



UNDERSTANDING COMPRESSION IN THE HOME MUSIC STUDIO

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Understanding Compression in the Home Music Studio

Properly understanding and using compression in your home recording projects can notably mark the difference between a professional sounding final mix and an amateur sounding one. Understanding what compression is, how it works, and how to use it will most certainly put you in a class above most when it comes to your own home recording projects.

It may also be helpful to note that, regarding compression processors, there are many options in the home music studio environment. You may be using a software compressor in the form of a plug-in or a physical rack mounted unit. In either case the information below is universal and the principles can be applied to any type of compressor, regardless of the interface you are using to process your audio.

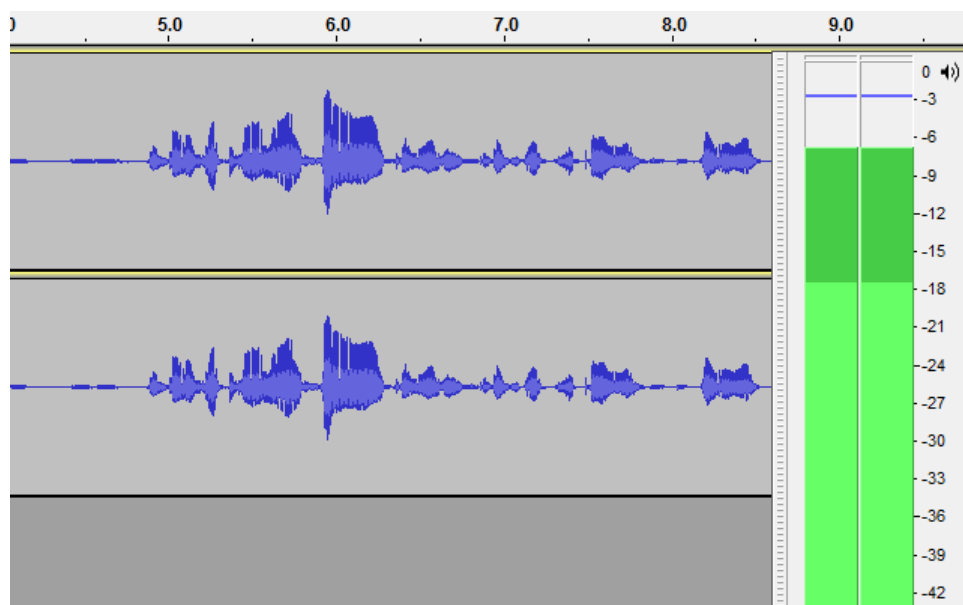
What is audio compression?

Audio compression, as it relates to home recording, is the ability to control the dynamic range of any given audio. This can be on a “per track” basis or for an over all “master mix”. An over simplified understanding of compression is that it will decrease the louder portions of your audio thus giving you the ability to increase the softer portions.

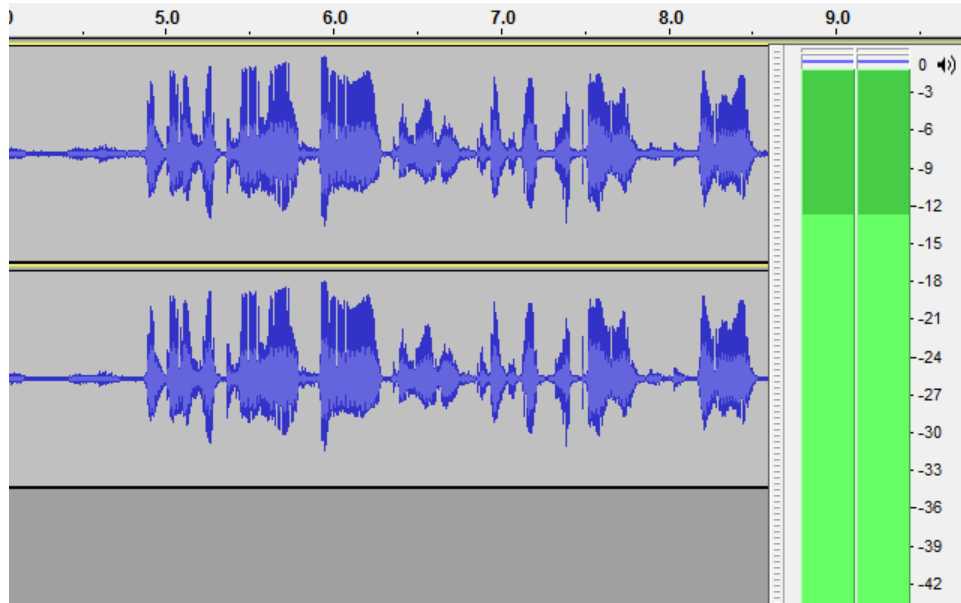
Audio is measured in what is called “decibels” or db. The higher the db the louder the audio volume, the lower the db the lower the audio volume. Compression is taking the high db audio and lowering it's db so the range between the louder and softer audio is lessened.

Below I have included a few images of a .wav file that has been processed with compression. This may help to better understand what compression is. Notice the highs or peaks, and lows of the file. Note how they have changed after compression has been applied.

Uncompressed audio file



Compressed audio file



If you are new to home music studio editing let me explain what these two images are. Each is a screen shot of an audio file imported into a free music editor call [Audacity](#). The blue vertical lines represent the audio at its various db levels. The taller the line the louder the audio with the center being its quietest spot. This is a stereo track so the top set of lines represents the left side and the bottom set represents the right side of the stereo field.

The uncompressed image shows the loud and soft db points of the audio exactly as the track was recorded. After applying compression you can see the softer parts of the audio appear to be louder and the overall peaks or loudest db points of everything are much closer to the quieter spots.

In reality the compression has pushed down the louder db audio in the file and allows the softer db audio to be brought up. This still gives a good dynamic between loud and soft parts of your audio but the dynamic is decreased a bit. To the ear, the second audio file simply sounds louder and much more balanced between the high and low db places within the track.

Using proper compression in the home music studio can make your tracks sound tight and balanced. Some audio will need to be compressed a good amount, while others tracks may not need compressional at all. This is completely dependent on your material. In general instruments like drums, bass and most all percussion will require more compression than say keyboard pad, or vocals.

Learning if, and when to use compression is equally important as learning how to use compression on your tracks. In many ways this takes experience combined with trial and error to get the best results. That said, give yourself some time to learn and you too can develop an ear to hear where a little or a lot of compression would really make all the difference in your home recording project.

This brings me to our next question. Now that you know what compression is you also need to understand how compression works in order to learn how you can benefit most from using it to process your audio.

How does audio compression work?

In the home music studio, compression has long since been a topic that confuses many audio engineers. In reality it does not have to be that confusing at all. Let me attempt to demystify the true tech behind any compressor, be it a rack mount unit or a software plug-in.

Threshold

The first term we need to understand is the word “threshold”. I explained what db means above and the threshold is simply understood as the volume level or db at which the compressor processes the audio itself.

The threshold is a peak value so when your audio is loud enough to go above the threshold you have set, your compression settings will then be applied. Any audio quieter than your threshold level will not be processed at all.

For example, a threshold level of +20 db will not process or compress your audio at all. While a threshold set at -22 db will compress every part of your audio that is louder than -22 db.

Ratio

Next you will see a “ratio” setting on your compressor. If the threshold refers to when compression is applied to your audio, then ratio refers to the amount of compression that is applied.

This is a simple in/out formula. If your ratio is set at 3:1, then for every 3 db of input signal *above the threshold level*, 1 db above the threshold will be allowed to pass through to the output.

Keep in mind that only the audio above the threshold setting is compressed. The higher the ratio the more compression or gain reduction will be applied to the signal above the threshold you've set. The ratio setting above (3:1) would give 2db of gain reduction at the output for any audio that exceeded the threshold level.

Attack

Threshold is when, ratio is how much, and attack is how fast will the compression or gain reduction be applied to your audio. Essentially the attack setting is adjusting the amount of time the compression has to be applied to any signal above the threshold setting. As a general rule, the faster the attack the more noticeable the effect of compression will be. The timing of attack is measured in milliseconds.

Release

You may have already guessed it but the release time is the exact opposite of attack. Release tells the processor at which point to return the compressed audio signal back to its original uncompressed state. This is also a millisecond measurement. Like the attack, faster release times may also be more noticeable than slower release times depending on your audio source.

Output Gain

The output gain is an adjustment that allows you to compensate for the loss of volume or db due to compression. When the input signal is lowered in db by your compressor settings than the output gain can be increased to bring the level back up.

Hard Knee/Soft Knee

Another term you may often see when dealing with compression is hard knee/soft knee. This setting refers to the aggressiveness, or lack there of, when compression is being applied to audio above a set threshold. Hard knee compression is often useful for percussion instruments as they generally have a great deal of natural attack acoustically. At the same time, soft knee can be useful in most vocal tracks as the compression applied will sound more natural.

Note: Some compressors have a setting called “OverEasy” which is a form of hard knee/soft knee technology.

How should I use audio compression in my home music studio?

Compression can be used in a great deal of ways to achieve a more professional home music studio recording. There is certainly a technical side to properly using compression as we've covered above, but it can also be very helpful to understand the relative aspects to processing audio with compression.

How to use compression in your home music studio projects has as much to do with your personal tastes and the style of music you are recording, as it does the technical aspect of using the processor itself. It takes time to experiment with your tracks and mix in order to achieve a desired result. Often there are simply no hard rules to using compressing.

It would be safe to say that many times compression is best applied to the track after it has been recording and not before. Though there are some valid exceptions to this rule, applying compression to a recorded track will allow you the most flexibility in the mixing process.

However, I have often used compression to stop a track from clipping when recording. This can be a great help when tracking a vocal or voice over part. In this case you may need to use an outboard or physical compressor (as opposed to a plug-in). Many Mic pre-amps have compression features build in which works great for this type of application.

You might try setting the ratio at 3:1 with a faster attack/release setting. Then adjusting the threshold until you have about 3-6 db of gain reduction at the loudest points. Using compression in this manner can keep your vocal and voice over tracks from clipping while still maintaining a good dynamic range.

Some other general compression settings to get you started

I have listed a few general recommendations for using compression below to help get you started. Again, please note that there are very few, if any, hard and fast rules for using compression. My suggestions below may prove to be a helpful starting point for your home recording projects but they may not produce the exact effect you desire without your own experimentation.

- **Vocal Tracks**
 - Threshold: Adjust this to get about 3-5 db gain reduction at the loud points.
 - Ratio: 2.5:1
 - Attack: 25ms
 - Release: 300ms
 - Output gain: +6db
- **Acoustic Guitar:**
 - Threshold: Adjust this to get about 4 db gain reduction at the loud points.
 - Ratio: 3:1
 - Attack: 20ms
 - Release: 250ms
 - Output gain: +4db
- **Bass Guitar:**
 - Threshold: Adjust this to get about 6-13 db gain reduction at the loud points.
 - Ratio: 5:1
 - Attack: 20ms
 - Release: 350ms
 - Output gain: +6db
- **Kick Drum:**
 - Threshold: Adjust this to get about 6-10 db gain reduction.
 - Ratio: 5:1
 - Attack: 4ms
 - Release: 150ms
 - Output gain: +10db
- **Snare Drum:**
 - Threshold: Adjust this to get about 6-10 db gain reduction.
 - Ratio: 4:1
 - Attack: 3ms
 - Release: 200ms
 - Output gain: +10db

Conclusion

Compression is a very much needed tool in your home music studio. The best way to learn how to best use compression is to begin hands on, and listen to the difference. Use professionally mixed and mastered audio as a reference point. Find a sound source you like and play with your settings until you are satisfied with the results.

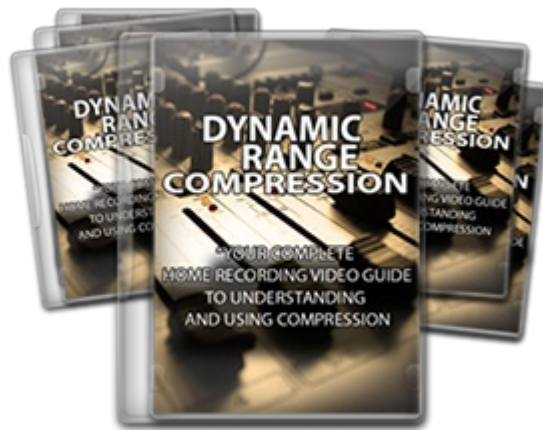
I'm sure you've noticed by now that almost everyone has an opinion of how to use compression. Just remember that your project is just that, yours. I would encourage you not to get frustrated with the wealth of opinions but to experiment with the information you do find most helpful.

My hope is that this short e-book has been enlightening to you on your journey to pro sounding home and project recordings. I welcome your feed back and any questions you may have. Please submit them through my [blog](#).

Learn the professional secrets to using compression.

Compression has always been one area of home and project recording that can easily be confusing. For this reason I have created a complete video guide to understanding and using compression. Learn the secrets of using dynamic range compression to create amazing audio projects.

Dynamic Range Compression: Your complete home recording video guide to understanding and using compression.



I have been working my way through the Dynamic Range Compression videos... they are SUPERB. Excellent, clear explanation of what is going on - it has really opened a door that I have been battling to go through for more than a year now. ... Now I have the confidence to start experimenting and I feel at long last there is some light at the end of the tunnel as far as compression is concerned. Thanks for a great course, worth EVERY penny (dollar)

- Mark



About David

David Maxey is the author and Creator of Home Music Studio 1. He is a musician, live/recording audio engineer, and consultant with more than 14 years experience.

He teaches teams of people and conducts technical, musical and audio training conferences. You can find David and Home Music Studio 1 on [Facebook](#), [Twitter](#), and [Google +](#).