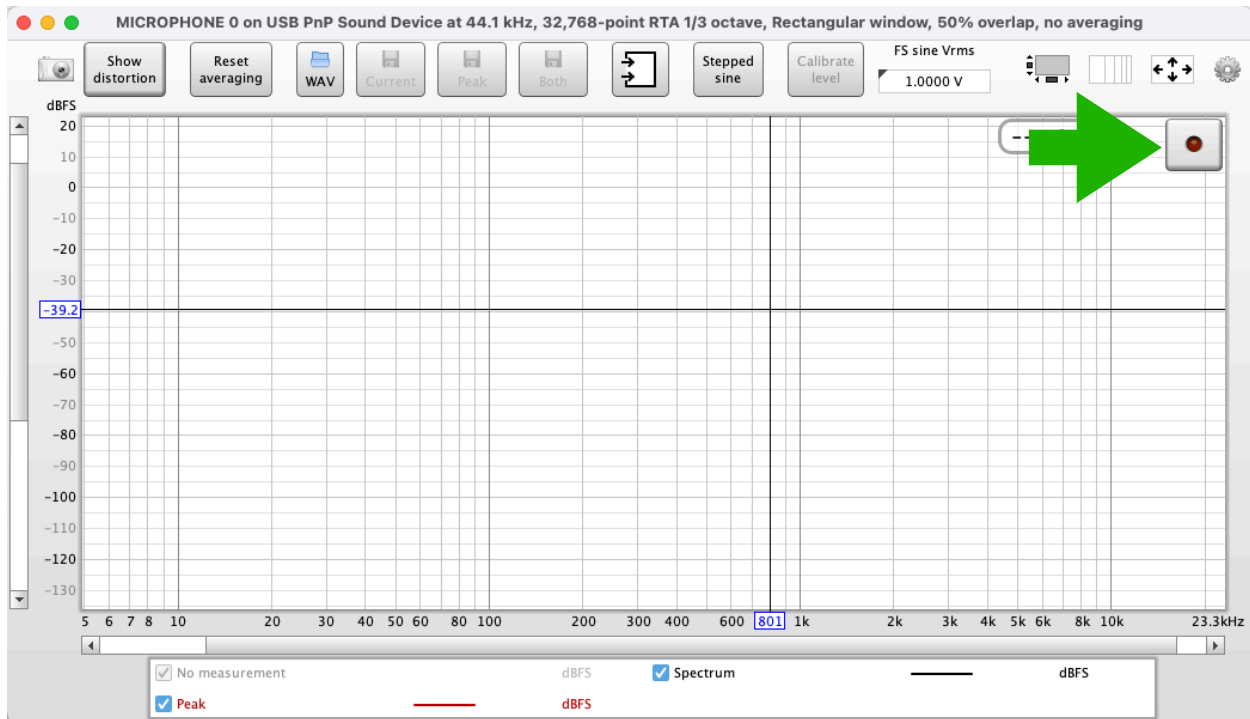
Step 4. Click on the “Limits” box at the top right of the display and enter “20” in the Left box and 20000 in the Right box. Leave the top at 10 and the bottom at -120. Click “Apply Settings”



Step 5. Click on the “Settings” wheel and in the top drop down box, choose 1/3 Octave for the Mode. Choose 32768 for the FFT length. Choose None for Averages. Choose “Rectangular” for the Window. Choose 50% for Max Overlap. Select “Bars” for the RTA and for “Spectrum”. Click the settings wheel to close the box.



Step 6. To start the RTA, click on the red “record” button. Start Track 1 on the Tuning CD and measure the frequency response of the system.



That’s it! When you close REW, it will remember all of these settings the next time you open it unless you choose “Delete Preferences and Shut Down”. If you chose that, you’ll have to repeat this process. One of the reasons we recommend REW, is that the help file is great and provides lots of easy to understand explanations of how this program works and how to use it. These instructions have been written to get you started using REW in a format that’s similar to other Real Time Analyzers you may have used. There are many additional tools available in the program, too. We will provide some additional information, tips and tricks and tuning help in the Forum section of www.audiofrog.com.

Happy Tuning!

