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 fre#quency 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	Windows 64-bit installer (42.9 MB, includes private 64-bit Java 8 runtime)
Vista XP Pro x64	Windows 32-bit installer (43.3 MB, includes private 32-bit Java 8 runtime)
	macOS DMG (51.3 MB, includes private Java 8 runtime)
10.11 - 12	Notarized universal binary for Intel and M1 Macs. On Ventura set the theme to Light (nor- Dark) to run the installer. Mic access is included in the code signature and will be requested if necessary. A mic access prompt for REV can be forced using tocuti 1 reset. Nicrophone 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)
Δ	Linux installer (22.4 MB, requires a Java 8 runtime)
	Sampledata.mdat (8.0 MB)
All	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.

•••	Sound	
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	MacBook Air Speakers	Built-in
🕗 General	MJAudioRecorder	Virtual
Appearance	MMAudio Device	Virtual
	Quicktime Player Input	Aggregate device
	Screen Record w/Audio	Aggregate device
Control Center	Living Room	AirPlay

•••	Sound	
Q Search	Alert volume	◄ I I I I I I I I I I I I I I I I I I I
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Control Center		

Step 5. Run Room EQ Wizard and Click Preferences.

••• REW V5.20.13
Measure Open Save All Remove All Info Image: Big SPL Meter Image: Big SPL Meter </td
REW is free software, but if you can afford to please <u>click here</u> to make a donation to help support its continuing domain and the support
Welcome to REW
Configure audio inputs and outputs in Preferences – Soundcard
To make a measurement use the Measure button
Recommended equipment
The simplest configuration for most acoustic measurement purposes is a calibrated USB microphone (such as the miniDSP UMIK–1) and your computer's headphone or HDMI output. An analog measurement microphone will need a suitable interface with a mic preamp and phantom power.
Don't show the welcome message again
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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.

•••		-		Prefe	erences				
Soundcard Cal F	iles Comms	House Curve	Analysis	Equaliser Vie	w				
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	SPEAKER Tij	nce Output	R 💌	MICROPHON	ed input opback input		-20	-20	-20
Input Options Invert High Pass	Control o Output Volume. Sweep Level:	ut volume 0.801 🛓 -12.0 🛓	Mute dBFS	Control	it volume		-40	-40	-40
✓ Treat 32-bit dat Soundcard calibrat USB PnP Sound Dev None	ion //ice_SP5R_at.44	.1 kHz		Browse	Calibrate ar Cal Make	soundcard cal file	-60	-60 -70 -80 -90	-60 -
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Help	le noise for levere	necks throughou						<u>^</u>	
Choose the Outp chosen. The cha are stereo so yo if that is the cas	put Device and In annels used for o bu have the choice e the channel sel	put Device you utput and input e of using the le lectors will be di	wish to use fo are selected f ft or right chai sabled.	r measurements from the drop d nnel, or (for outp	. After the devices owns to the right o out only) both chan	have been sel f the output an nels. Some inte	ected the partic d input selection erfaces only pro	ular Output and ns, most output vide mono inpu	l Input can be s and inputs ts or outputs,
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								Next >	Cancel

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 F	Files Comms House Cu	irve Analysis E	Equaliser View				
Sample Rate 44.1 kHz	Output Device USB PnP Sound Device Output	Buffer ▼ 32k +	Input Device USB PnP Sound Device	Buffer	Out In	Ref In	
	SPEAKER	▼ R ▼	MICROPHONE Virtual balanced input	-20	-20	-20	
Input Options Invert High Pass Treat 32-bit da	Timing Reference Ou Control output volume Output Volume Sweep Level: -12	tput L ▼ 1 m Mute 0 m dBFS	Loopback inpu	-30 -40 -50 -60	-30 -40 -50 -50 -50	-30 -40 -50 -60	
Soundcard calibrat USB PnP Sound Der None	tion vice SPEAKER at 44.1 kHz		Browse Clear Cal	e soundcard80 ce cal file90	-70	-70 -80 -90	
Levels Use main speaker 1 Use pink period	test signal to check/set levels dic noise for level checks throu	Ighout REW	neck Levels Generate Deb	bug File	dBFS -100 - L		
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.							

• • •		Preferences			
Soundcard Cal	Files Comms House Curve Analysis Ed	qualiser View			
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	Timing Reference Output L	Loopback input	-30	-30	-30
Input Options	Control output volume Output Volume: 0.801 m Mute Sweep Level: -12.0 dBFS	Control input volume Input Volume: 0.252	-40	-40	-40
✓ Treat 32-bit d	ata as 24-bit		-60	-60	-60
Soundcard calibra	avice SPEAKER at 44.1 kHz	Calibrate soundcard	-80	-80	-80
Levels		Srowse Clear Cal Make cal file	-100 dBFS	-100 - BFS	-100 dBFS
Use main speaker	test signal to check/set levels	ck Levels Generate Debug File			
Help					
The audio inte response is su channel that w line input). Please connect	rface is measured with an external loopback conr btracted when subsequent measurements are ma ill be used for measurement (usually the Right cha t the loopback now and press Next when it has be	nected to allow its frequency response to be de ade, eliminating the interface's own response. T annel of the Line output) to the input channel th een connected or Cancel to quit.	termined and s he loopback c at will be used	saved as bra onne i (usu	ation file. This in the output channel of the
				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.

• • •		Preferences		
Soundcard Cal Files Comms	House Curve Analysis Equ	ualiser View		
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Use pink periodic noise for level che	ecks throughout REW			
Help The 1kHz tone is now playing. Adj controls so that the input level is c If the input level control is at its m control (if enabled and available) of Press Next when the input volume	ust the Input Volume using the lose to the output level, ideally aximum but the input level is st or your interface's mixer or your has been set or Cancel to quit	REW control (if enabled and available) or you within 6dB, and the peak level (the red line o iill more than 6dB below the output level try in r OS audio level controls. t.	r interne mixer or yo n the second wer than creasing se Output Vol	ur OS a servel -1dB, ume using e REW
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Step 9. Click "Next" in REW's Soundcard panel. Then click "Next" again.

• • •	Preferences			
Soundcard Cal	Files Comms House Curve Analysis Equaliser View			
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Levels	tast signal to check/sat lavals	dBFS	dBFS	dBFS
Use pink perio	dic noise for level checks throughout REW	r interface's mixe	r or your OS aud	io level
controls so tha If the input lev control (if enal Press Next wh	t the input level is close to the output level, ideally within 6dB, and the peak level (the red line o el control is at its maximum but the input level is still more than 6dB below the output level try ir iled and available) or your interface's mixer or your OS audio level controls. en the input volume has been set or Cancel to quit.	n the bar) is lowe	r than 18. but Vorte using	the REW
			Next >	Cancel

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.

$\bullet \circ \circ$		Make	a measurement			
Type:	SPL Impedance		Method:	Sweep	Noise	
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Notes:						
	Keep for next measurement		Playback:	From REW	From file	
	Start Freq End Freq					
Range:	0 🖉 22,050 🕷	Hz	Sample rate:	44.1 kHz 👻		
	RMS	🔵 dBu	Measurements:	1 🔺	Delay: 0 💌	seconds
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	Remaining sweeps: 1 time: 7s					
	18%	Lleadraam				
	-10 -	dR			Cal files	
locut	-30 =	117		Virtual balanced input		
input:	-50	11.2	Input:	MICROPHONE	•	-
	-80 -80		Chec	k levels	Start	Cancel
		112101				

Step 11. Click "Make Cal" to store the measurement.

O Preferences	
Soundcard Cal Files Comms House Curve Analysis Equaliser View	
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Levels	
Use main speaker test signal to check/set levels Check Levels Generate Debug F	ile OBFS OBFS OBFS
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 ha chosen. The channels used for output and input are selected from the drop downs to the right of th are stereo so you have the choice of using the left or right channel, or (for output only) both channel 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 the Analysis Preferences the other channel will be used a reference to remove time delays within th connection on the reference channel.	ave been selected the particular Output and Input can be he output and input selections, most outputs and inputs ds. Some interfaces only provide mono inputs or outputs, f Use loopback as timing reference has been selected in he computer and interface, this requires a loopback

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

000			Preferences			
Soundcard Ca	l Files Comms Hou	se Curve Analysis	Equaliser View			
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44.1 kHz 💌	USB PnP Sound Device	▼ 32k -	USB PnP Sound Device	▼ 32k -	0	0
	Output		Input		-10 -10	-10
	SPEAKER	▼ R ▼	MICROPHONE	v		
			Virtual balanced input	t	-20 -20	-20
	Timing Reference	ce Output L	Loopbac	k input 📃 👻	-30	-30
Input Options	Control output vol	ume	Control input volume	504 Å	-40	-40
Invert	Output Volume:		Input Volume: 0.	.504 💌	-50 -50	-50
High Pass	Sweep Level:	-12.0	Soundcard Cal File no	tes		
🗹 Treat 32-bit d	lata as 24-bit				-60	-60
		Enter any no	otes you wish to save with this ca	libration measurement	-70	-70
Soundcard calibr	ation	Audiofrog	y UMI-1 Soundcard			
USB FIF Sound D	evice SPEAN					-80
None			Ca	ncel OK	-90	-90
					-100	-100
Levels					dBFS d	SFS dBFS
Use main speake	r test signal to check/set l	evels 💌	Check Levels Generat	e Debug File	-95.99	
Use pink perio	odic noise for level checks	throughout REW				
Help						
Choose the O	utput Device and Input D	evice you wish to use	for measurements. After the d	levices have been sel	ected the particular Outp	ut and Input can be 🔺
are stereo so	you have the choice of u	sing the left or right c	hannel, or (for output only) bot	h channels. Some inte	rfaces only provide mon	inputs or outputs,
if that is the c	ase the channel selectors	s will be disabled.				
Make sure tha	it the input channel is the	e one connected to yo	our SPL meter (or mic preamp o	output). If Use loopba	ck as timing reference ha	s been selected in
the Analysis P	references the other cha	nnel will be used a re	ference to remove time delays	within the computer	and interface, this require	es a loopback
connection on	the reference channel.					T
					Ne	ct > Cancel

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

000		Preferences				
Soundcard Cal Files Comms	House Curve Analysis Equ	ualiser View				
Sample Rate Output Device 44.1 kHz V USB PnP Sound De	Buffer	Input Device USB PnP Sound Device	Buffer 32k v	Out	In	Ref In
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Save In: Cal files	5			× M A	hs 🖬 😑	
Audiofrog TM1 14 Input Options Invert High Pass Treat 32-1 Soundcard ca USB PnP Sour UMI-1 Sounc Levels Use main see	469.txt d.cal					
Use pink r File Name: UMI-	1 Soundcard					
Help Files of Type: Calib	pration Data (.cal, .csv, .frd, .tx	t, .omm, .bkw)			-	
Choose the chosen. Th are stereo if that is the case the channel selec	ctors will be disabled.			Save	Cancel	can be nputs itputs,
Make sure that the input channel is the Analysis Preferences the other connection on the reference chann	s the one connected to your SPL channel will be used a referenc el.	meter (or mic preamp o te to remove time delays	output). If Use loopback as within the computer and	i timing reference interface, this requ	has been seleo uires a loopbao	cted in ck
					Next >	Cancel

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.

	Preferences								
Soundcard Cal Files Comms House Curve Analysis Equaliser	View								
Soundcard cal fit V USP Device SPEAKER 44.1 kt MI-1 Soundcard.cal Browse Clear Cal	Mic cal files Wic cal files USB PnP Sound Device MICROPHONE None B e Clear Cal								
USB PnP Sound Device Default Output 44.1 kHz None Browse Clear Cal	USB PnP Sound Device Default Input Separate cal for each input None Browse Clear Cal								
Efault Device Default Output 44.1 kHz None Browse Clear Cal	Default Device Default Input Separate cal for each input None Browse Clear Cal								
Help Calibration Files All the outputs and inputs that have previously been selected in REW are listed here, along with any calibration files that have been specified for them. Choosing an output device and output or input device and input will cause REW to automatically load the associated calibration file. Entries can be deleted if they are no longer needed. Individual calibration files can be added using the Browse buttons or removed using the Clear Cal buttons. The calibration data will be applied to all new measurements taken after it has been loaded and will be shown on the SPL & Phase graph for the measurements. The currently active entries are highlighted. The calibration files that will be used for a new measurement can be seen by using the Cal files button on the Measure dialog. Soundcard calibration files are specific to the sample rate being used. If the sample rate changes a file for that sample rate will be loaded, if available.									

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"

Choose the file to overwrite or enter a new filename										
Look In: 🖿 c	al files	• M ★ M ⊞ ⊞								
Audiofrog	TM1 1469.txt indcard.cal	<pre>* Measurement data measured by Rt * Source: C:\Users\andyw\OneDrive Format: Comma/Tab/Space delimi1 * Dated: Apr 8, 2022 9:52:30 AM * REW Settings: * C-weighting compensation: Off * Target level: 75.0 dB * Note: Measurement imported fror * Measurement: Audiofrog TM1 146! * Smoothing: 1/6 octave * Frequency Step: 1/12 octave * Start Frequency: 20.0 Hz * * Freq(Hz), SPL(dB), Phase(degree 20.000, -0.102, 0 21.189, -0.102, 0 22.449, -0.102, 0 23.784, -0.102, 0 25.198 -0.102</pre>								
File Name:	Audiofrog TM1 1469.txt									
Files of Type:	Calibration Data (.cal, .csv, .frd, .txt, .omm, .bkw)	· · · · · · · · · · · · · · · · · · ·								
		Open Cancel								

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

0							Prefer	rences					
ndcard	d Cal F	iles	Comms	House Curv	e Analys	is Equalise	r View						
ndcar	d cal files							Mic cal	files				
	USB PnP S	ound D	evice SP	EAKER				×	USB PnP Sound De	vice MICROPHONE			
ľ	44.1 kHz	UMI-1 S	oundcard	d.cal	Brows	e Clear Ca	al		None		Browse	lear Cal	
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										dBFS @ 94 dB SPL	Full scale SPL	FS sine Vrms	
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		Sour	ndcard c	alibration file	are specifi	ic to the samp	le rate be	eing used.	. If the sample rate	changes a file for tha	at sample rate will b	e loaded, if ava	ilable.

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 fir 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!