

Mastering Your Own Music

v2.1

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Preface: The original version of this mastering guide was by far the most downloaded and shared production guide I've ever written, even though it was primarily geared towards "beginner" musicians. As time went on and I began doing mastering as a full-time profession however, it also raised a lot of questions from more advanced users. So I figured it was time to update it and provide some clarifications, as well as cover some new ideas in places. My hope is that this new version will be as useful as the original, and that musicians and producers of all skill levels will continue to benefit from it.

I'm writing this because I have always seen the same questions asked again and again "How do I master my song?" or "Can anyone recommend some good mastering plug ins?". More and more people are learning the ins and outs of their home studios, and they eventually start to finish songs and realize that they don't sound as good, or as 'polished' as what they hear when they buy a CD or download tunes online.

So, what is mastering? Surprisingly it can be many things, depending on your needs or the format you intend to release your music on. Some examples of things that commonly are done during the mastering process include:

- Making all the songs on a CD sound cohesive.
- Preparing the song so that it is not too quiet, and more importantly these days, not too loud.
- The final quality control for projects going to a replication house.
- An experienced, fresh set of ears to help achieve the overall balance of frequencies in a song.
- And more recently, a chance to interact with an experienced audio engineer and get feedback on the sonic qualities of your productions as they get close to completion.

In general however, I think what most people want to achieve when it comes to mastering their own songs is two-fold: Get the overall level of the song right (how loud or quiet it is), and achieve a good balance of frequencies in the song (making sure it's not too bright or too bass-heavy for instance).

Of course, as someone who makes their living mastering other people's music, my first suggestion on the easiest way to achieve this is to let someone with the right gear and the lots of experience handle these issues. A professional mastering engineer not only has



accurate monitoring and an acoustically treated studio dedicated to mastering, but more importantly experience and an unbiased opinion. For many people nowadays, it's the only time from the start of the song to its release where they will get to work with someone who can offer a critical second set of ears to help them shape and present their music in the best way possible.

But, if you're reading this, then chances are you really want to do this on your own, or you can't afford professional mastering. How then, do you go about mastering your own work, and which tools do you really need to get the job done?

I think it goes without saying that two things will always remain true when it comes to music mastering:

- Specialized mastering equipment will almost always give you better results than what comes with your DAW (Digital Audio Work station). Audio processing tools designed for mastering will likely sound clearer and introduce less artifacts than a free or a bundled plug in. There's always exceptions, I'm just saying in general.
- Experience and trained ears will always get you better results than just the right gear. That is, an experienced mastering engineer will be able to get very, very good results no matter what gear they use.

To me, this means one thing. Becoming good at mastering (or anything really) will take practice and lots of it, and having good quality tools at hand will help as well. Lacking these two things, there's one final way to approach the situation, and that's through trial and error. To me is a form of practice as well however, which means ultimately there is no magic tool that will make your productions shine. If you want your tracks to compete with professionally produced songs, then you need to be ready to invest not only in the right tools, but also in TRULY learning when and how to use them.

Where to start then?

The first thing you need to look at is your listening environment. Having good monitors is only one small part of knowing you are hearing everything in your music, especially with any sort of accuracy. Good monitors don't just reproduce the the lowest lows and the highest highs correctly. They also have clean amplifiers able to react instantly and provide the power needed to replicate the sharpest transients, over the widest dynamic range. They have impeccable imaging, reveal the true depth of field in music needed to determine when there's too much reverb, when instruments might be panned too much to one side or the other skewing the mix, or when there's too much stereo information and not enough in the center of the mix to provide a solid foundation to the soundstage. Or vice versa.

However, in my opinion, far more important is the way in which the sound from your speakers interacts with the room you're in. The best speakers in the world can sound terrible if your room is negatively influencing what you hear. I won't go too much into acoustics here, but if you're working in a small room with no acoustic treatment (i.e. diffusors, bass traps, something to counteract first order reflections, etc) you're already starting off with things not in your favor. Given that acoustic issues can be expensive to address, I'll assume that most of you haven't, which means you need a plan B.



The best way to get around acoustic limitations is to make sure that you listen to your song on as many speakers, and in as many playback locations as possible. Listen to your song in headphones, on your iPod, your home stereo, in your car, your kitchen radio, your friends' stereos (they hate this by the 5th or 6th month BTW), etc. Learn how to correlate what you hear in your home studio, with what it sounds like elsewhere.

For instance, pay attention to things like the bass instruments or kick drum. If it sounds good in your studio, but you keep noticing it's too bass-heavy elsewhere, then you know you need to compensate for that at home. So you mix and master with the bass sounding weak at home, so that when you test it elsewhere, it sounds good. The goal is to get it not sounding perfect everywhere per se (though congrats if you can!), but to minimize any negative sounding problems in as many places as possible. You should be able to hear all of the main instruments clearly, without anything jumping out at you as sounding too loud or quiet.

It's not that simple though, you need to learn this for the whole frequency spread; the mids, the highs, the low mids, etc. Slowly you'll start to hear what the deficiencies are in your studio and your monitoring, and learn how to compensate for these. This takes a LONG time. It's not something you do in a day, over a weekend, or even in a couple months. You need to train your ears and practice to always listen for the overall balance of what you are hearing, and then test that against how it sounds in your studio. What's worse, getting better speakers, a new soundcard, or even finally springing for some acoustic treatment all changes this balance once more, and you need to start the process all over.

Without the proper room and gear, this is the only way you'll know what's truly going on in your music: trial and error. The good news is that as you do get better monitoring, or finally can afford some proper acoustic treatment, this process gets MUCH easier. But in the meantime, while it's not ideal, the point is that it can be done with enough practice and perseverance. By only listening to your productions in your home studio however, you will never really know how the rest of the world is truly hearing your music.

"Yeah yeah", I hear you muttering, "but how do I master my songs in the first place?"

To put it bluntly, you don't.

What?

Let me say this again, in case you skipped over it. If you are writing and releasing your own songs, there is no reason to "master" them per se.

Everything you need to do to make a song sound polished and balanced can be done in the mixdown, and this is where you should focus 100% of all your attention. There's only one

exception, and that's getting the overall volume of the song more inline with today's standards, and I'll come back to this later.

A truly great-sounding song rarely needs much done to it by a mastering engineer. This is what you should strive for. Putting things like multi-band compression, heavy-handed EQ, aural exciters, sonic maximizers and such over your mixed-down song is the **WRONG** way to fix any issues you hear. Those tools were created to give mastering engineers more flexibility when they didn't have the luxury of going back and fixing the individual elements in a song. They were forced to work on a single stereo file of the song, and couldn't adjust anything in the mixdown.



So tools like these were created for those **RARE** instances when they needed to adjust something beyond what simple EQ or compression might fix. Unfortunately marketing by plug-in manufacturers, along with some small dose of urban myth, makes it seem like these are critical to the mastering process. The world's best mastering engineers rarely use things like "mastering reverb", multi-band compression, aural exciters, or even linear-phase EQ's. They don't arbitrarily apply a high-pass (or worse, a low-pass) filter to the song. These are tools we have on hand for very specific, and usually very rare cases.

It's also important to understand that there is no such thing as a **DEFAULT MASTERING CHAIN**. Each song is different, and each song may or may not require different processing tools to get it to sound it's best. Just because you have the tools, doesn't mean you need to use them all the time. Listen to the song, and only apply the processing you personally **HEAR** a need for. And if you're mastering your own song, you have the luxury to go back into your DAW and adjust the problems right at the source in the mixdown, so do that first!

For instance, here's some examples where you can more cleaning adjust the mix, instead of waiting to fix something in the mastering:

- If the song is too bass-heavy, then go back and turn down the bassline and kick, or add some EQ to tame just those parts.
- If it sounds too mono and centered, start panning some instruments until you get a wider sound-stage. Add some chorus or stereo delay to a part to make it seem wider. Be careful to not overdo this, especially if you only listen to it on headphones. Check your mixdown in mono if you can, and also make sure none of your main instruments is pulling the mix too much to one side.
- If the song sounds flat and dull, save a copy of the song, then take off all the effects and EQ you added in your previous mixdown attempt and start over. I'd say 90% of the time this "dull" phenomenon is due to people over using tools they don't understand. Contrary to all the popular magazines and "How To" articles you might read, you don't need compression on every single track, especially for electronic music. Many times you might only need 1 or 2 compressors total in one of your songs, if even that.

The best way to get a rich-sounding song is to not overdo the effects, and to try and get a balanced sounding mixdown without using anything but your volume faders at first. It's also important to realize that this stuff takes lots and lots of practice (and I mean years and years), so even if you do all the above and then some, productions that compete with your favorite producers are just not going to happen overnight.

Have patience. Remember that music is not a race. Keep experimenting at home in your free time, and eventually you'll get the hang of it. You'd never expect to be as good as Jimi Hendrix on the guitar in a week, and good sounding productions are the exact same. Patience!

The point of all this is simple, if you're producing your own songs and no one else is going to work on them, you should focus your efforts on getting it sounding good while working the mixdown. Burn copies of that and live with them for a week while you play it on as many systems as possible. Always strive to get the mixdown sounding good first before you think about the mastering phase. The mixdown should sound exactly how you want your song to sound. There are no magical tools that will make this better in mastering. By far, you have way more options, not to mention more transparent options, when you address any issues you hear while in the mixdown phase.

Here's a guide I wrote about mixdowns that might offer some other tips for you:

<http://innerportalstudio.com/articles/Mixdowns.pdf>

When your mixdown is balanced the way you like, then likely the only thing you're going to notice while listening to your new song everywhere is that it's quieter than you'd like. This is fine when you're testing the mixdown, just turn up the playback device to compensate for now.

DO NOT WORRY ABOUT HOW LOUD THE SONG IS UNTIL YOU ARE COMPLETELY DONE WITH THE MIXDOWN.

Doing so is only distracting you from what's important, and trust me, it's generally so simple to fix you that don't need to worry about it yet. When you're doing your mixdown, make sure that the levels on your master channel in your DAW peak around -6dBFS, just so you have some headroom to avoid clipping. Then just turn up the playback device to compensate and make it louder when you're testing the mix.

Here is another guide I wrote that goes more into digital audio levels and metering, for those that want more info:

<http://innerportalstudio.com/articles/Levels.pdf>

Ok, so you're finally happy with the way your song sounds. You've listened to it for a couple weeks now on multiple systems (yeah, right) and you think it's perfect the way it is. Well, except for the fact that it's just too quiet still, right? At this point, you just need to use a limiter to gently raise the overall volume. The key word here is gently. Far too many songs these days are over-limited purely for the sake of 'apparent' volume, especially dance music. Google "loudness wars" if you really want to read more about it.

There are two approaches for applying this limiting: by using a limiter on the master track in your DAW and then rendering the final mastered file, or by rendering the mixdown and then applying limiting in another application like Triumph, Soundforge, Peak, Wavelab, or even the same DAW you used for writing the track. The results should be the same no matter which you use, so it will mainly come down to your own working preferences. And if you have enough CPU power left to still use a quality limiter in your DAW. If you're going to use another app for mastering, render your mixdown as a 24bit file (you should always use 24bit anyway) and make sure any normalizing or dithering functions are off when you do.



With your best limiter, set the release to Auto if that's an option, and set the main output to -0.3dBFS. Then lower the threshold until the very highest peaks of your song are only being limited by about 3dB's, which you'll see on the gain reduction meter. And I mean only the very highest peaks of the song. The GR meter should just barely flicker up to 3dB ideally.

If your mixdown was well done and balanced, you should be pretty close to the ballpark you need to be in. It'll sound fairly competitive with most music out there, at least in terms of volume. Probably a touch quieter, but that other music is too loud anyway, right? :)

Going beyond this in terms of loudness is where experience really comes to play though. Sometimes you can transparently go more than 3dB of gain reduction when limiting, but you need to have an accurate monitoring chain to be able to recognize when you're truly doing more harm than good. When in doubt, err on the side of caution and use less limiting.

If you do want to experiment and try to push the volume up more, here's two further bits of advice I'd offer:

- Be careful of falling into the trap of thinking you are making things better, just because you can hear the sound changing when you turn a knob or raise a fader. It's very easy for people to change a setting on their dynamics processor (compressor, limiter, etc) and when they hear the sound of song somehow alter in response to that, they think they've instantly made it sound better just because it now sounds different than it previously did. Just because the song got louder somehow, doesn't mean you did it in a way that sounds better. Always try and A/B any changes you make with the song at roughly the same playback volume if you can, as that can often reveal which version really sounds better.
- Don't practice these techniques when you're trying to prepare a new song for release. It's better to take a couple hours one day and experiment on some older mixdowns you have, or maybe even something from a friend. When you're learning this type of thing, you're going to make mistakes that you don't realize initially, everyone does. So don't use a song you're about to release to the world to showcase these mistakes. Instead err on the side of caution like I advocate above, use less limiting and save the learning period for when you know that no one will hear any mistakes you might make. It takes a long time to learn to do this kind of thing well, so take it slow and don't feel you need to rush.



And because many people ask me this every week, the mastering limiters I like to use right now are Fabfilter Pro-L, Voxengo Elephant 3, and PSP Xenon. Which of these I use will depend on the song and what I think it needs, as they all react and sound different.

Ok, so now you've got the overall spectral balance right in your mixdown, and you've sorted the overall volume of the song, what's next? The very last thing to do when finishing your song is to apply dither. Dither is used when converting 24bit (or higher) files to 16bit for CD burning or MP3 conversion. You want to insert the dither plug in AFTER the limiter, it's ALWAYS the very last process you apply.

If your limiting plug in has dithering built in (and most do now), this will be handled correctly for you by the plug in. Most plug-ins license their dithering algorithms from the same third party manufacturers, so you'll often see the same UV22HR, MBIT+, and POW-r dithering options in various plug-ins. UV22Hr and MBIT+ typically don't have any settings for the user to change, while POW-r dithering comes in 3 different varieties. For most people, POW-r2 is probably the version that will work the best over the widest range of musical styles.

Keep in mind that while dithering is an important process that can help the conversion from 24bit to 16bit sound better, it's also one of the least audible processes you can apply to an audio file. So by all means go ahead and apply dither when rendering your master, but don't stress over which version you choose too much.

If you want some audio examples of what dither does, here's some I made:

<http://tarekith.com/assets/ditherexamples.zip>

You can hear how the dithered version trails off more smoothly than the truncated version, albeit at the expense of some added noise. These examples were boosted A LOT to make the effect more audible, normally this stuff is extremely quiet, around -94dBFS or so. It's very subtle, like I said.

So, that's more or less it. Render your song as a 16bit/44.1kHz wav file, burn it to CD or convert to MP3 and you're done! I hope I've made it clear that there's generally no reason to use a complicated mastering chain, or fancy multi-band tools when mastering your own songs. You will achieve FAR, FAR better sounding results if you do as little as possible to your song once the mixdown is done.

Instead focus your efforts on getting everything right in the mixdown first, and treat the mastering phase simply a chance to get the overall volume of the song increased some. It doesn't have to be as complicated as people make it when you're prepping your own material, it's only when people like me (full-time mastering engineers) have to deal with other people's music that it can get complicated and we need to resort to some these tools.

I hoped this helped some of you, though if you still prefer to have someone else master your songs, you can of course contact me at:

<http://innerportalstudio.com>

On a more personal note, if this guide (or any of my other guides) has helped you in your music making, please consider a small \$1 donation via pay pal to the email address below. Even a dollar here and there really helps me and my family out more than you can realize. Thanks, and I hope you find this guide useful.

Peace and beats,

Erik M.

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I'm the owner of Inner Portal Studio a Seattle-based facility with over 15 years experience providing quality mastering and mixdowns of electronic music for producers around the world. I have been writing, releasing, performing and DJing electronic music of all genres for over 20 years. You can find my blog, original music and DJ mixes, as well numerous audio production related tutorials available for free at <http://tarekith.com>.

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