

## Column by Renzo van Riemsdijk (Masterenzo):

### The higher the better

Sample rate and resolution. Not everyone will know these terms but they are in fact important pillars in this current (digital) music age.

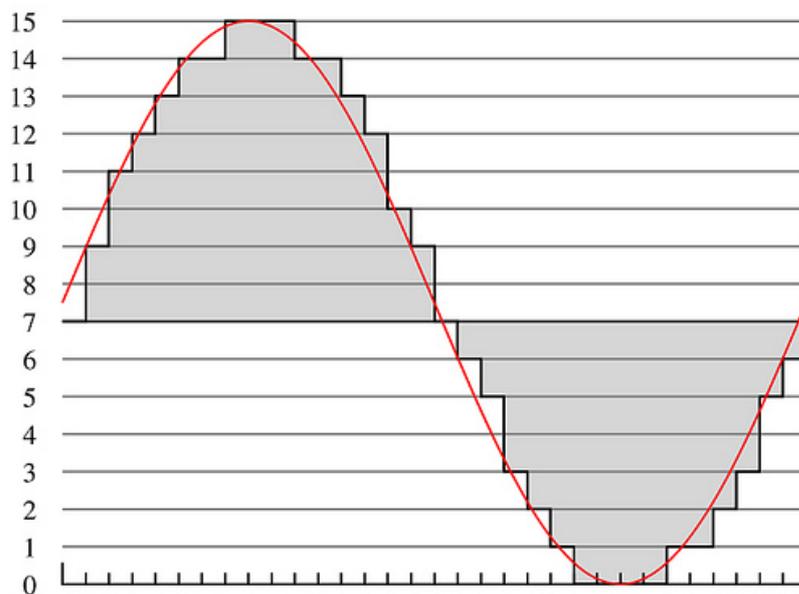
Let me start with the *least important* term: sample rate or sampling frequency.

Long ago, the early eighties of the previous century, the compact disc was invented by Philips and Sony in Holland and Japan. From that moment our music experience would be changed for the better, since: **Digital = Better!** By now we know better. If only we look at the revival of the completely analog vinyl record.

The technique behind this digital medium (and all other digitally produced music) is fairly complex and I won't bother you with Nyquist, digital filtering and aliasing.

No, let's imagine the process of sampling (yes, that's what we call the chopping up of analog waveforms into digital pieces) simply as an A4 sized piece of paper filled with tiny boxes. On the horizontal axis, time, we have 44100 boxes (for CD). The vertical axis displays the level in decibels.

Next we draw a sinus-like shape (see the image). The sinus is drawn over the 44100 boxes. Every time the line passes a box a digital image is made of the signal and here we have the process of sampling.



But why did we choose to take 44100 samples per second?

Well, according to the sampling theory of uncle Harry Nyquist the Nyquist frequency is half the sampling frequency and is therefore also the bandwidth of the audible signal.

Okay, stop! Hold your horses! You were sayin'?

Yes, sampling is a rather intelligent and complex process but in short this is what it comes down to:

**At a sampling frequency of 44100 Hz (Hertz are the units) the theoretically audible frequency range or bandwidth is 22050 Hz.**

Be aware, this is the theory. In practice this frequency is lower due to the artifacts of digital filtering

to prevent aliasing. To prevent aliasing of you readers you may quickly forget the previous sentence. The frequency range of compact disc is roughly 20 to 20 kHz (=20000 Hz).

The audio and studio world never stands still. During the nineties and beyond engineers started experimenting with higher sample rates, even up until 96000 Hz. That's pretty high, especially when we take into account that if we're lucky and blessed with great hearing we're able to hear tones of 20000 Hz.

Roughly there are two camps. The first camp is convinced that higher sample rates (88200, 96000 or even higher) sound better and more natural and then there's camp two: the camp of the lower sample rates (44100 and 48000 Hz). They find these lower frequencies to be sufficient and are convinced that the quality of music is much more than a couple of impressive high numbers.

I tend to place myself into camp two. The sampling frequency is merely supportive to a good piece of music, hitting you into your flesh and bones! There are other (also technical) issues related to sampling that I find equally important.

What these are I will tell you next month.

Happy sampling!

Renzo

*Renzo (Masterenzo) is a Rotterdam based Dutch mastering engineer. He has worked for Gery Mendes (GMB), The Legendary Orchestra Of Love and Phil Bee's Freedom. More info about mastering and about Masterenzo can be found on his [website](#).*