tonebase Academy | Recording Course

IV. Critical Listening

ACADEMY

Your Instructor: Martin Zimny

Suitable For: All Levels

A tonebase Workbook

“Keep an eye on your metering, but don’t listen with your eyes!”

Prior Knowledge

• Reaper Basics as covered as in the first two lessons

Contents

Lesson Summary

In this lesson, we will listen back to your recordings and I will try to give as much feedback as possible! We will use several measurement tools in order to counter the problem that not every one of us has access to acoustically treated studios with a set of flat frequency response monitor speakers.

What You’ll Learn:

- How to understand the frequency response of your listening device
- How to cross-reference your mix
- How to use spectrometers and goniometers
- How to use a correction loop to improve the sound of your audio

Can we trust our ears?

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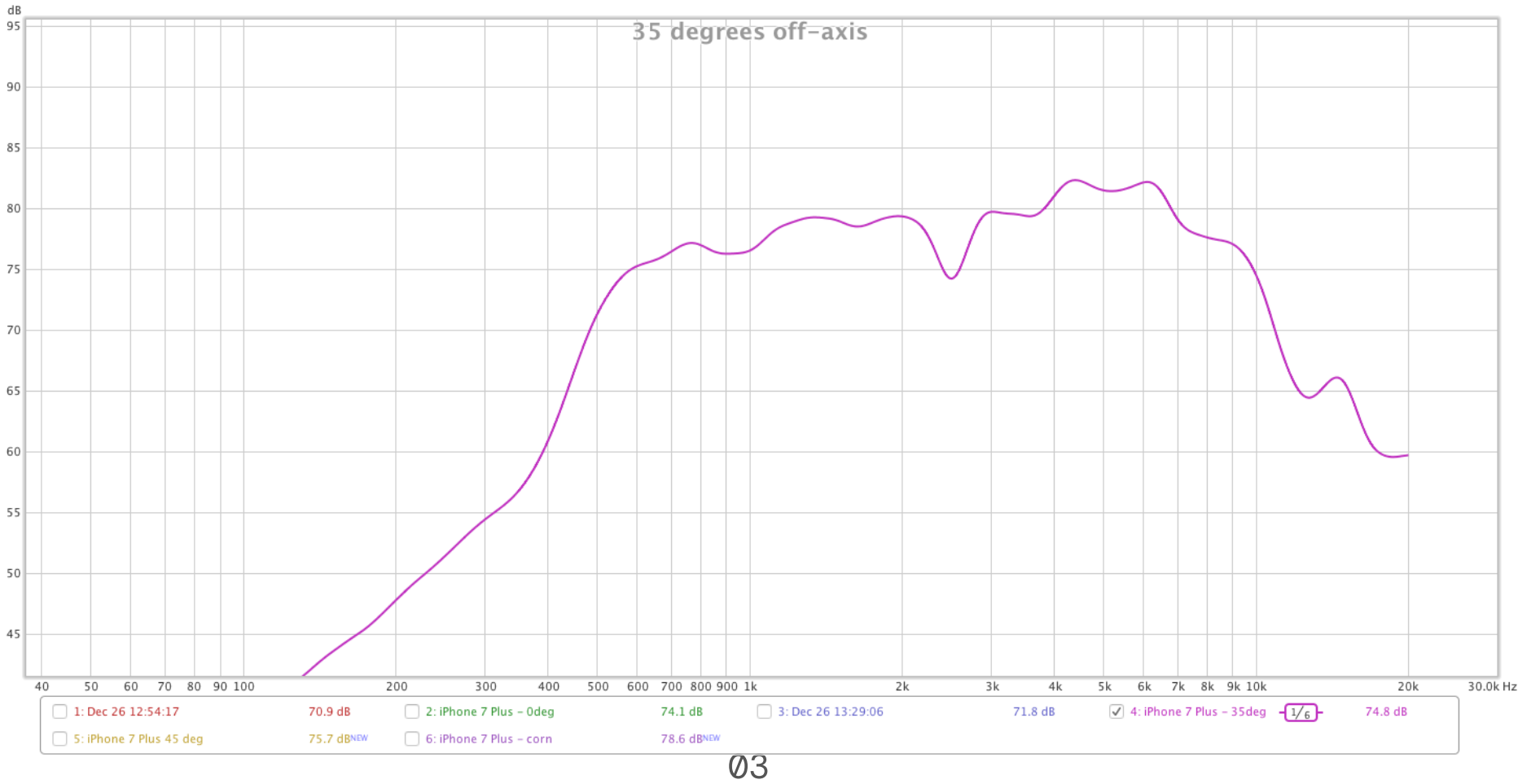
Now that we have recorded, edited, and sonically manipulated our master take, we need to evaluate whether the adjustments are actually benefiting the music. Sure, listening back to our recording with our smartphone, laptop, or headphones gives a decent audio experience, but are we actually *hearing* our recording clearly and accurately?

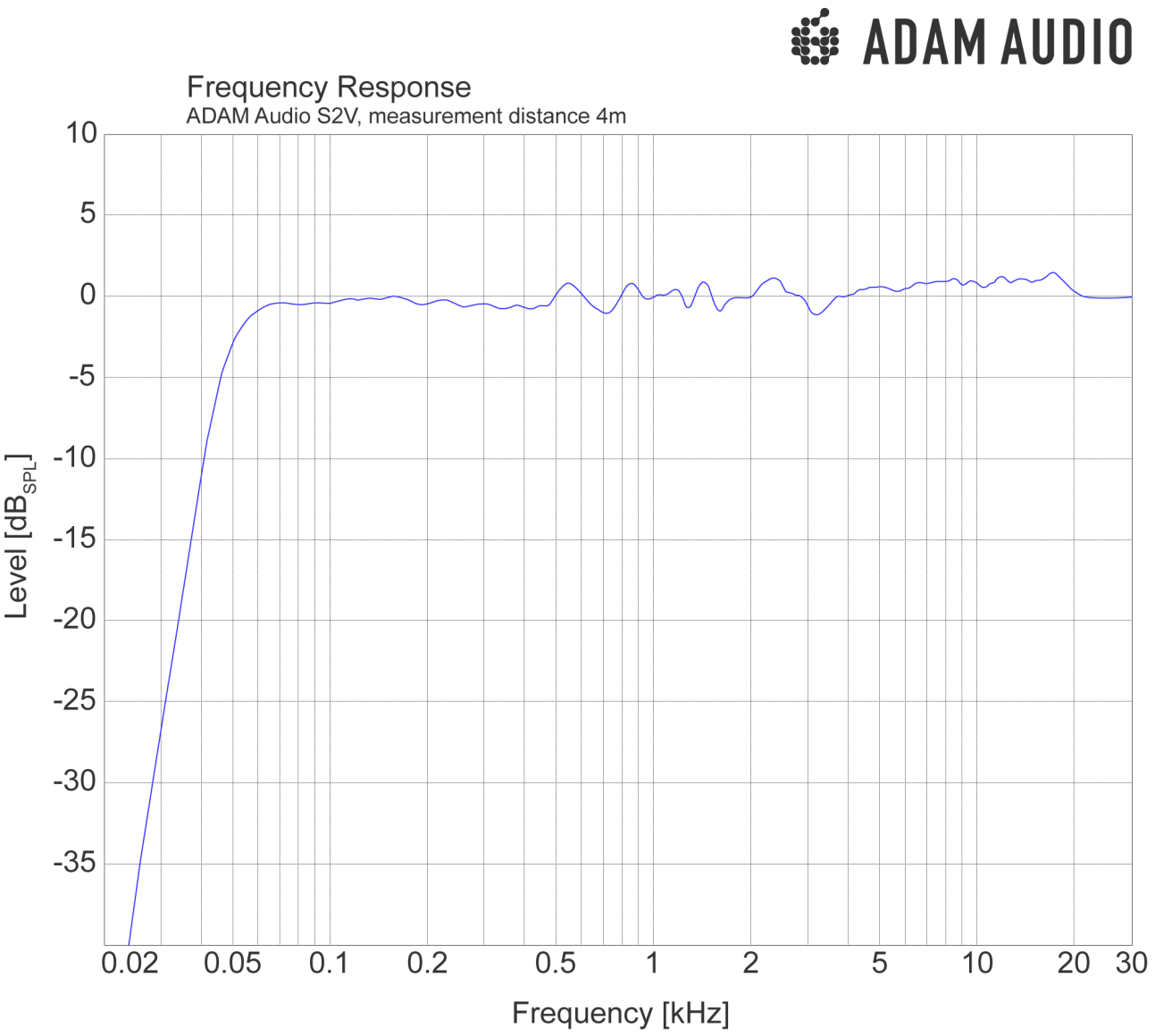
Every sound system, from our speakers to our cables right up to our eardrums (and even your room), has a unique sonic signature. If we want to make informed decisions about whether to apply an equalizer or not, it is important to understand how your sound system might be misrepresenting your audio signal.

Understanding frequency response

This is the frequency response of a commercial smartphone. On the y-axis, you can see the **amplitude** (or volume) plotted in dB, and on the x-axis **frequencies** from 40 Hz–20 kHz.



With a smartphone speaker, there is virtually nothing audible below the range of 150 Hz. There's a strong emphasis on the range between 1 kHz-2 kHz and 4 kHz-6 kHz. This is not only normal, it's intentional. Smartphone speakers are designed to make phone calls easy to hear, so frequencies that are natural for the human voice are boosted. The next graph is the same but uses a pair of high-end speakers designed for audio post-production. Notice how flat the line is in comparison to the smartphone chart above.



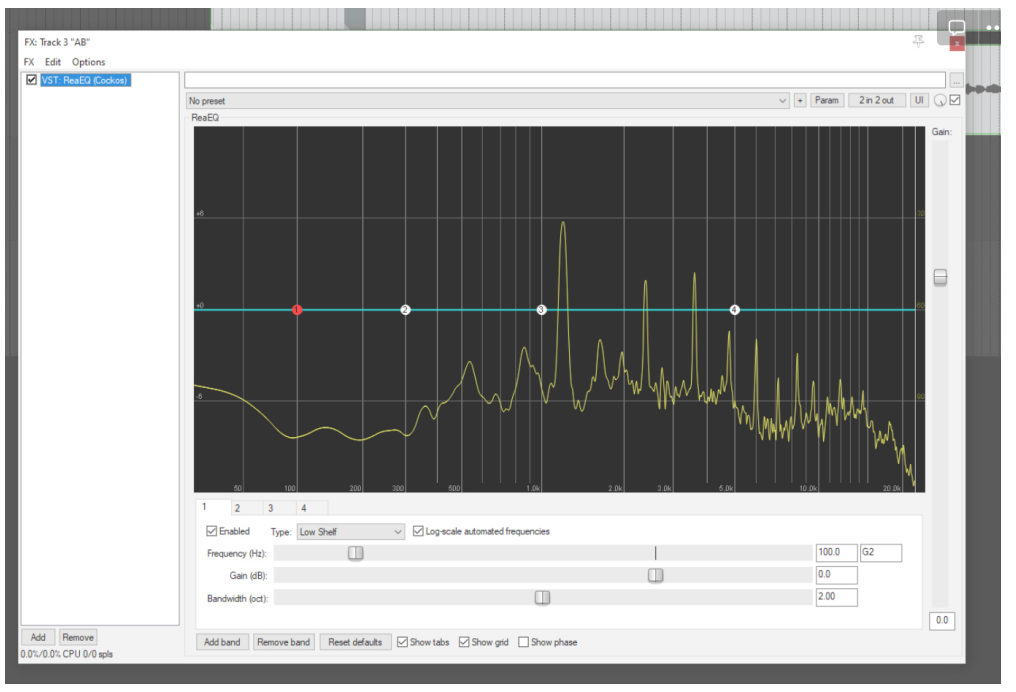
When you listen to your recording on a smartphone, you may find the bass is lacking a little bit of *oomph* (or probably a lot), so naturally, you grab your trusted equalizer and boost frequencies from 80-200 Hz, because that's where the bass and low mids are living. You hear a distinguishable difference now that you added some (or a lot of) gain.

Now that you're happy with the result, you take that audio file and play it back in your car or on a good pair of speakers. Suddenly, you cannot hear any differences between the low strings of your guitar, and everything is muddy and dull. This is to be expected. In this scenario, you **overdid** your EQ adjustments because you were not aware of the limitations of your sound system (in this case, you relied on your smartphone speakers and over-compensated).

By listening back on different devices, you take the first step toward solving an audio problem: **Cross-referencing your mix!** By listening to the file on different headphones, your TV, your speaker, your car, different spots of the room - you name it! - you will probably get very different results. If you created a mix that sounds *equally* good on all speaker setups, you did a good job. This is why professional studios often test their mixes on consumer speakers. It is also why professional studios spend a lot of money to have a neutral audio chain (a flat line in the graph on the previous page). If your music sounds good on a neutral system, it will probably sound okay in most regular use cases.

Measurement Tools

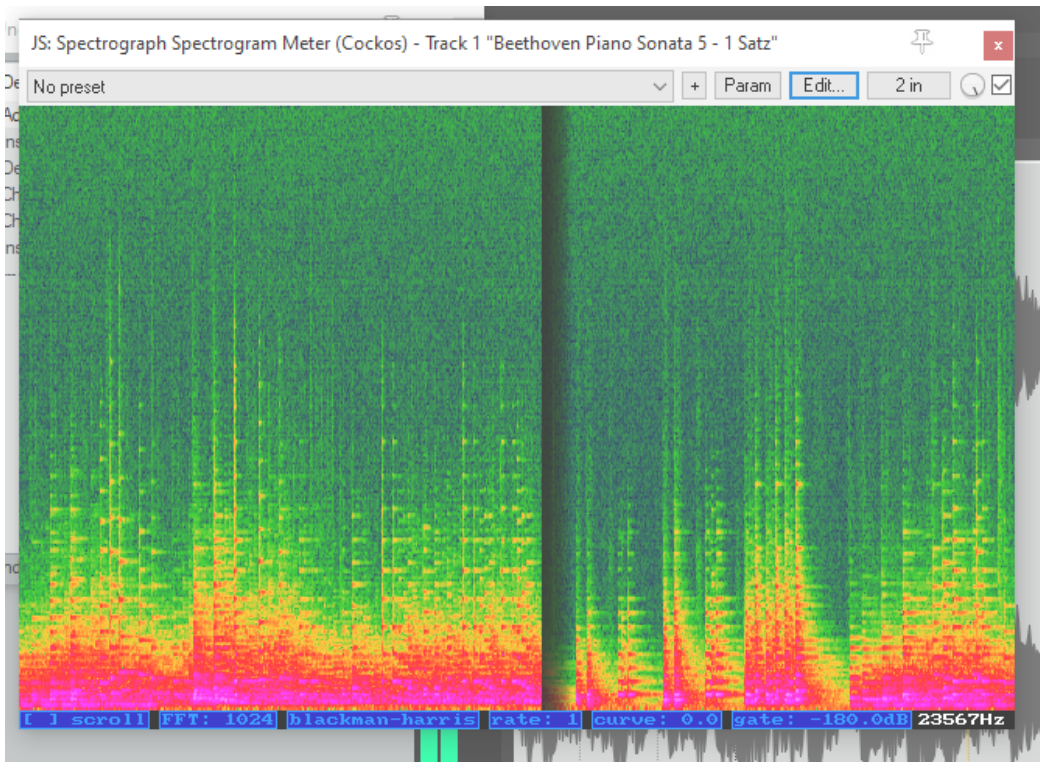
Our first measurement tool lies within the EQ that we got to know in last week's workshop!



This graph is similar to the frequency response graph on the previous page. Now, why would you want to monitor your frequencies if you can already hear them? This graph shows you what frequencies are embedded into the file, whether or not your sound system is playing them.

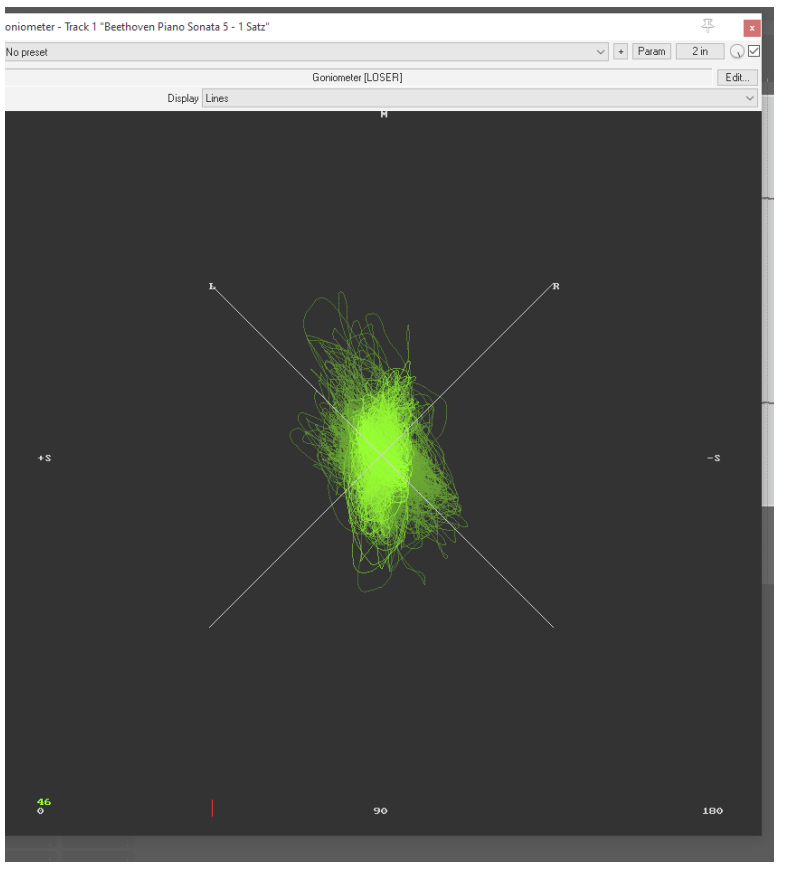
Imagine you are listening back to your recording with a smartphone that cannot reproduce frequencies lower than 150 Hz. We've already learned that the 6th string has a frequency of approximately 82 Hz. This bass frequency cannot be reproduced by your smartphone, no matter how loud it is. What you *do* hear are overtones of your sixth string. However it's still impossible to tell how loud your sixth string is in the audio file. If you're using a compressor, those low frequencies may be peaking and triggering your compressor. This redues the overall gain of your recording. By looking at the frequency spectrum of the EQ, you can know if your sixth string is peaking or if there are other issues with your file, regardless of your sound system.

Spectrograph



The spectrograph is a handy tool to see whether or not there are background noises or unwanted hums in your audio file. These can come from appliances, electronics, air conditioners, or even neon lights. A **spectrograph** shows time on the X axis and frequency range on the Y axis. Background hums can appear as a horizontal stripe.

Goniometer

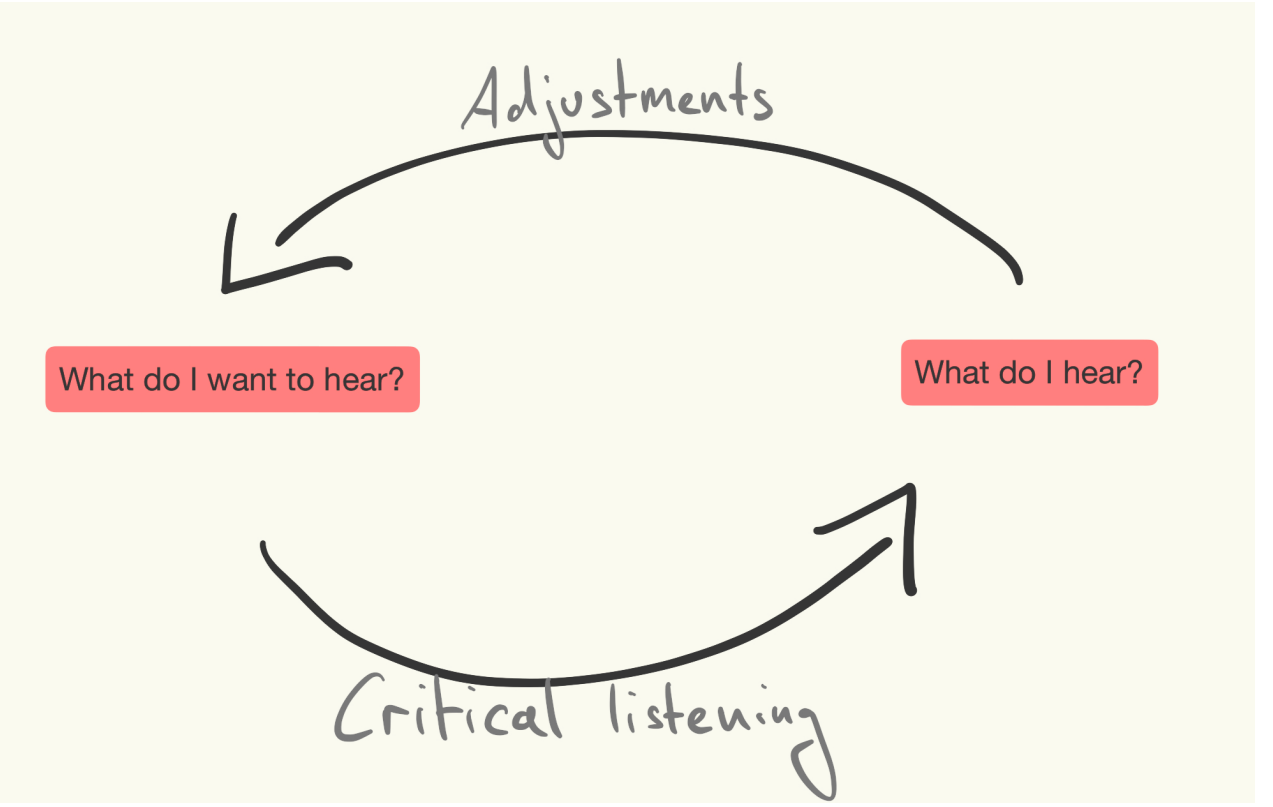


If your audio sounds fine on your computer and headphones but sounds thin or quiet on *mono* speakers like kitchen radios or some smartphone speakers, it might come from phase issues. An audio file has phase issues when frequencies in the left and right channels aren't precisely together and cancel each other out. You don't have to worry about this if you only used one microphone. If you used two or more microphones, it's good to keep an eye on a **goniometer**!

Ideally, your goniometer readings are between 0° and 90° (or the lines roughly **vertical**). If you see lots of lines moving horizontally, your audio file has phase cancellation issues. These issues are hard to counter in post-production (you can only hope that changing the phase of one channel is helping!). Often the best solution is to increase or decrease the distance between your microphones by a couple of centimeters!

The Correction Loop

First, ask yourself: how do I want my recording to sound? Second, compare that idea of your sound with what you actually hear. Third, use the tools and techniques at your disposal to change one factor at a time. Then, start the correction loop over again! Many problems can be solved before recording a note–different mic placements, distance from walls, the shape of your guitar and nails, and so on. For some problems, it is good to use the techniques of audio post-production that we just acquired. **Keep in mind that the solution to a big problem is often a lot of small, simple adjustments.**



Assignment

- ○ Listen to 5 provided recordings and evaluate what is wrong with them!

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CLICK TO REVIEW THE RULES AND FAQ

Questions

Use the questions below as a chance to reflect on how far you've come with your progress on the topic of home recording and use the dedicated forum thread to post questions or discuss topics of this workshop.

1. What components affect the sound of your playback?

2. What can you do if your audio sounds thin on your laptop speakers?

3. Why do audio professionals choose flat frequency response systems?

4. What frequency is the lowest string tuned in E?

5. In what frequency range do nail clicks usually live?

6. How can you listen back in Mono in Reaper and why would you want to do that?

About Your Instructor: Martin Zimny

Martin Zimny, born in 1988 in Munich, Germany, graduated with a Master's of Music from the Robert Schumann Hochschule in Düsseldorf, Germany with Cuban guitarist Joaquín Clerch. He has won prizes in several national and international competitions and played concerts across Europe and India. He has taken part in festivals and workshops in Austria, Germany, Spain, the Netherlands, and Serbia. Martin has been working as a guitar instructor for almost 10 years. After his degree in music, he studied Engineering for Audio and Video at the University of Applied Sciences in Düsseldorf. Today, he continues to perform and teach while working as a professional recording engineer.

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Notes

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