

Setting UP the UMI-1 with REW

PC based test gear or single purpose device?

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.

NOTE: This process will not calibrate the ACTUAL SPL readings you'll make with your kit. The graph will show an accurate frequency response shape, but the actual SPL level won't be correct. For that, there is a second process that we will describe in a second document. Usually, when tuning cars, we are more interested in the frequency response shape and the relative levels between channels and speakers. Accuracy of those aspects is assured by this process, even if the absolute level is incorrect.

Step 1. Download version 5.20.13 at www.roomeqwizard.com and follow the instructions to install the program.

The screenshot shows the REW website homepage. At the top, there are several screenshots of the software interface, including a large 'REW' logo, a 3D surface plot, a waterfall plot, and a real-time analyzer (RTA) plot showing a frequency response curve with a digital display of 80.7 dB(C) S. Below the screenshots is a navigation menu with links: REW, Downloads, Equipment, Donations, Upgrades, Features, EULA, History, Help, Reading, Videos, Links, Beta, Forum.

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 Auto or 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>tcctuil reset</code> Microphone 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

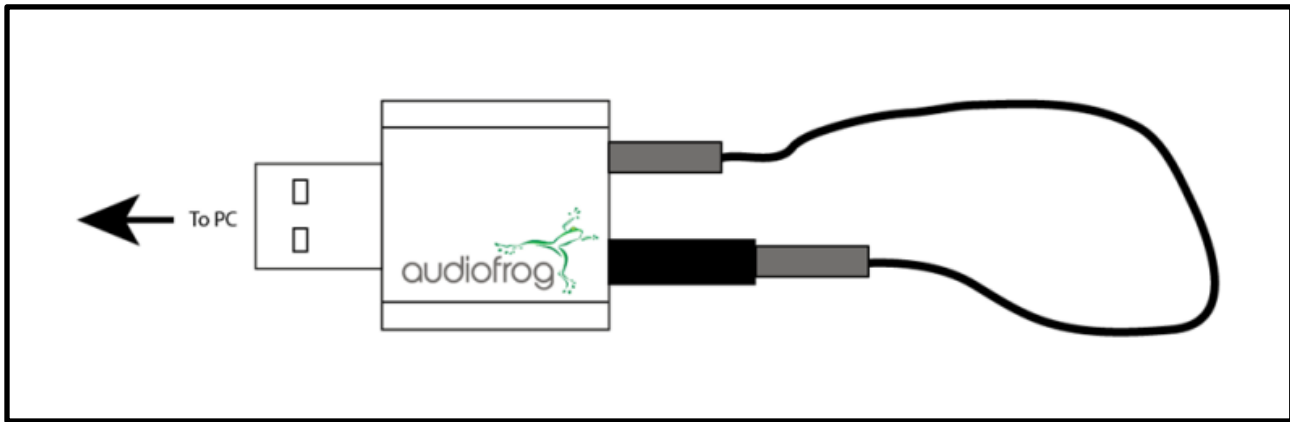
Equipment

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.

Associate I earn from qualifying purchases.

- miniDSP UMIK-1 calibrated USB measurement microphone
- Dayton Audio EMM-6 calibrated analog measurement microphone
- Steinberg UR22 MkII USB audio interface

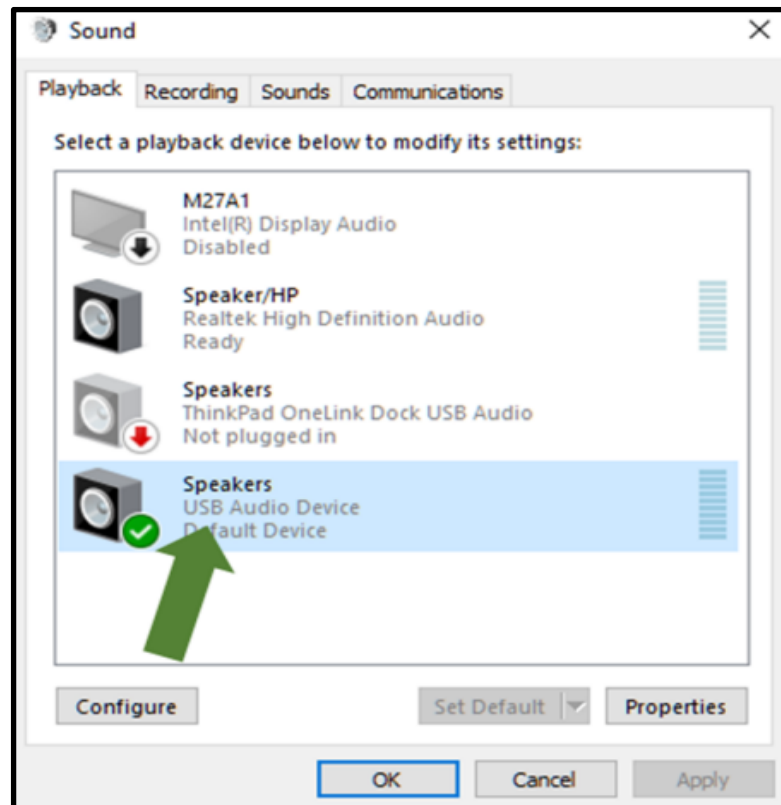
Step 2. Using the extension cable and the 3.5mm male to male adapter, plug the soundcard input into its output.



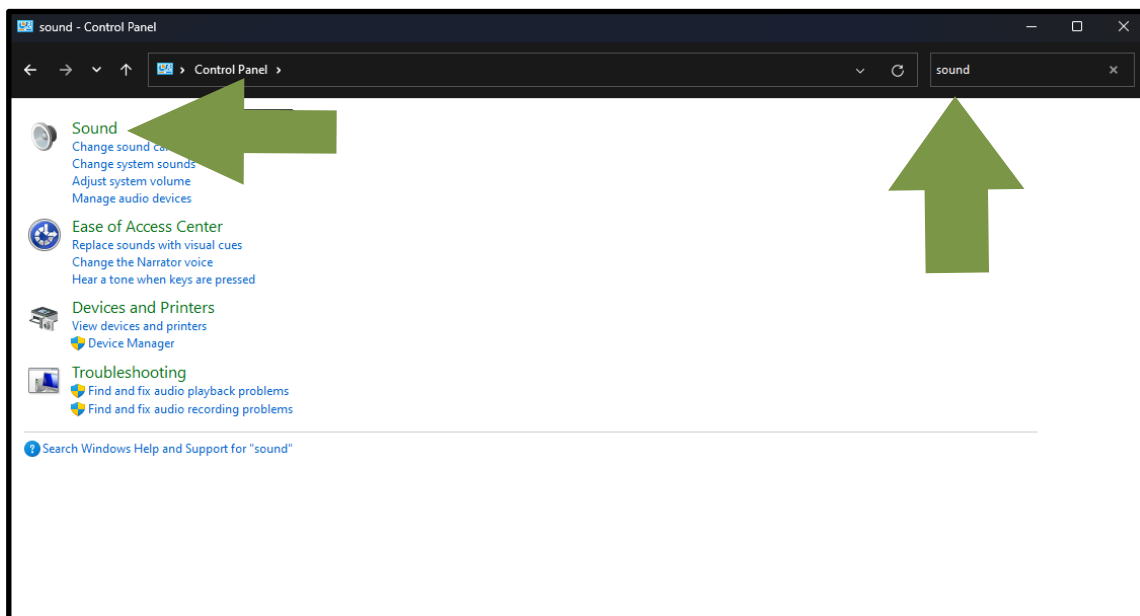
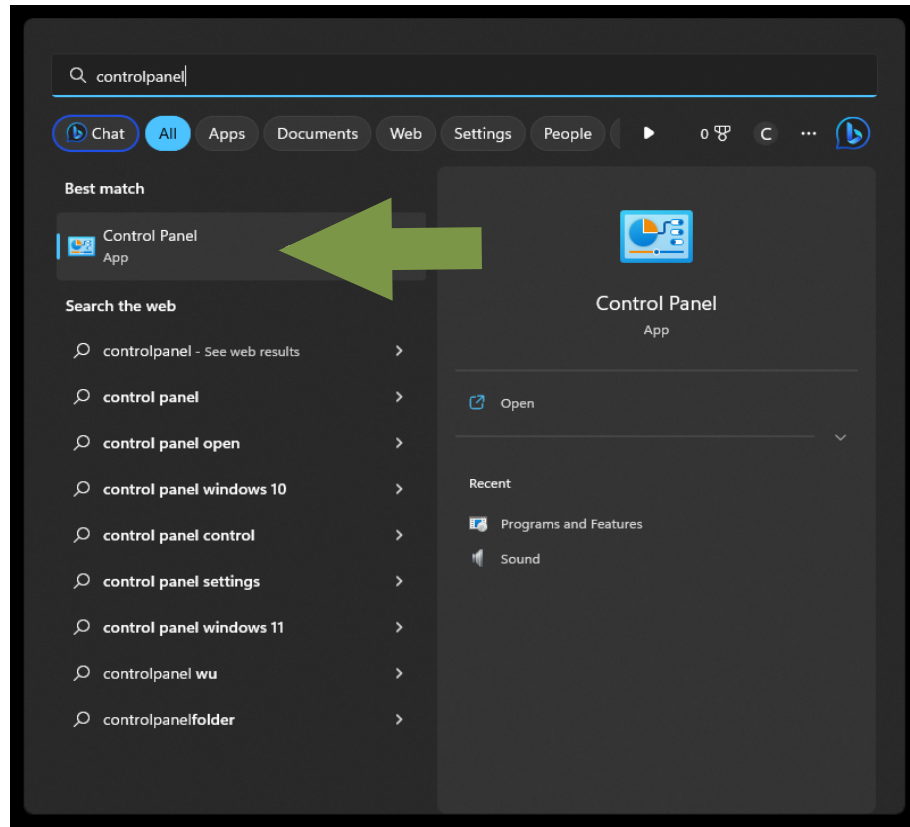
Plug the soundcard into an open USB port on your PC.



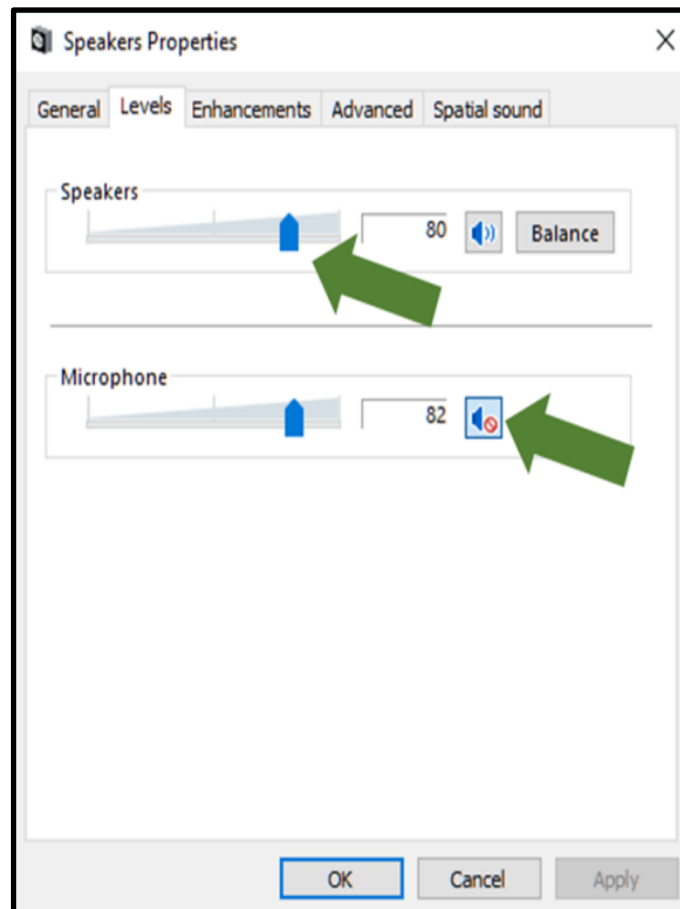
Step 3. Right click on the speaker icon at the bottom right of your computer screen and choose Playback Devices from the drop down menu. You'll see a list of all possible playback devices. The USB Audio Device should be highlighted. Double click on the USB Audio Device. (For windows 11: tap the windows key then type "control panel". The control panel will appear. Click on control panel. Once in the control panel at the top right corner type "sound". Click on menu item "Sound").



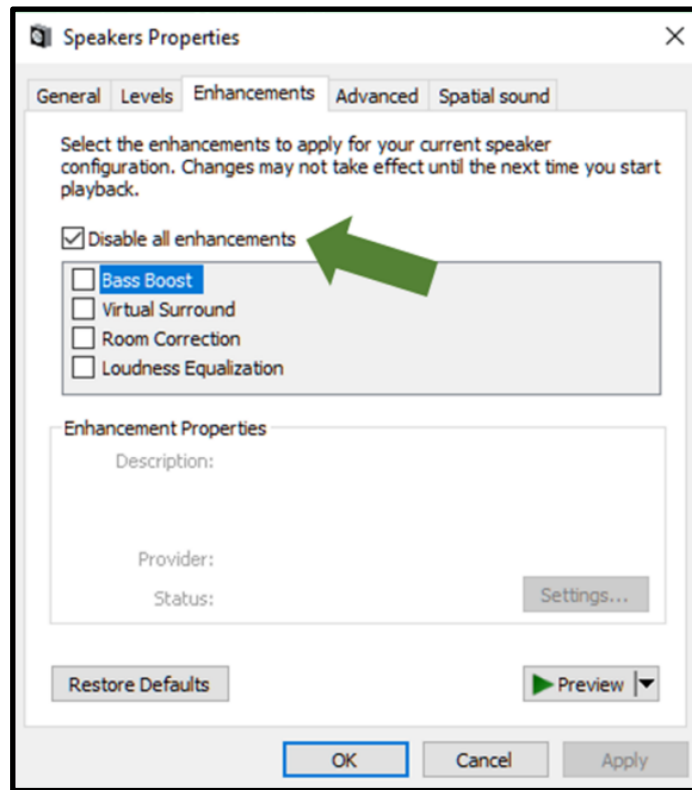
Windows 11:



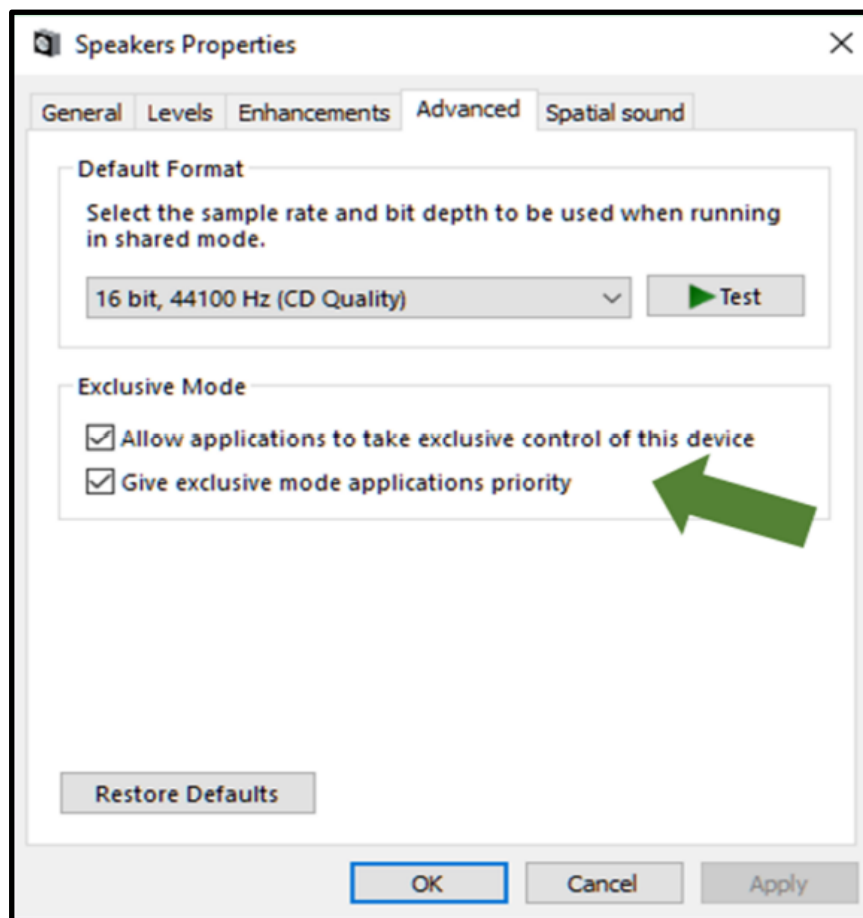
Step 4. In the box that's now open, choose the "Levels" tab and set the level to 80 using the slider control. The "Microphone" should be muted.



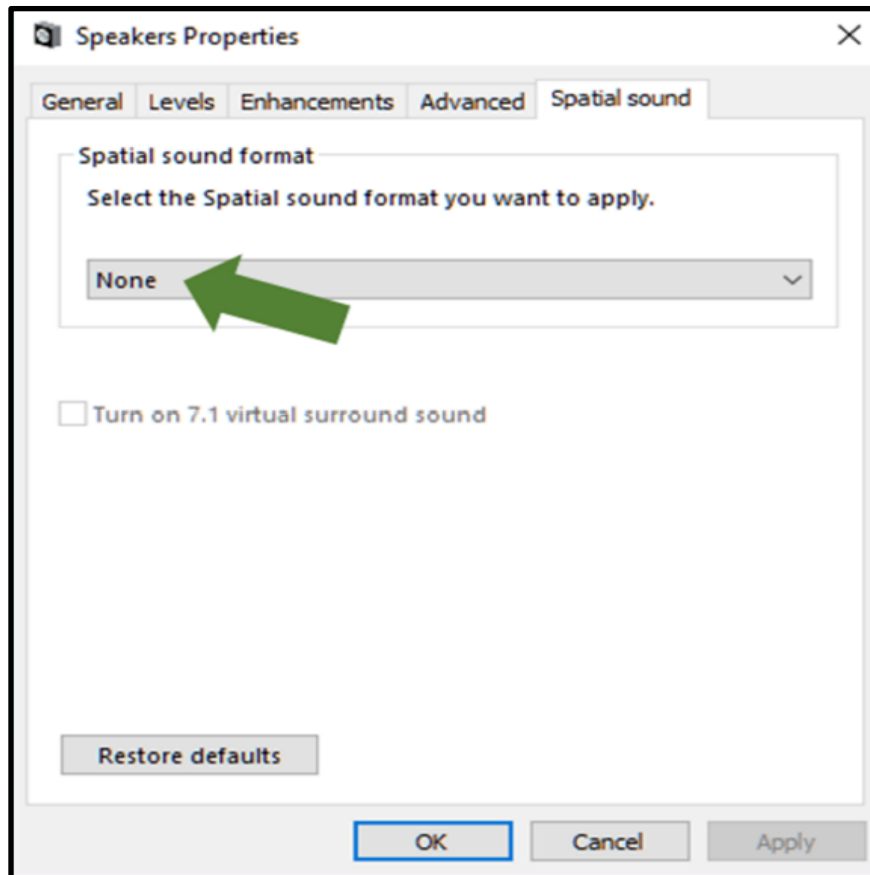
Step 5. Click on the “Enhancements” tab and be sure that all enhancements are disabled.



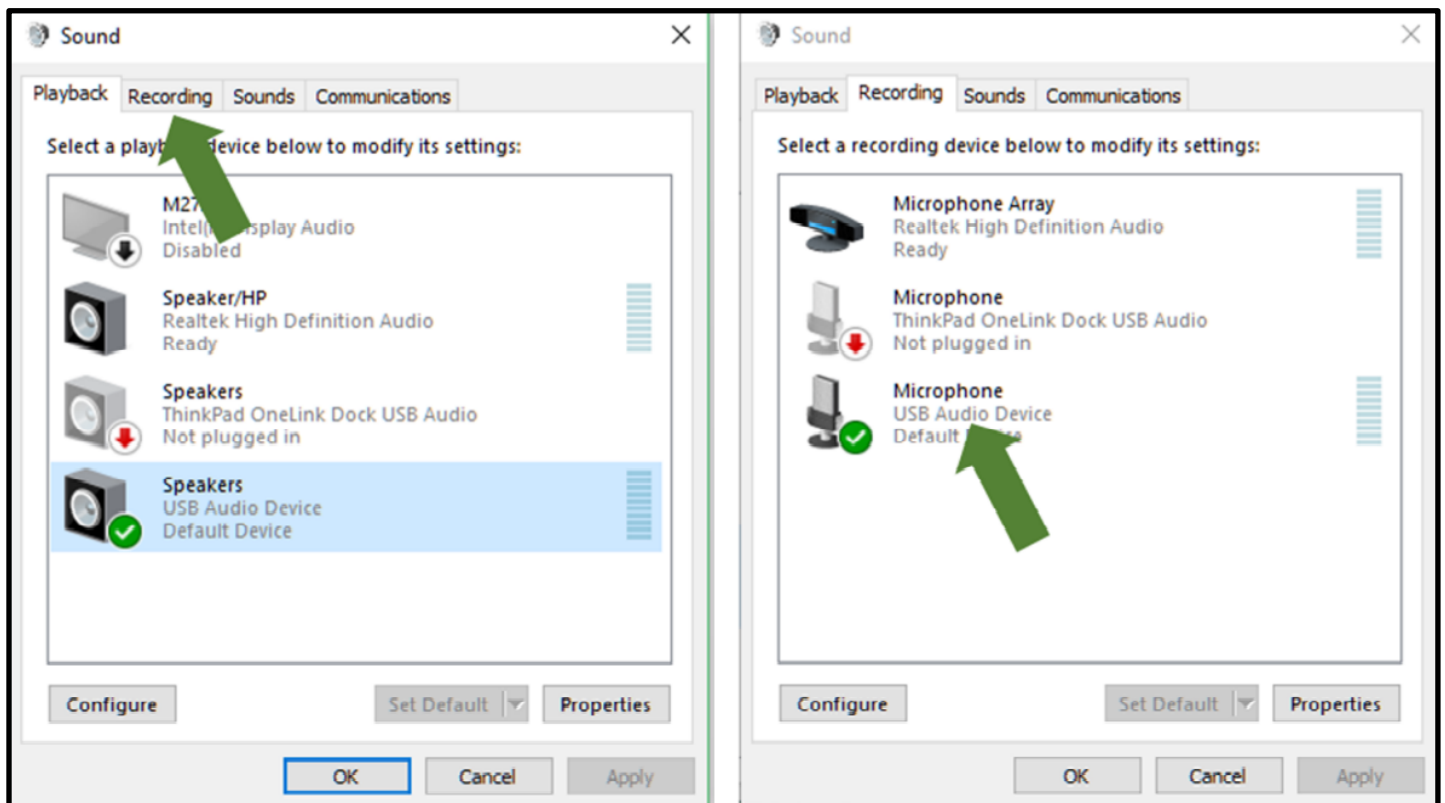
Step 6. Click on the “Advanced” tab and be sure that the boxes under “Exclusive Mode” are checked.



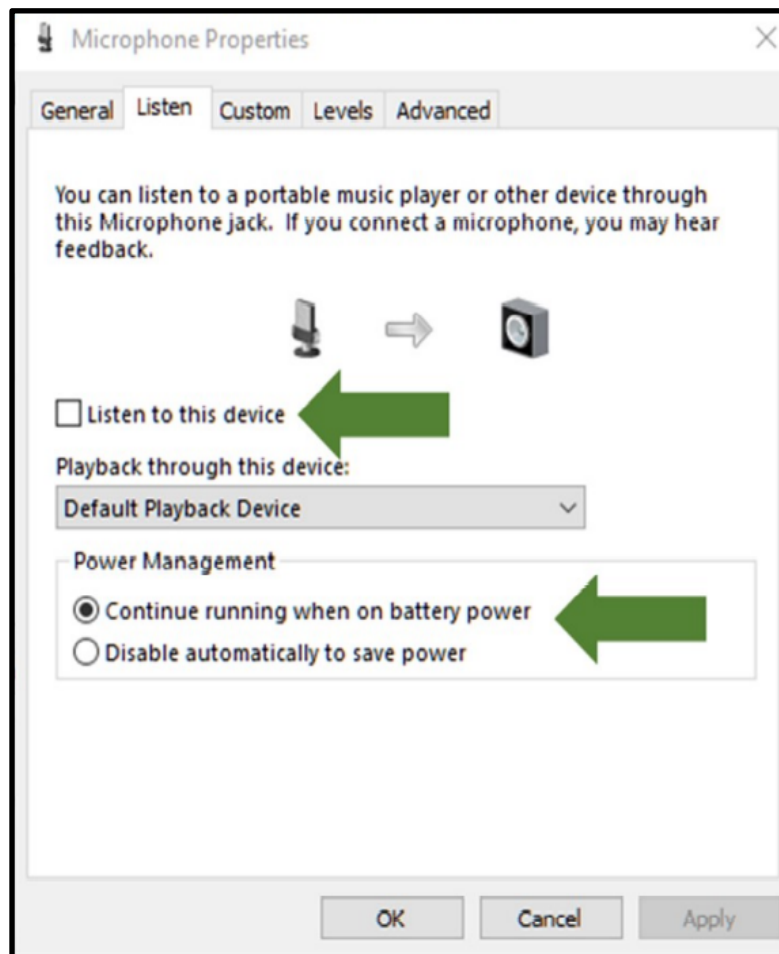
Step 7. In the “Spatial Sound” be sure that Spatial Sound is disabled. Click OK



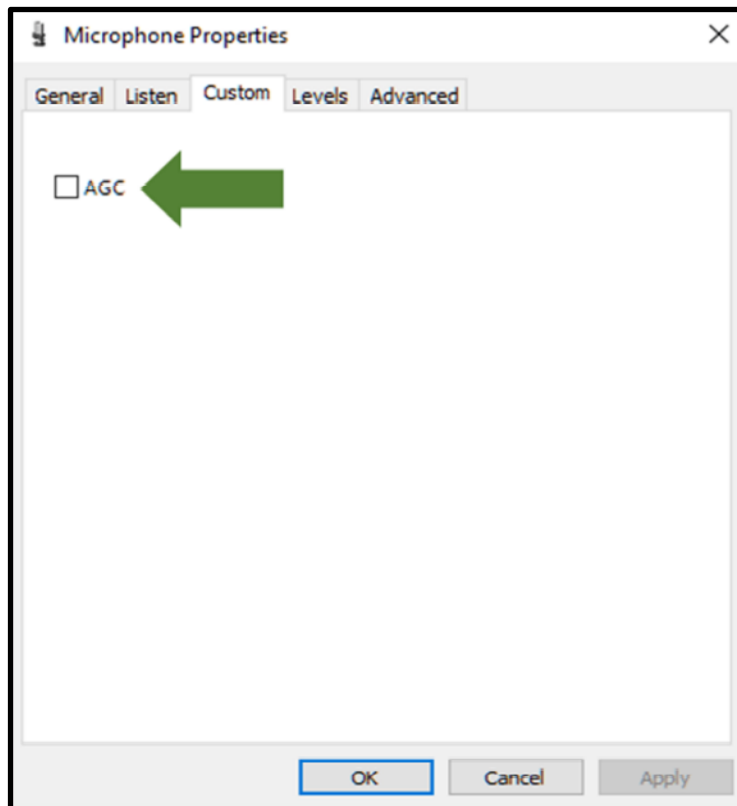
Step 8. Now, click on the “Recording” tab and double click on the USB Audio Device.



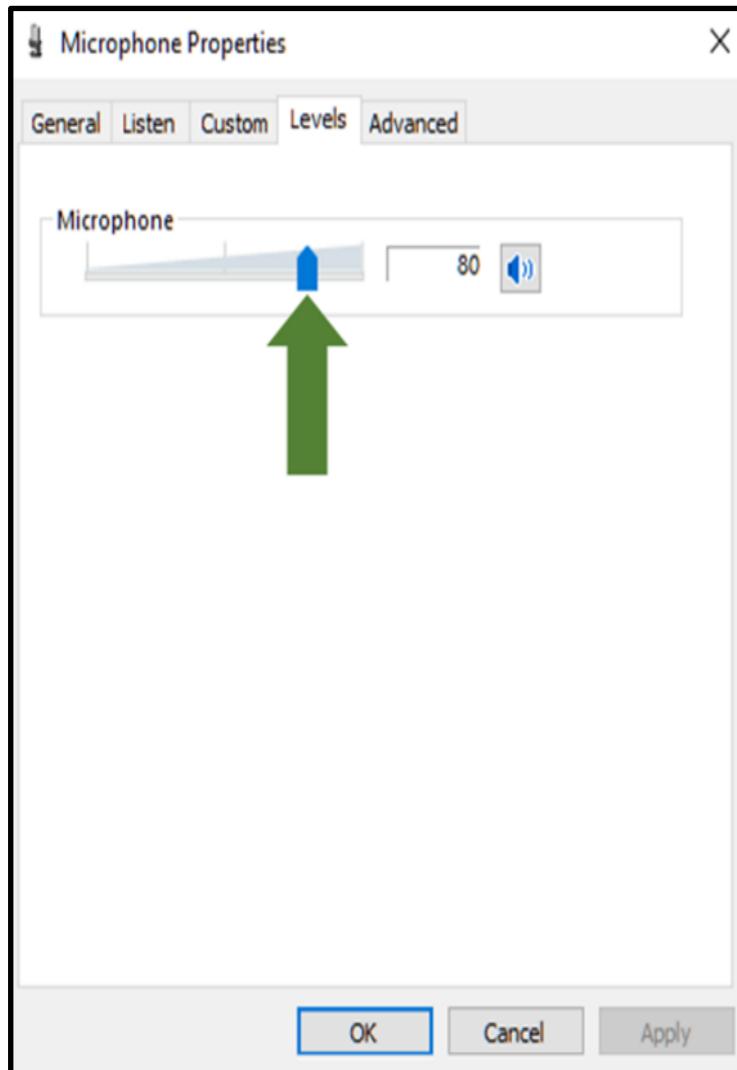
Step 9. In the “Listen” tab, be sure that the “Listen to this device” box is unchecked and that the box next to “Continue running on battery power” is checked.



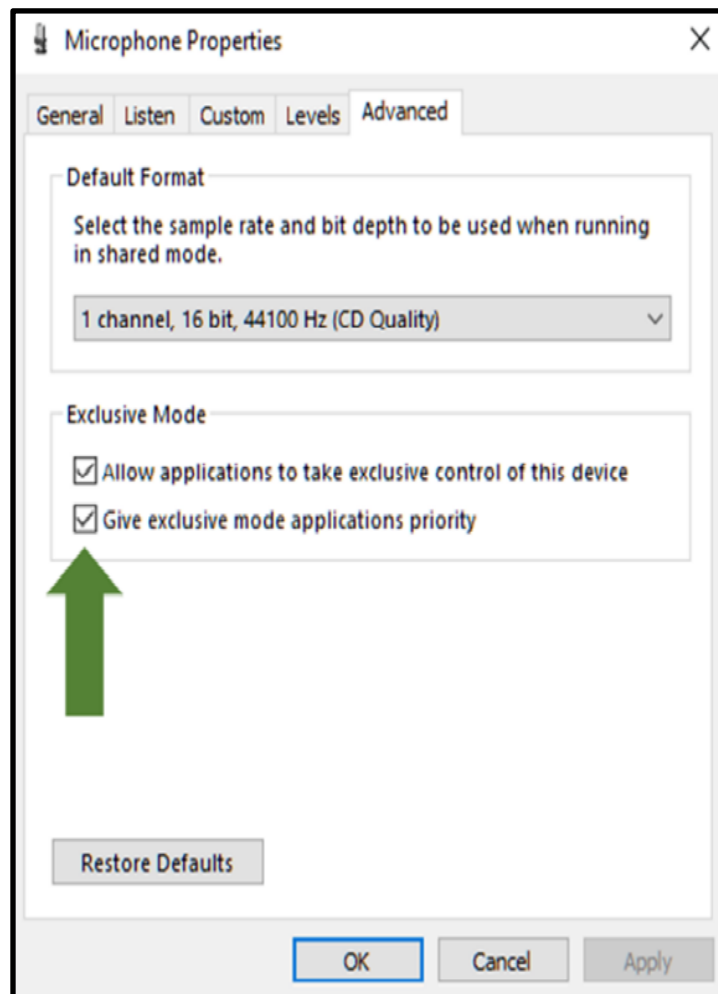
Step 10. If you have a “Custom” tab, click on it and be sure that the AGC (Automatic Gain Control) box is unchecked.



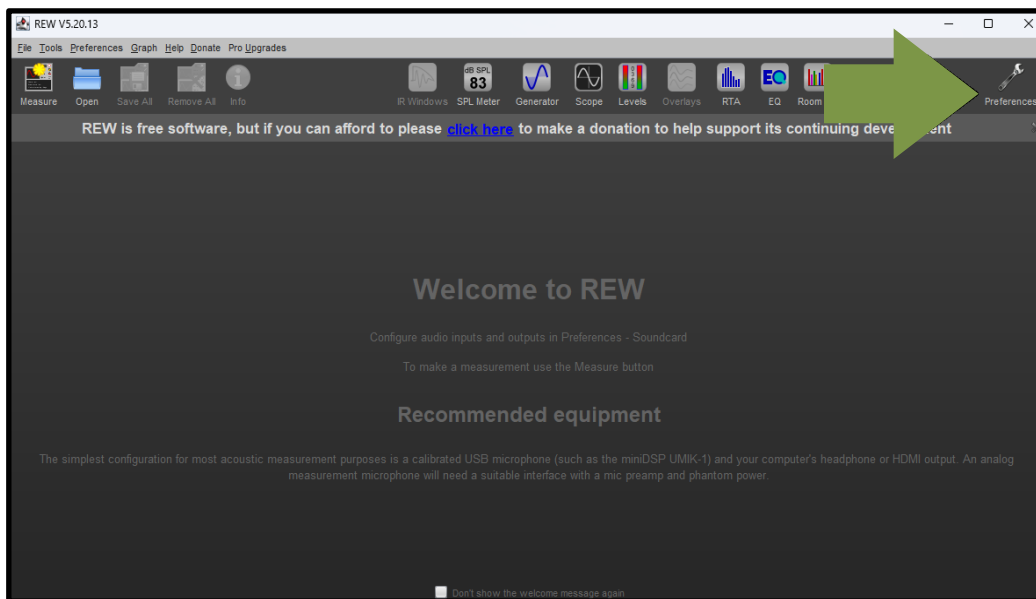
Step 11. Click on the “Levels” tab and set the level to 80.



Step 12. Click on the “Advanced” tab and be sure that the boxes under “Exclusive Mode” are checked. Click OK. Then, click OK again.



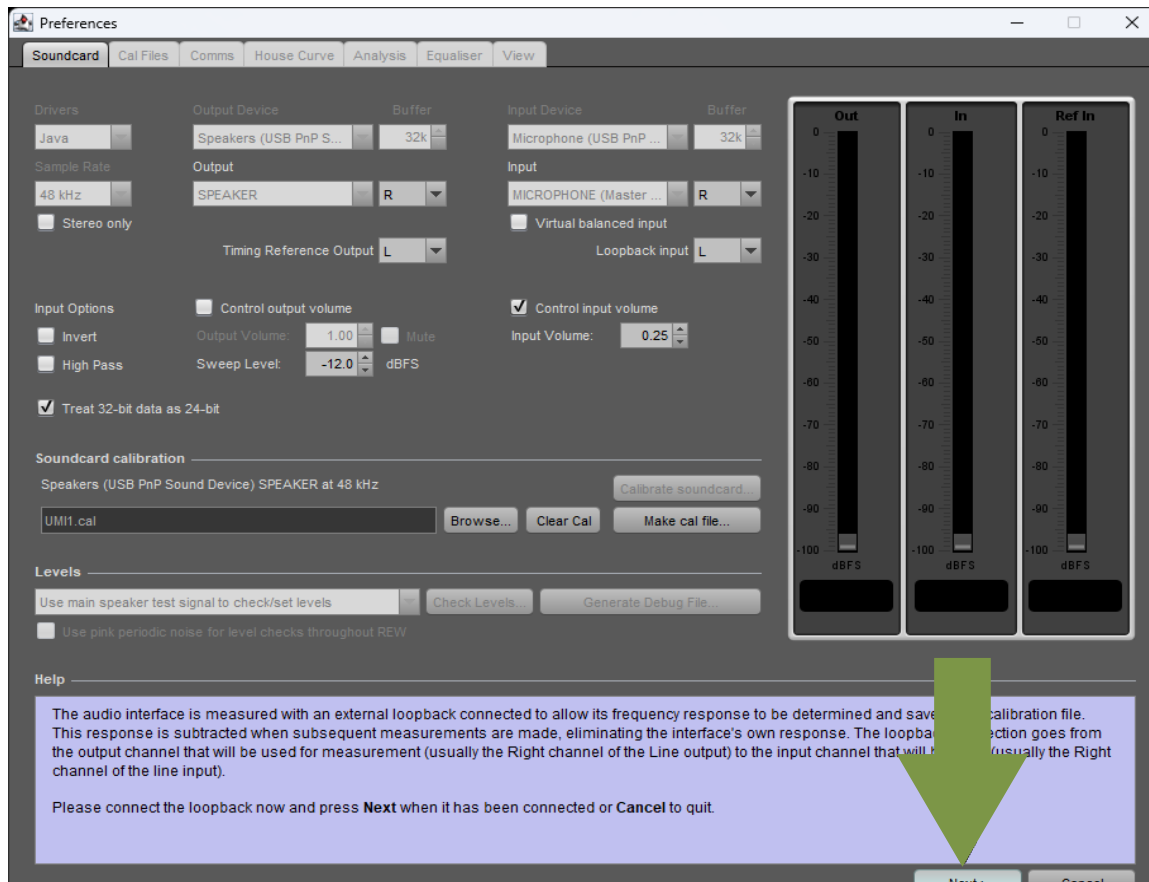
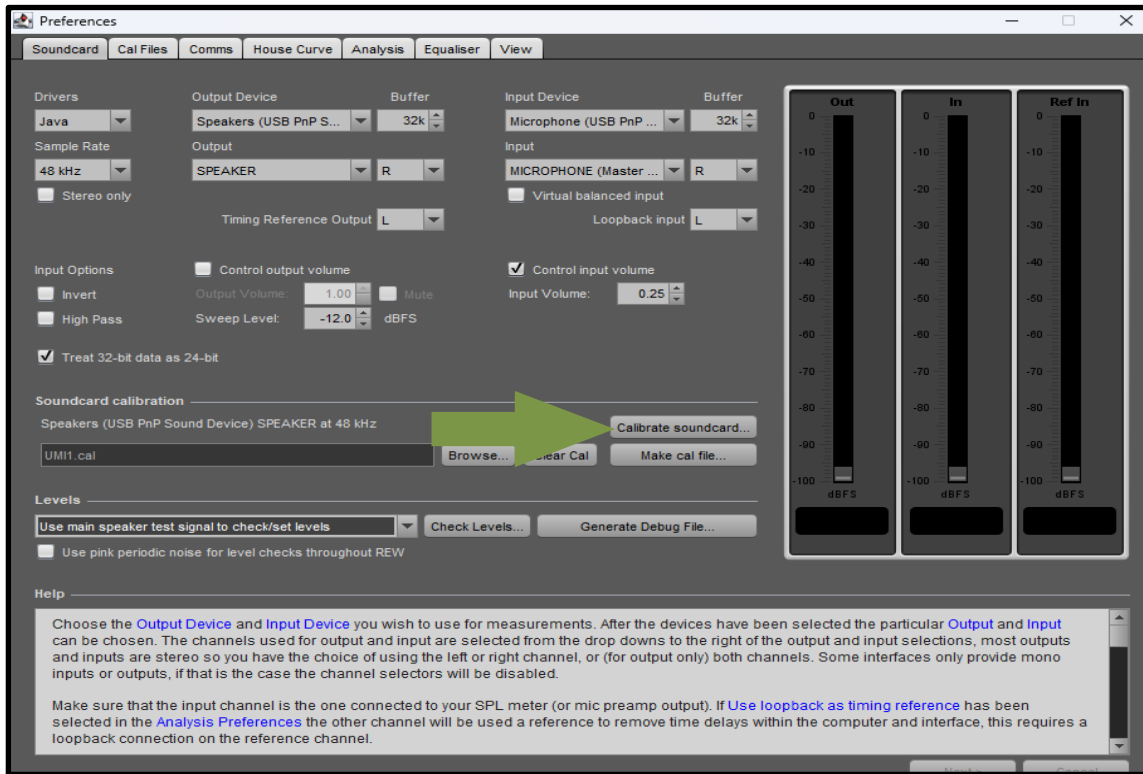
Step 13. Run Room EQ Wizard and Click Preferences .



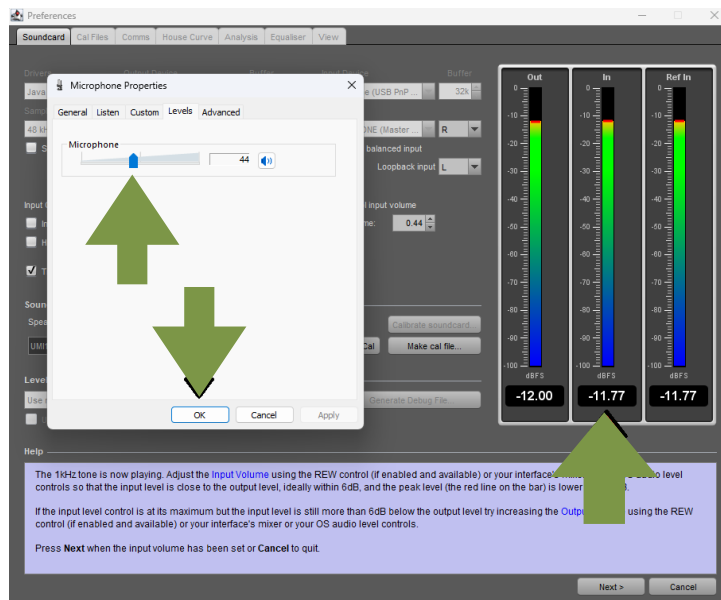
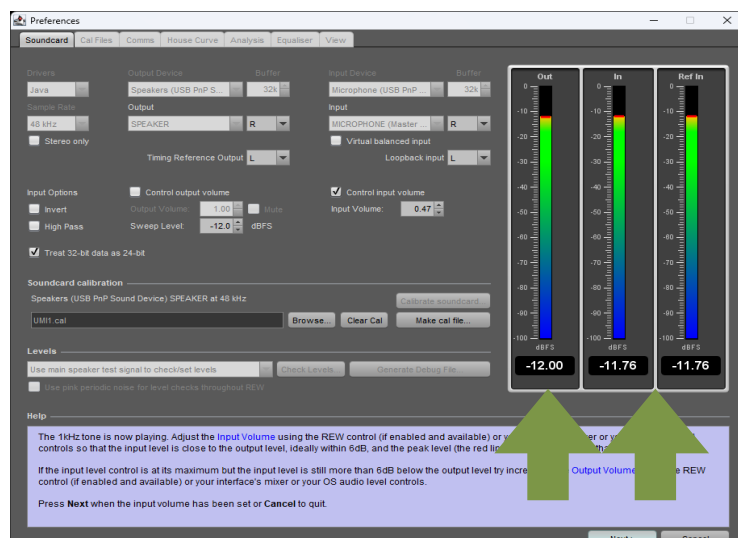
Step 14. Use the down arrows and the drop down menus to select the USB device in the “Input” and “Output” selection boxes. Also, choose “Use main speaker signal to check/set levels”. Double check that all of the other boxes in the “Soundcard” panel match the settings shown below.



Step 15. 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.



Step 16. 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, right click on the speaker icon at the bottom of your screen, choose "Recording Devices" and then choose the "Levels" tab. 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.



Step 17. 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 divided into several sections:

- Drivers:** Java (selected)
- Output Device:** Speakers (USB PnP S...)
- Buffer:** 32k
- Input Device:** Microphone (USB PnP ...)
- Buffer:** 32k
- Sample Rate:** 48 kHz
- Output:** SPEAKER, R
- Input:** MICROPHONE (Master ...), R
- Virtual balanced input:**
- Timing Reference Output:** L
- Loopback input:** L
- Input Options:**
 - Invert
 - High Pass
 - Treat 32-bit data as 24-bit
- Control output volume:** (disabled)
- Output Volume:** 1.00
- Mute:**
- Sweep Level:** -12.0 dBFS
- Control input volume:**
- Input Volume:** 0.44

Soundcard calibration:

- Speakers (USB PnP Sound Device) SPEAKER at 48 kHz
- Calibrate soundcard... (disabled)
- UMI1.cal (selected)
- Browse... Clear Cal Make cal file...

Levels:

- Use main speaker test signal to check/set levels (selected)
- Check Levels... Generate Debug File...
- Use pink periodic noise for level checks throughout REW (disabled)

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 the output level.

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.

Level Meters:

- Out:** -12.00 dBFS
- In:** -11.78 dBFS
- Ref In:** -11.78 dBFS

Step 18. 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.

Make a measurement

Type: **SPL** Impedance

Method: **Sweep** Noise

Name: Add number
 Add date/time
Will appear as: Mar 4 Use as entered

Notes: Keep for next measurement

Range: Start Freq: 0 Hz End Freq: 24,000 Hz

Level: **RMS** -12.00 dBFS dBu dBV Volts dBFS

Protection: Abort if heavy input clipping occurs Abort above SPL limit: 100 dB

Remaining sweeps: 1 time: 4s

Input:

Headroom dB **14.3**

Settings: Length: 256k Repetitions: 1 5.5 s

Timing: No timing reference Set t=0 at IR peak

Playback: **From REW** From file

Sample rate: 48 kHz

Measurements: 1 Delay: 0 seconds

Output: SPEAKER R Invert second output

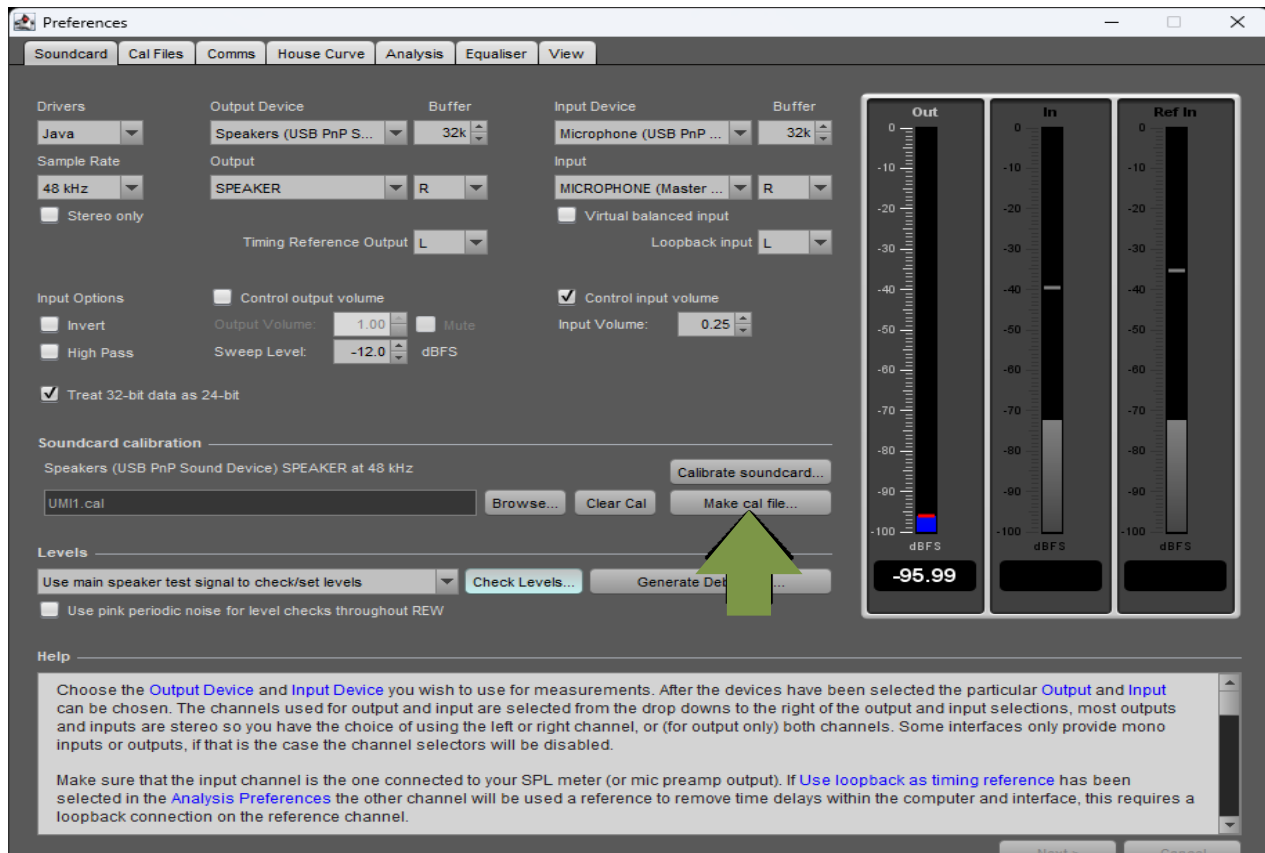
Cal files...

Virtual balanced input

Input: MICROPHONE (Master Volume) R

Check levels Start Cancel

Step 19. Click “Make Cal” to store the measurement.



Step 20. In the “Notes” box, type “Audiofrog UMI-1 Soundcard”. Click OK

The screenshot shows the 'Preferences' window in REW software, specifically the 'Soundcard' tab. The 'Soundcard calibration' section is highlighted with a green arrow pointing to the 'Notes' text box, which contains the text 'Audiofrog UMI-1 Soundcard'. A small dialog box titled 'Soundcard Cal File notes' is open over the notes field, with 'OK' and 'Cancel' buttons. The background shows various settings for drivers, output device, input device, and levels. The 'Levels' section shows a level of -95.99 dBFS for the 'Out' channel. The 'Help' section at the bottom provides instructions on choosing output and input devices and using loopback as a timing reference.

Soundcard Cal File notes

Enter any notes you wish to save with this calibration measurement

Audiofrog UMI-1 Soundcard

OK Cancel

Preferences

Soundcard Cal Files Comms House Curve Analysis Equaliser View

Drivers: Java

Output Device: Speakers (USB PnP S... Buffer: 32k

Sample Rate: 48 kHz

Output: SPEAKER R

Input Device: Microphone (USB PnP... Buffer: 32k

Input: MICROPHONE (Master... R

Virtual balanced input:

Timing Reference Output: L Loopback input: L

Input Options: Control output volume Control input volume

Invert: Output Volume: 1.00 Mute: Input Volume: 0.25

High Pass: Sweep Level: -12.0 dBFS

Treat 32-bit data as 24-bit

Soundcard calibration:

Speakers (USB PnP Sound De): UMI1.cal

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

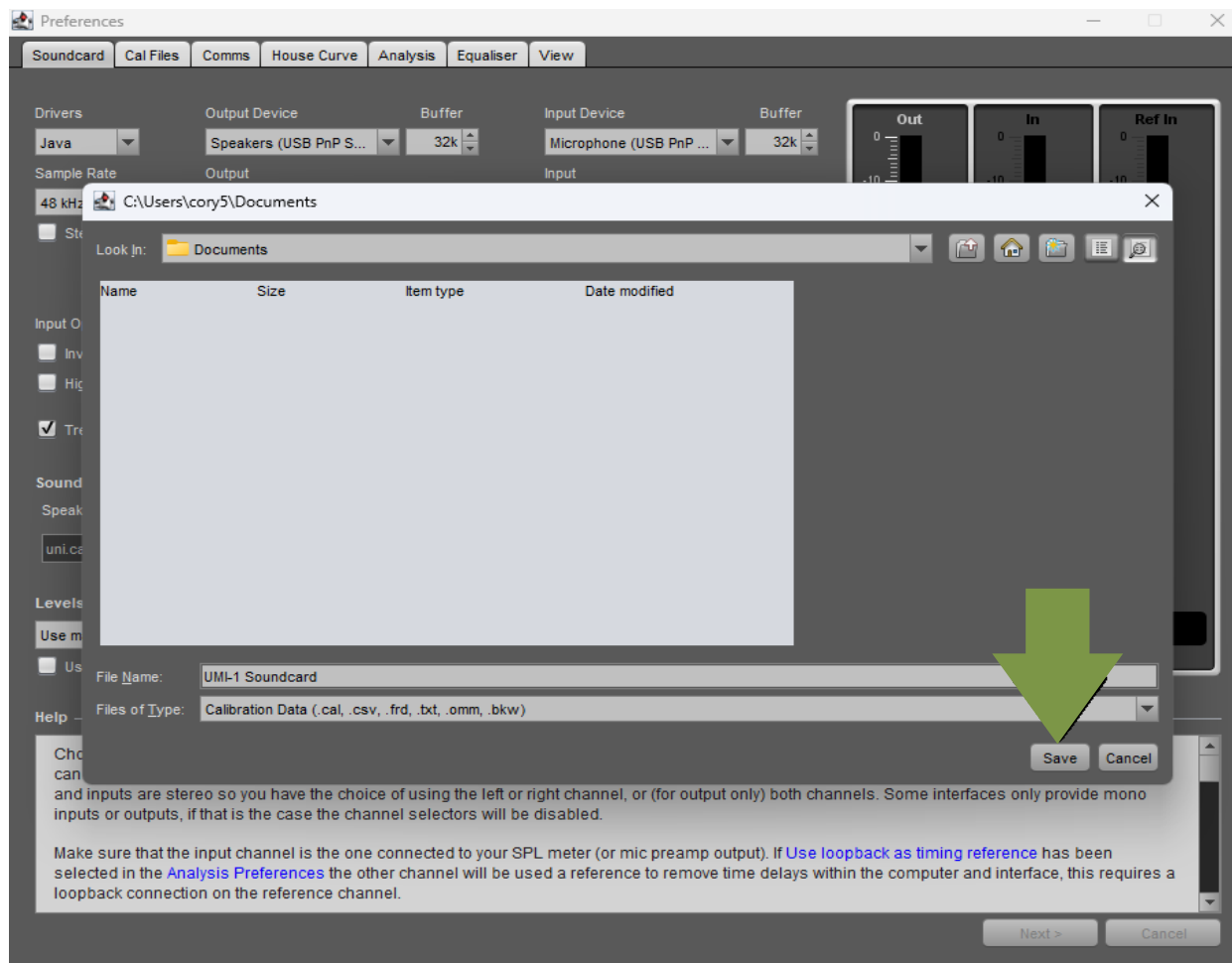
Use pink periodic noise for level checks throughout REW

Help: Choose the **Output Device** and **Input Device** you wish to use for measurements. After the devices have been selected the particular **Output** and **Input** can be chosen. The channels used for output and input are selected from the drop downs to the right of the output and input selections, most outputs and inputs are stereo so you have the choice of using the left or right channel, or (for output only) both channels. Some interfaces only provide mono inputs or outputs, if that is the case the channel selectors will be disabled.

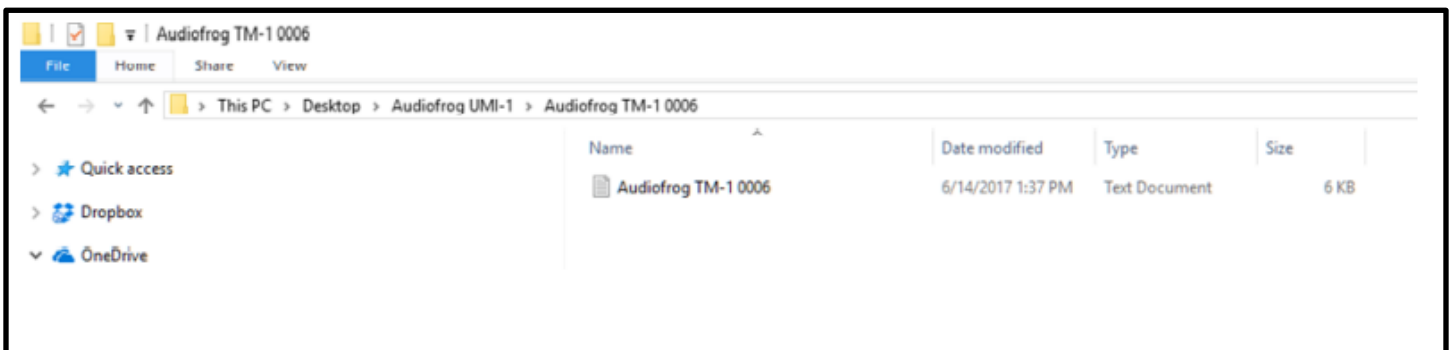
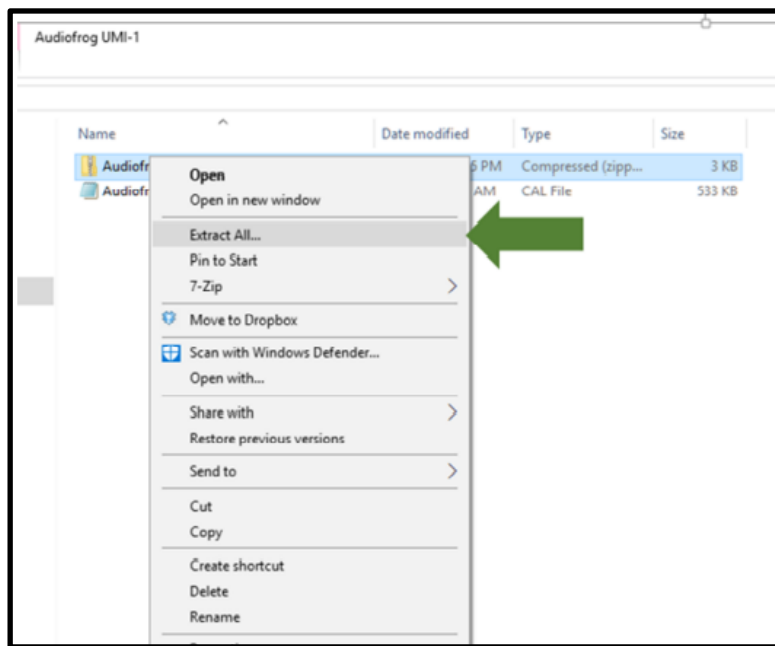
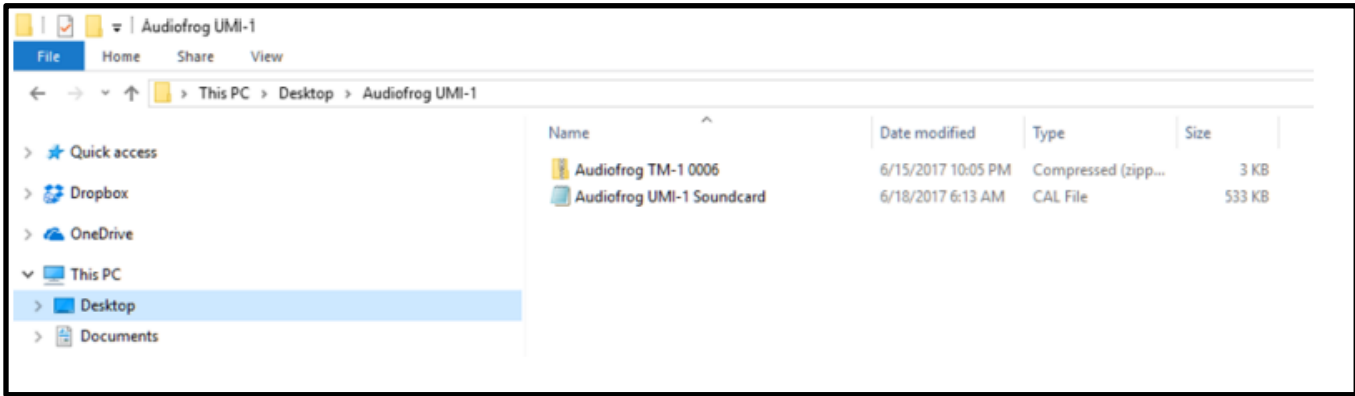
Make sure that the input channel is the one connected to your SPL meter (or mic preamp output). If **Use loopback as timing reference** has been selected in the **Analysis Preferences** the other channel will be used a reference to remove time delays within the computer and interface, this requires a loopback connection on the reference channel.

Next > Cancel

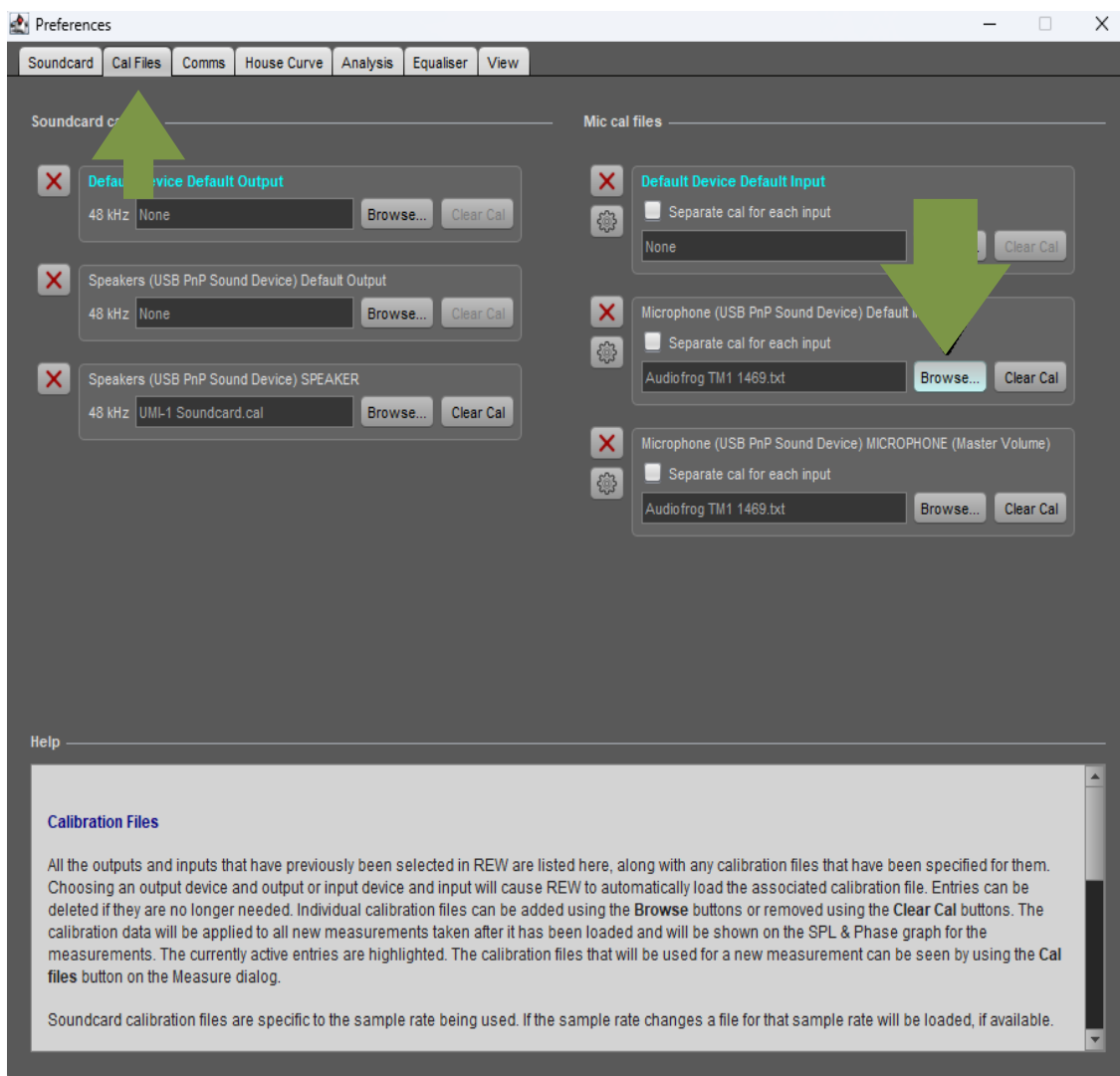
Step 21. Then, choose a location to store the soundcard calibration file in your computer, name the file “UMI-1 Soundcard” and click “Save”.



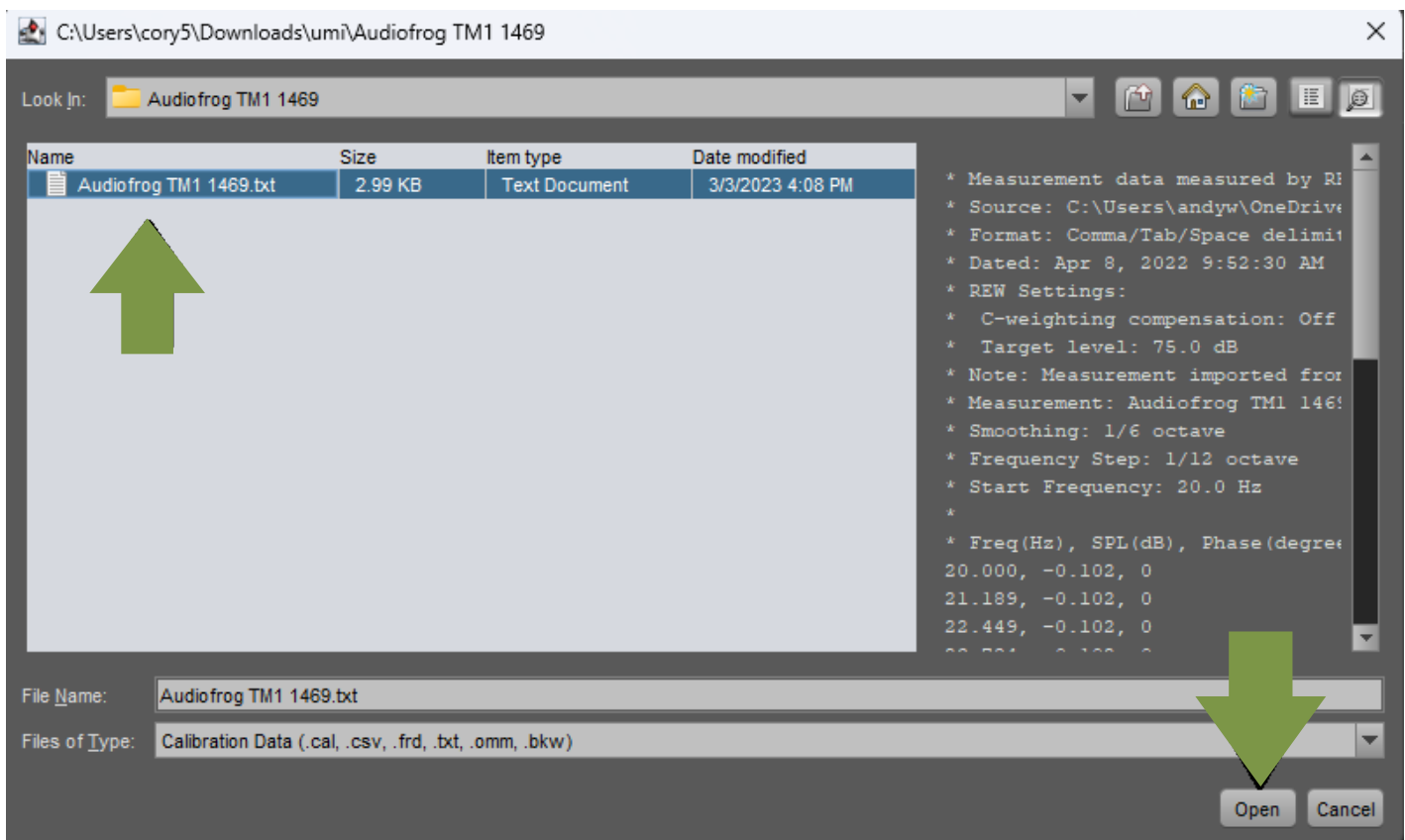
Step 22. Save the Mic Calibration file you received in an email from Audiofrog in the same place where you saved the soundcard calibration file. Right click on the .zip file and choose “Extract All” extract the text file to the same folder in which the zip file and the soundcard calibration file are stored.



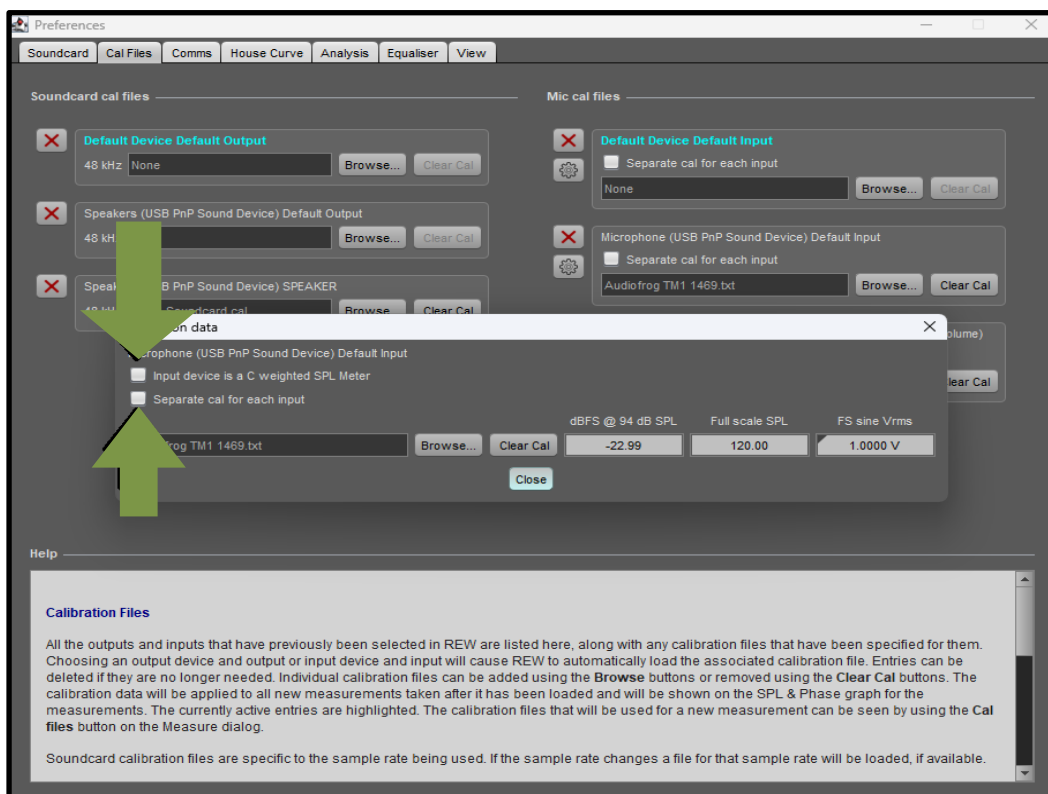
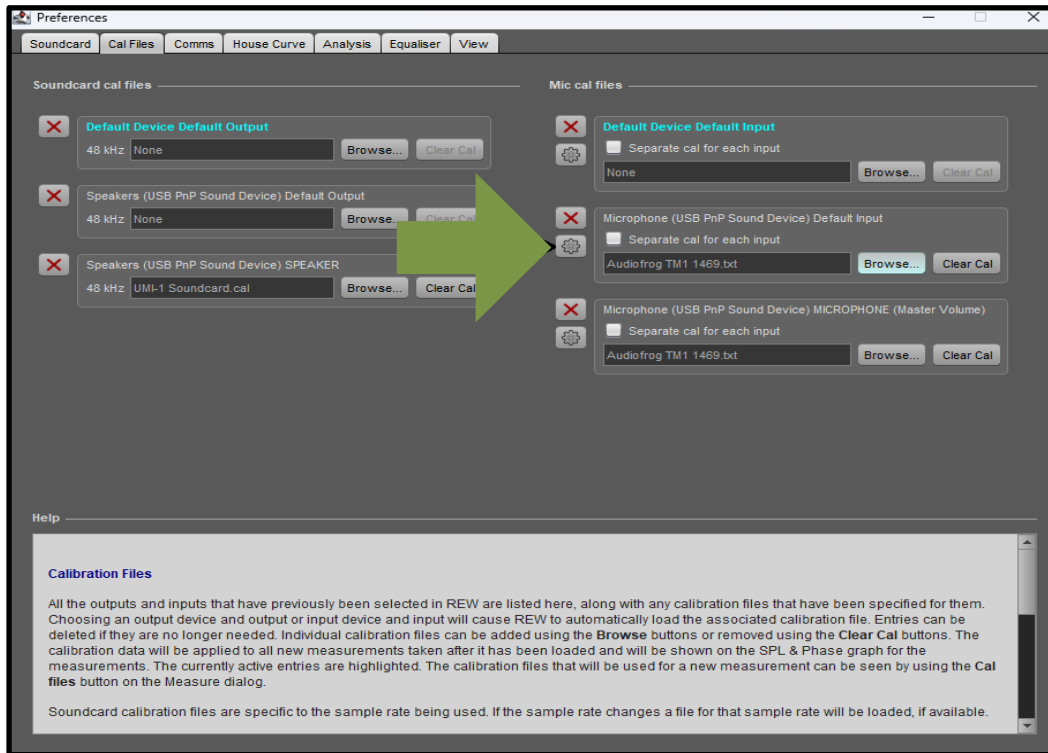
Step 23. In REW, Click on the “Cal Files ” tab in the Preferences panel. Click “browse” next to the usb device under the “Mic cal files” column.



Step 24. Find the Audiofrog TM-1 calibration file. Double click on the file to choose it or click once to highlight it and click “Open”



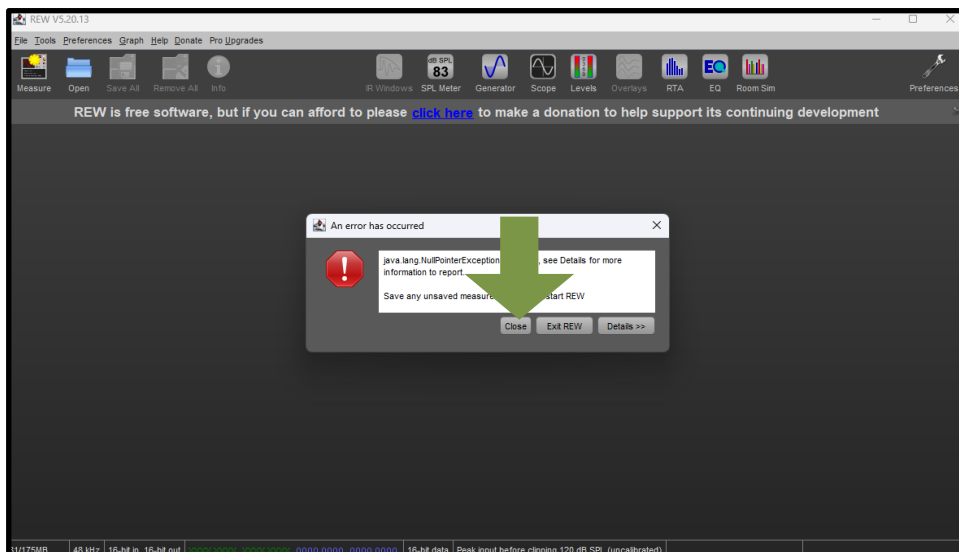
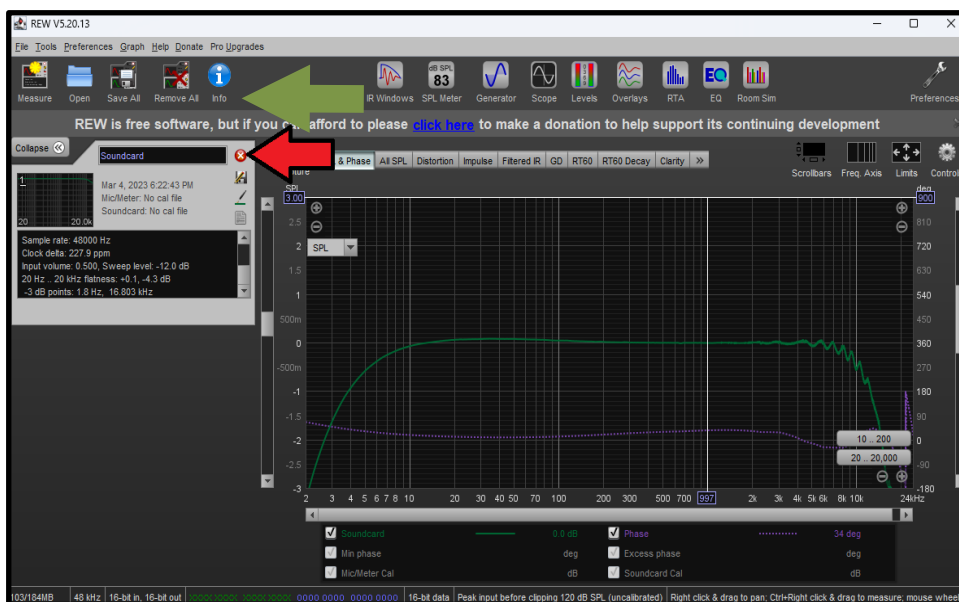
Step 25. Click the settings wheel next to the usb device under the “Mic cal files column”. Make sure both boxes are unchecked.



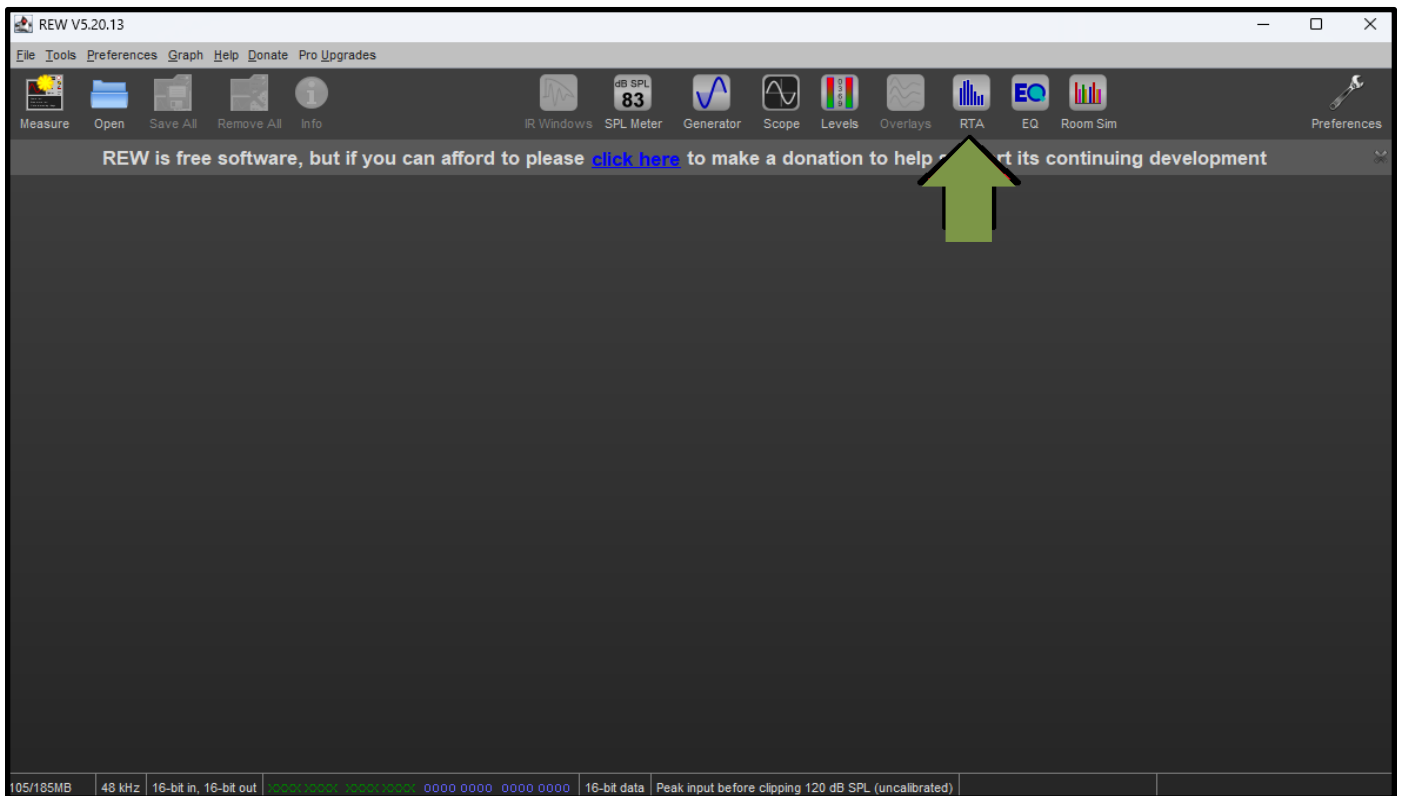
That's it. You only have to do this once. So long as you plug the USB soundcard into your computer before starting REW, you'll won't have to do this again. **Be sure to remember or to write down the settings you chose in the Windows mixer if you'll use this computer for other stuff. If you adjust those, 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

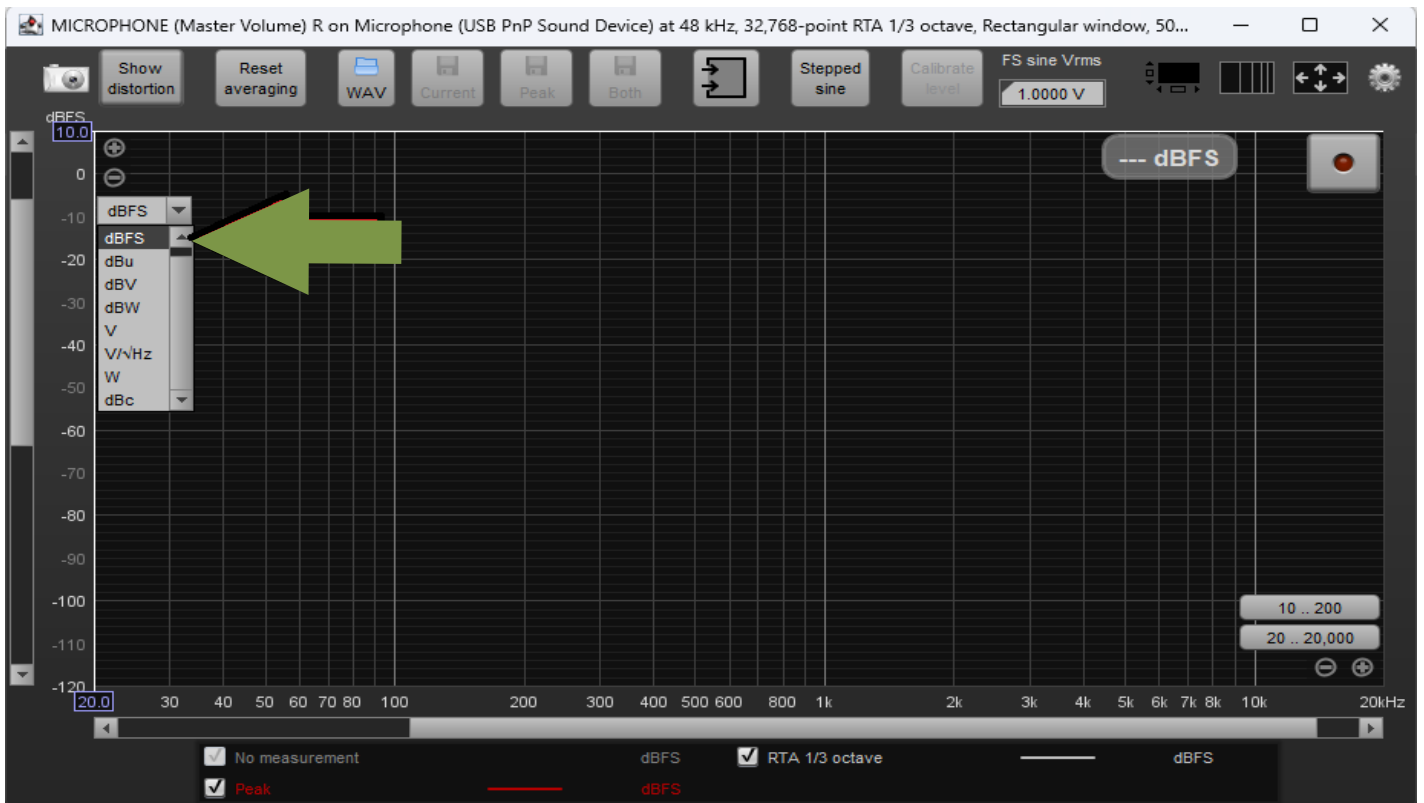
Step 1. In REW's main panel, click here to close your soundcard measurement. There's no need to save it because it's already been saved and loaded as a calibration file. (Click close if java.lang error occurs)



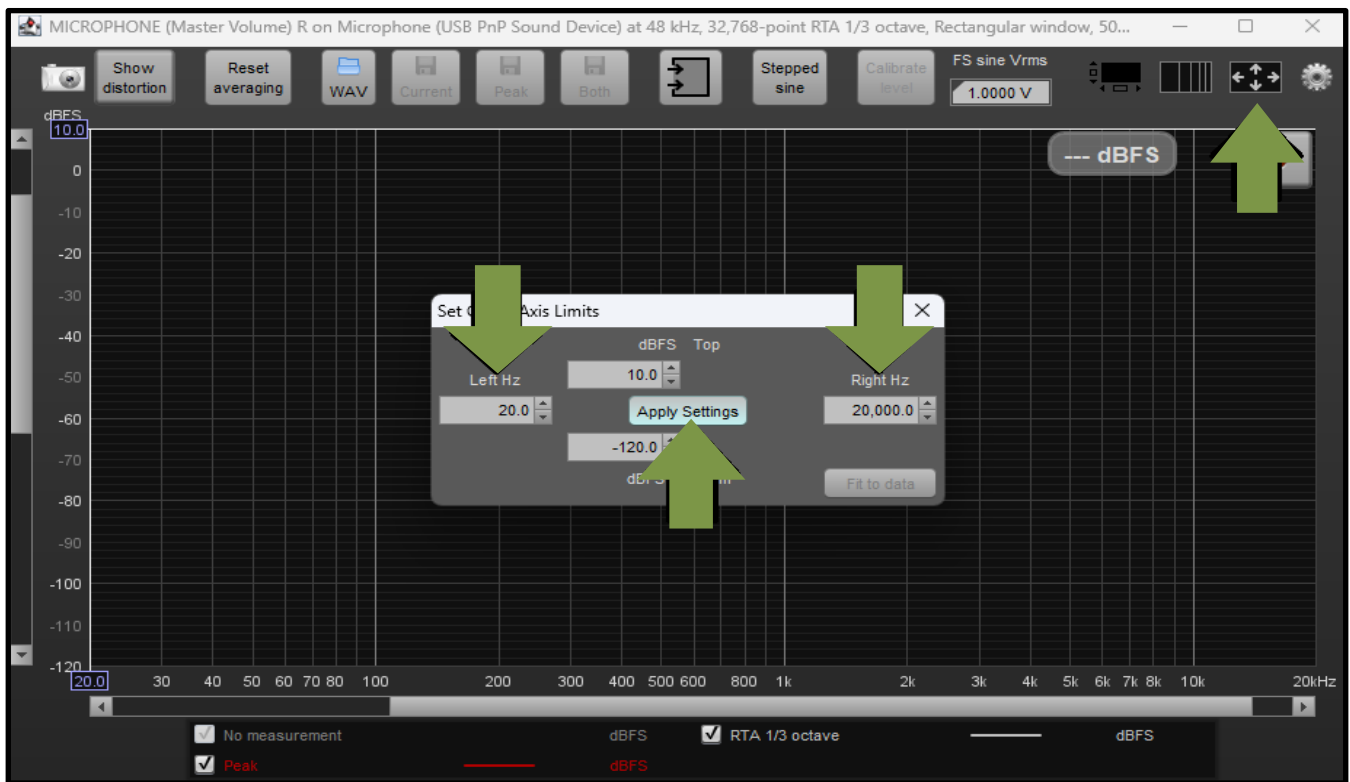
Step 2. Click on RTA at the top of the screen.



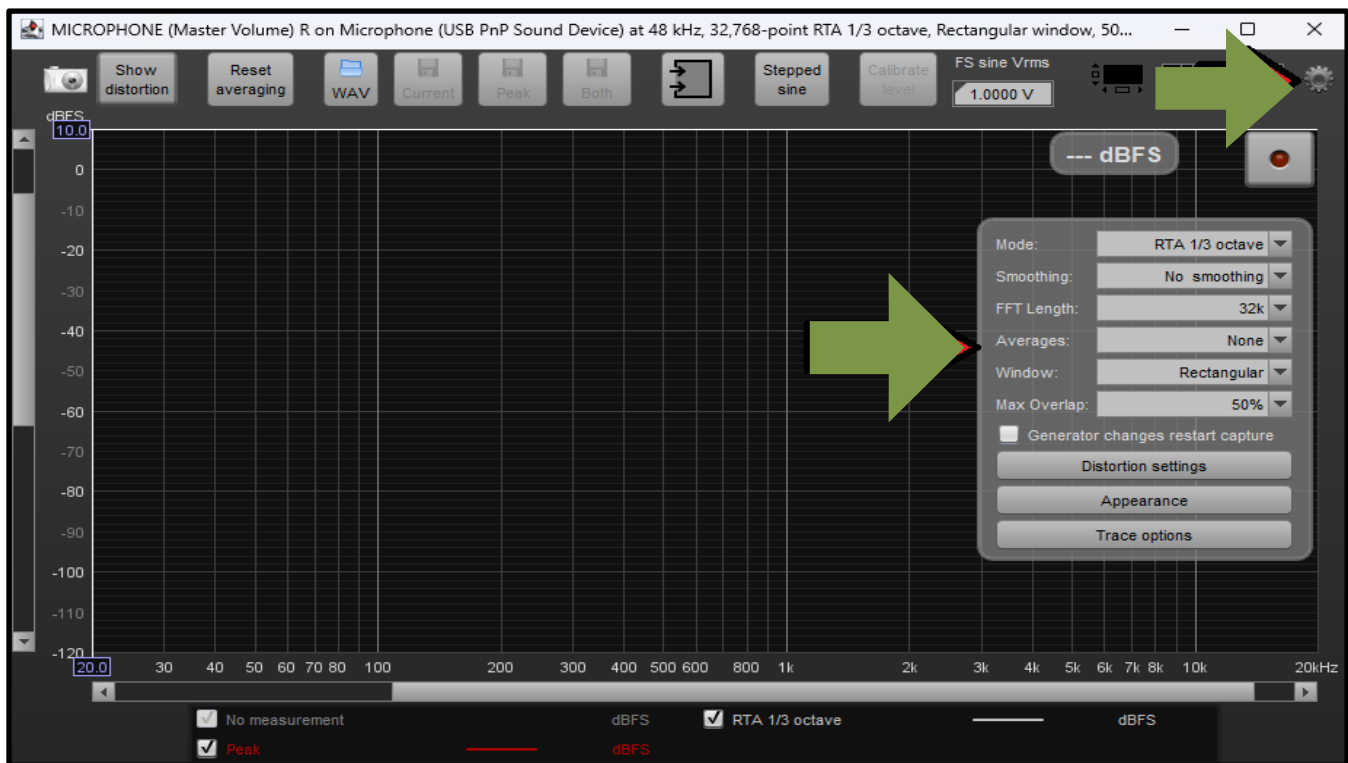
Step 3. In the small drop down menu on the left, choose “dBFS” instead of “dB”.



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!