What Is Compression In Music Production? An Audio Compression and Limiting Tutorial

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It's Not So Complicated As It Seems

Audio Compression create a sense of "fear" to people that just start their music production journey. The most familiar questions that people ask are "what is compression, **why** do we need it and **when** should we use it".

Truth is that if someone explains it **with simple words** then everybody will understand its use. And if you understand clearly **what compression does** then it's really easy to use it.

What Compression Is… In Simple Words

Think of a singer in front of his mic singing.

It's impossible for him to sing at a constant level during the whole song, there will be times that he will sing a bit louder and times that will go closer or a bit further from the mic, which is perfectly logical to happen cause no human can sing at the same exact level during the song.

It's also almost the same thing for everything. For example:

The bass player will hit the bass string a bit stronger and the drummer will hit the kick/snare/cymbal a bit stronger comparing to the other hit. **This makes perfect sense cause they are humans.**

Think of a Rock song – or Trance or Rap – imagine this song playing and its volume to constantly change or the singer's voice to be heard **sometimes louder and some times quieter in the same song** …

Wouldn't this be terrible? For this exact reason people have created the compressors!

To reduce volume if it exceeds a particular level of your choice, even if the singer sings louder at some point of the song, or the bassist hits the string noticeably louder or anything…

You can think of compression as a man standing in front of the volume faders/console and reducing the volume only to the louder parts of a song so that we can have a more "constant" volume throughout the whole song.

That's the main role of a compressor… We can also say that:

Compression is the procedure that we compress the audio signal in order to reduce the louder song parts and "match" them with the softer parts and achieve a more "constant" volume throughout the whole song.

Knobs, Controls and Settings

Like we said before, when the volume surpasses a particular volume level then the compressor starts compressing/reducing it in order to match it with the volume of the other parts.

But which is this **particular** volume level we're talking about and how do you configure it?

Well, you are the one that controls **how much** decibels the compressor will reduce, **how fast** it should cut them, **when** the compressor should start working… Everything can be configured by you and we'll see how right now:

- **Threshold** – How loud the signal should be in order for the compressor to start working. If the volume doesn't touch or surpass the Threshold then we will have no compression at all.
- **Ratio** – How much compression we use. For example, if the Compression Ratio is set at 6:1, then from the 60db that surpass the Threshold we keep only the 10db. If we set the ratio at 2:1 we'll only keep 10db out of the 20db that will surpass the threshold and so on…
- **Attack** – How fast – in milliseconds – the compressor "catches the signal" that surpasses the Threshold. 30ms Attack means that it will wait 30 Milliseconds and then it will "catch" the signal and start compressing it.
- **Release** – How fast – in milliseconds – the compressor will release the signal after it compresses it and drop it back out of the Threshold. Most of the times the Auto function works properly.
- **Knee** – It's similar to Attack but *not so important* that's why you may not see it on every compressor. Hard Knee means that our compressor will catch the signal aggressively and Soft Knee means that the compressor will catch it smoother and get "angrier" the further-er it surpasses the Threshold.
- **Make-Up Gain** – When we use compression we reduce the signal so we need to get it back to where it was. If we compress 2db then we need to add 2db back.
- **Gain Reduction (GR)** – This is how much db we reduce – Our main aim. Most of the times I find myself using up to -6db. Use more of this and the audio will sound "squashed" and definitely edited and we don't want the listener to think "something weird is going on here". If the listener that has no knowledge about recording and music production thinks that something is going on then we definitely didn't do a good job.
- **Output** – You can increase or reduce the final volume. But since the compressor's job is not to increase the overall volume it's pretty useless for me. We have *Volume Maximizers* for that (which we will talk about in a different article).

Knee is not so important so you may not find it on every compressor.

Spend time practicing using the Threshold, Ratio and the Attack and the rest settings will be easier to configure.

How Do We Use A Compressor

1. No matter if you use an analog compressor or a VST compressor the setup is almost the same. Open your favorite compressor as an **insert** on the track that needs a compressor (mono, stereo, bus, group)

2. Adjust the Threshold so that the **Peaks (sudden volume changes or "spikes" that need to be reduced)** will surpass the Threshold narrowly. Unless you want to compress instruments that there's no problem if the compressor compresses continuously, for example the bass guitar that can accept a sh*tload of compression cause it needs to be stable throughout the song.

3. Make the **Ratio** and the **Threshold** work together. Ratio is purely configured depending on the sound source but here's some nice starting points:

Bass – 4:1 to 8:1, Drums Group: 2:1, Vocals: 2:1 έως 4;1, Electric Guitars: 2:1 έως 6:1

Please treat the above information as **starting points** don't follow them blindly, take the initiative to experiment cause each sound is different.

4. Adjust the **Attack** and **Release** buttons, following the guidelines that I gave you above.

If your compressor has an **Auto** function on your Release button, then use it cause 80% of the situations it's gonna work right.

Too fast **Attack** will reduce the dynamics and kill the "feeling" of the song.

Let me explain…

If in a specific part of a song the drummer **must** hit the snare **harder only at this spot** – cause the song demands it (it sounds better and make the listener go "whoa!") – then cutting this "attack" of the snare with too much fast compressor attack is not the best thing you can do.

But if you mix sounds with crazy **peaks** (sudden volume changes of the volume level) then you can easily chop of these peaks with really fast attack, even if it's only 1ms or 3ms.

I usually use fast attack on Mono Tracks with Instruments/Vocals with sudden peaks and slow attack on Group Tracks, where the compressor here plays the part of " I glue instruments together" rathen than "I work for a more stable volume between the louder and the quieter parts".

So as I always say… Keep your ears open and hear the changes that you make!

5. Use the **Make-Up Gain** to get the volume level back to where it was. The compressor's role is not to give volume.

But it is to give back the volume that the compressor reduced so that when we bypass the signal we hear the before and after sound with the same volume level.

If you have for example 6db Gain Reduction then you need to add 6db Make-Up Gain.

6. You're ready! Take a break and listen again. Make sure the volume levels between the sound with and without the compression to be the same. Why?

You may have compressed the signal in an awful way but your ears would think that you did a nice job because of the louder volume. Our ears always think that louder is better.

So for this reason, keep the volume the same NO MATTER IF THE COMPRESSOR IS ENABLED OR DISABLED.

THAT'S VALID FOR EVERY TOOL NOT ONLY FOR COMPRESSION .

Limiters VS Compressors

I'll create a different tutorial for Limiters but I would like to explain to you their basic difference with the Compressors.

When the Ratio of the Compressor **exceeds 10:1** (meaning that it aggressively "chops off" the sound and doesn't "forgive" the decibels that surpass the Threshold) then we can say that the Compressor plays the role of a Limiter.

A Limiter is nothing more of a Compressor with a really strict Compression Ratio. Whatever audio signal surpassing the Threshold it gets chopped off aggressively so we must keep an eye on our Gain Reduction.

There's no written rule but you should aim not to exceed 3db Gain Reduction on a Limiter. The Limiter's role is to cut the sudden peaks and not to apply a smooth compression.

Limiters With A… Maximizer Role

Many Limiters, like Fabfilter L in the above photo, can also play the role of a Maximizer. They are **hybrids**.

Normal Limiters have a Threshold. You compress the signal to create stable dynamics and then you can dial back the volume using the Make Up Gain.

The hybrids though work the other way around:

The threshold is locked at 0db. You use the gain knob and give volume to the signal. When you reach and exceed the threshold then you apply limiting.

This way… you also **make the volume louder** plus you apply limiting to the peaks. 2 birds with 1 stone!

These kind of Limiters/Maximizers hybrids are perfect during mastering. You increase the final volume of the

whole song and also cut the remaining peaks that would may bother the listener.

That doesn't mean that we can't use Limiters on **Mono Tracks** though.

If you have a Mono Track with a vocal/instrument that was recorded so bad and no compressor can fix the peaks then you can easily choose a limiter to do the job!

A Second and… "Alternative" Use Of Compression

As we said, the main purpose of a compressor is to match the higher volume levels with the lower ones.

But music and sound is art. So if we can create a new sound or modify the existing sound using the compressor… Why not do it?

Music producers like to experiment and use **lots of Gain Reduction with ultra high ratio (sometimes up to 30:1)** just so that they can "squash" the signal and push the compressors to the maximum.

This "overuse" of the compressor forces it to add a characteristic sound to the audio signal. While the "rules" say **do not over-compress**, sometimes by experimenting you can achieve some wonderful sounds.

What I like to do when I want to experiment – but also want to make sure that I don't destroy the sound by over compressing it – is to duplicate a track of mine and use all the crazy effects that I want on the 2nd track.

Then I blend the 2 signals together by adjusting the volume faders.

The Reason There Are Many Compressors

If you've ever wondered why there are many compressors out there since they do the same job then this is the answer: **Some compressors have their own unique sound**.

Also, some analog compressors don't have every single knob that I showed you above. Companies create them their own way, with only the most important knobs (Ratio, Threshold, Release, Attack).

That's the reason you come across thousands of topics on the internet "discussing" which compressor is better for vocals or guitars or bass…

From time to time you will end up creating your own favorite compressor list, no matter if it's analog or a digital VST.

Conclusion

I hope this tutorial to have answered all your questions about the basics of a compressor! If not please don't hesitate to leave a comment, positive or negative.

I don't know the exact money a teacher or a music school would ask you to give you this kind of information but I hope that this article will make you start practicing and improving yourself.

If you'd like to thank me consider sharing this post below or/and leave a comment, I am happy to see that this tutorial helps people, it motivates me creating more material for you guys.

Happy mixing and happy practicing!

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