MUSIC TODAY EUROPE
explains

THE FOLLY OF HD AUDIO | PART II

Why the Bit Depth of music is not of interest for the customer!

Recently, there are a lot of big and popular music shops that promote music by using the term "HD Audio" This is to fool customers and to talk them into thinking "HD Audio" grants for a better music quality. This is the second of two articles explaining the folly of HD Audio.

The first article described why "more kHz ≠ Better Music Quality". This second article explains why 24Bit or 32Bit files don't offer a better music quality than 16Bit files (CD quality). We will show that "HD Audio" is a marketing gag to fool those who are not acquainted with the underlying concepts.

BIT DEPTH AND DYNAMIC RANGE

What does "**Bit Depth**" stand for? The Bit Depth of an audio file tells us more about the **Dynamic Range** that can be inscribed into the respective **audio file**. An audio file is an **audio room**: A room that is empty but offers space for an audio signal.

The space between the softest and the loudest part of a particular audio signal is measured in **LU** (Loudness Units) and called "**Dynamic Range"**. There is a ceiling in the audio room that cannot be broken through ("Full Scale" = 0 **LUFS**, Loudness Units relative to Full Scale). This ceiling is high and every attempt to break through it simply cuts and distorts the audio signal.

BIT DEPTH WHILE RECORDING

A sound engineer wants to record a piano player performing a very lively piece of music with soft and loud passages. The level of sound events can be measured in LUFS while rehearsing ("Soundcheck"): The softest sound event played by the piano player is -45 LUFS, whereas the "loudest" sound event is -15 LUFS: The Dynamic Range of the performance is:

45 LUFS - 15 LUFS = 30 LU.

The audio engineer wants to replicate the piano performance as good as possible by the recording. He has to decide which **Bit Depth** to use:

1. Which audio room is big enough and capable of storing an audio event that has a **Dynamic Range** of about 30LU? To play safe let us simply plan to record 40LU.
2. Each audio file has a **Noise Floor** that the audio signal should not slip into in order to avoid a noisy recording. Thus, the audio engineer plans to leave about 34LU of the audio room unused, viz. the **Footroom** (FR).
3. In order to capture an intact audio signal that is neither distorted nor cut by hitting the ceiling, the audio engineer plans to leave a **Headroom** (HR) of about 10LU.

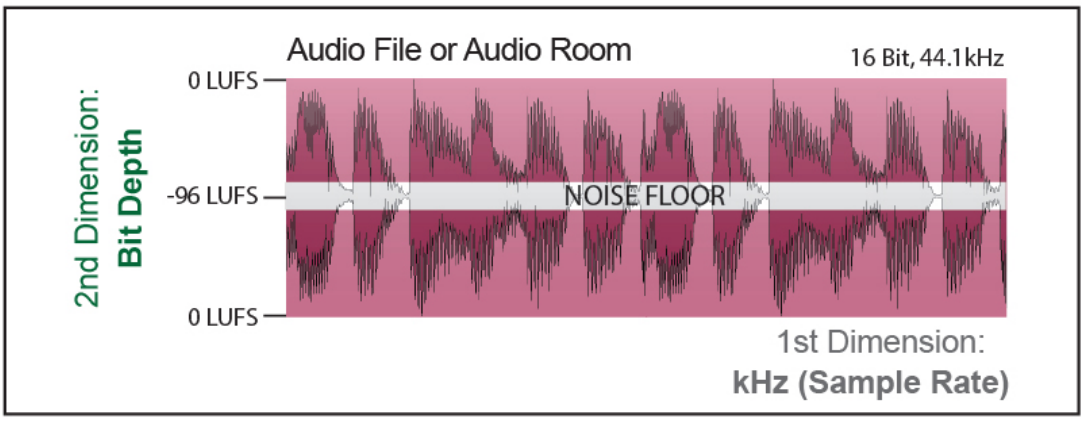
The audio engineer can choose from the following standard options:

	Dynamic	Dynamic - 34FR - 10HR
8 Bit	48LU	048LU - 44LU = 004LU
16 Bit	96LU	096LU - 44LU = 052LU
24 Bit	144LU	144LU - 44LU = 100LU
32 Bit	193LU	193LU - 44LU = 149LU

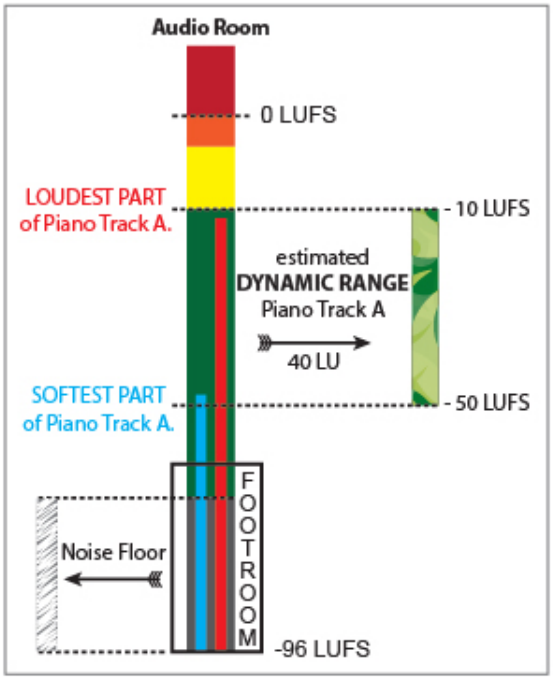
(Dynamic: Dynamic Range that can hypothetically be used. FR: Footroom. HR: Headroom.)

As we can see in the table above, an 8Bit audio file cannot be recommended for the job because it only offers a Dynamic Range of about 4LU. Trying to inscribe 40LU into such a file would result in a noisy, distorted, and gross recording. A 16Bit file offers a secure Dynamic Range of about 52LU and is, therefore, the optimal choice.

If the audio engineer is very insecure about what he is doing, he might tend to use a 24Bit file or a 32Bit file: Because he can simply not go wrong with these options that are able to store a "larger than life" Dynamic Range. 100LU or 149LU respectively should be more than enough to capture a performance that will probably have a Dynamic Range of 30LU (to play safe we said: "40LU"). However, a secure engineer would adjust the mics right and use a 16Bit file to get the piano job done.



Dynamic Space of a 16Bit audio file:



THE NEED OF REDUCTION

After the recording process, the engineer notices that the actual performance had a Dynamic Range of 35LU. The softest parts of the recording sound as brilliant and good as the loudest parts. In cinemas, the engineer could place this unedited recording, for the audience tolerates a Dynamic Range of about 38LU.

However, since music is almost never played back in noise-free environments, a Dynamic Range of 35LU cannot be sold to the customer: Either parts are too soft or parts are suddenly too loud and might damage the customer's ears. Flight entertainment systems, e. g., reduce the Dynamic Range of audio material to 6LU in order to make soft parts audible.

Thus, engineers need to heavily reduce the captured Dynamic Range. In the field of Classical Music the reduction of a given Dynamic Range will be more subtle because engineers are aware of the fact that Dynamic (level alteration) is an important form of musical expression. However, a Dynamic Range of about 3LU to 0LU is not uncommon in modern Electronic (Pop) Music. Insecure engineers tend to craft such productions that aim to extirpate the Dynamic (Range) in total.

WHAT BIT DEPTH ARE WE TO USE FOR THE DISTRIBUTION?

With this new knowlege (modern songs often have a Dynamic Range of 3LU to 0LU) in mind, take a relook at the previously introduced table and decide which audio room is sufficient for accomodating the ready-produced song:

	Dynamic	Dynamic - 34FR - 10HR
8 Bit	48LU	048LU - 44LU = 004LU
16 Bit	96LU	096LU - 44LU = 052LU
24 Bit	144LU	144LU - 44LU = 100LU
32 Bit	193LU	193LU - 44LU = 149LU

Exactly: 8Bit would already be enough for modern music because it can store a Dynamic Range of 4LU without heavy distortion. However, since there is also music with a Dynamic Range > 3LU, we should opt for an audio file that is also able to store larger level alterations.

If we had to decide upon a standard we would opt for 16Bit. 16Bit files cannot just store modern audio material that often has no Dynamic Range at all but also the most dynamic music (Classical Music, a.m.o.).

HD AUDIO SHOPS OPT FOR 24BIT

During the last decades the industry promoted 16Bit as "CD Quality". Most of the music you know is encoded in 16Bit. 16 Bit files offer a big Dynamic Range that no production has ever used and it can store a lively, dynamic and amazing sound. We know you have not thought, lately:

"This Tina Turner song is amazing. If only they would have used 32Bit to enlarge the file size!"

However, a lot of popular streaming portals have started to promote "HD Audio". That means: Audio is not being streamed at 16Bit anymore but at 24Bit or 32Bit. Technically speaking, this is nonsense. The 16Bit standard was not chosen as the lesser evil or as a compromise because no better option existed but was deemed to be optimal! And it is optimal and will always be: Why should we use larger audio rooms for music with a minor Dynamic Range?

The HD Audio Shops sell and stream content at 24Bit or 32Bit. That means:

"We now put music with a Dynamic Range of 2LU into a room that is able to store at least 100LU."

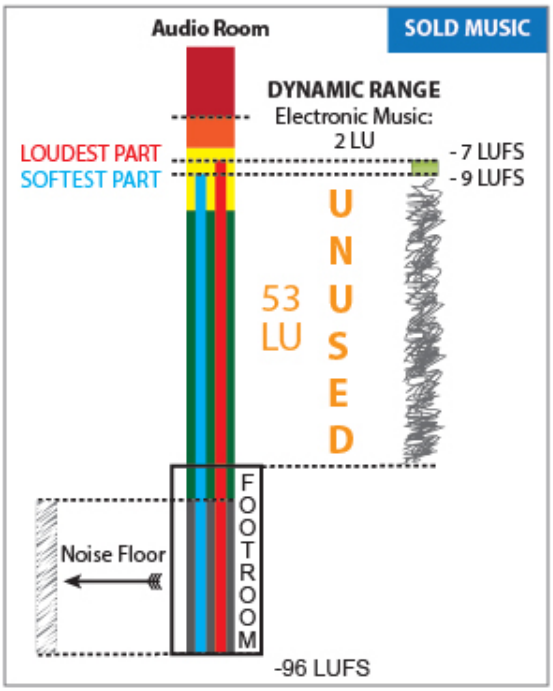
That is not of any interest to you. The responsible technicians just increase the size of every audio file, not the quality.

A song that is produced with a Dynamic Range of 2LU does not suddenly turn into a song with a Dynamic Range of 100LU, just because the song is stored in a 24Bit container. A song with a Dynamic Range of 2LU stays a song with a Dynamic Range of 2LU: No matter whether you save it in a(n) 8Bit, 16Bit, 24Bit, or 32Bit file.

TECHNICAL EVOLUTION IS NOT AN EVOLUTION OF MUSIC.

The quality of music is determined by the composition, the lyrics, the skills of the musicians, the emotions, the recording quality, the mixing and mastering process.

Yes: The producer should use 24Bit while recording to ensure that the whole Dynamic of the recorded real world sound events is captured without any compromise, and without material being cut by exceeding the ceiling of the audio room. But since the real world Dynamic Range will definitely be reduced by the engineer, there is simply no need to distribute 24Bit or 32Bit audio files. 16Bit files already offer a lot more room than any piece of sold music can occupy:



"HD Audio" cannot make a bad composition good; it cannot make a bad drummer good; it can neither fix a bad mix nor fix a bad recording. It does not enlarge the Dynamic Range of an existing song. A switch to 24Bit does actually **NOTHING** for the audience. Bigger numbers in technical specs do not result in better art.

What can "HD Audio" do for you? It can psychologically manipulate you and make you pay a monthly fee for access to music that has a nice technical data sheet that is hardly of any interest for you.

OUR MESSAGE:

At the end of the day: The reason why you like music has nothing to do with the technical specs. When paying monthly fees for listening to music: Pay for services and music that you love. MTE