

## Sound Quality

In today's world general sound quality is far lower than it was 25 years ago not in spite of our digital technology but because of it; in fact we have actually gone backwards. Early digital was dreadful because of the limits of the technology and the expense of doing it properly. Add that to the narrow bandwidth of the internet and we now have the ubiquitous MP3 and generations of people who have been deprived the experience of quality sound.

Knowledge and understanding is not an ever growing bubble of progress, it is in fact like money. It can be gained and lost. Where are the people who built the pyramids and the classic Greek Temples today! My point is that during the development of digital we have either forgotten, or never heard, high quality audio. Despite the fact that we now possess the technology to easily transcend 25 year old analogue technology we don't, vinyl is still the most human!

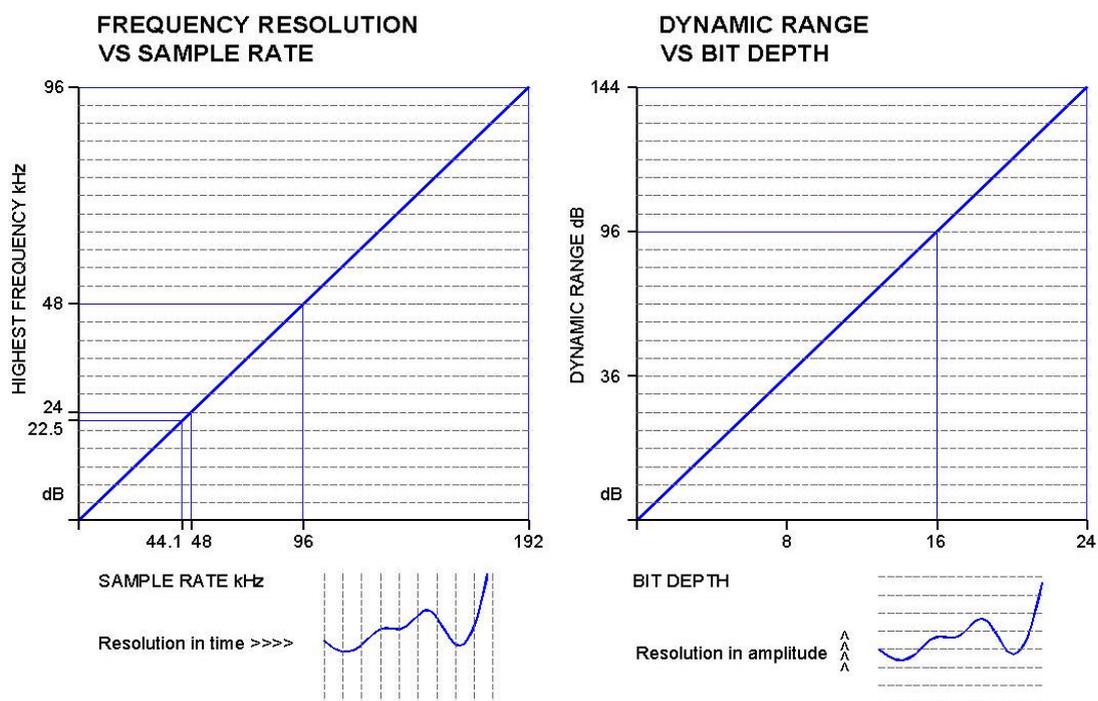
I have spent 40 years working with loudspeakers because when I started in audio they were the limiting factor on the final result. Funktion One now has loudspeakers that in some respects outclass studio monitors even at huge power levels. The limiting factor today is the source material, signal processing chain and the medium it is stored to and transmitted with. MP3s are the final insult in a series of events leading to bad quality source material. Good quality sound is clean, transparent, spectrally (tonally) balanced, free of distortion and has sufficient resolution (quantity of clean information) to produce a stereo sound stage of depth and dimension. To my mind the stability and vividness of the stereo sound stage is the best indicator of good quality program material and reproduction equipment.

Sound quality can be compromised right from the start with bad choice of samples, instrument or vocal. For example, a web download, an 8 bit sample, badly recorded vocal and

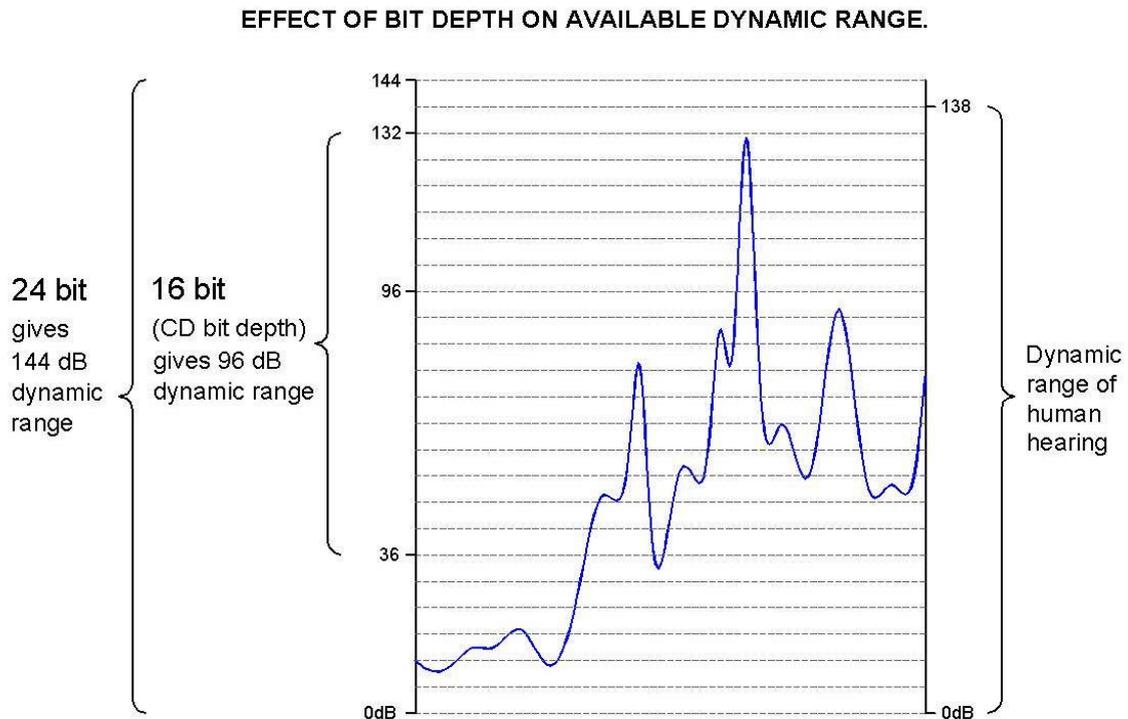
overloaded or clipped sample resulting in distorted or edgy sounds. Some people actually want it to sound this way – I can offer no help with that situation apart from suggesting therapy.

The next place where audio can go wrong is in the mixer and the mixing process. Assuming that any analogue to digital converters being used are of high enough quality, the mixer itself must have full frequency response; low distortion levels and free of any artefacts or spurious audio nonsense of its own. Professional equipment at unity gain (same level output as input) ideally should not degrade the original signal any more than a length of wire would.

Digital audio quality is often described by sample rate and bit depth (44.1kHz 16bit for example) with the assumption that the bigger the number the higher the quality. If only life were that straightforward, there are many other factors determining digital audio quality. However, all things being equal a higher sampling rate will give greater resolution, particularly noticeable at higher frequencies and a greater bit depth will retain more of the low amplitude information such as harmonics and reverb tails which give sounds their richness, depth and uniqueness.



Now we come to the all important digital gain structure. Input gains should be such that as much of the bit depth as possible is utilised without compromising the dynamic headroom.

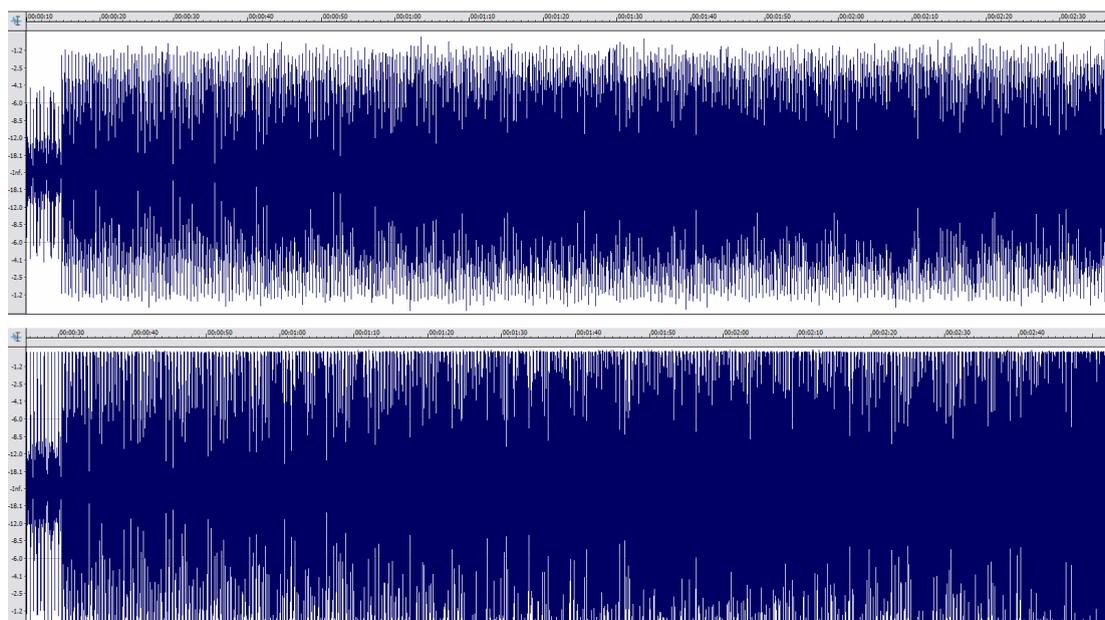


In digital audio the bits are distributed across the input level range of the channel or device (minimum to maximum level). In the case of human hearing it goes from 0dB to the threshold of pain (130-140dB) so the dynamic range of human hearing is 140dB.

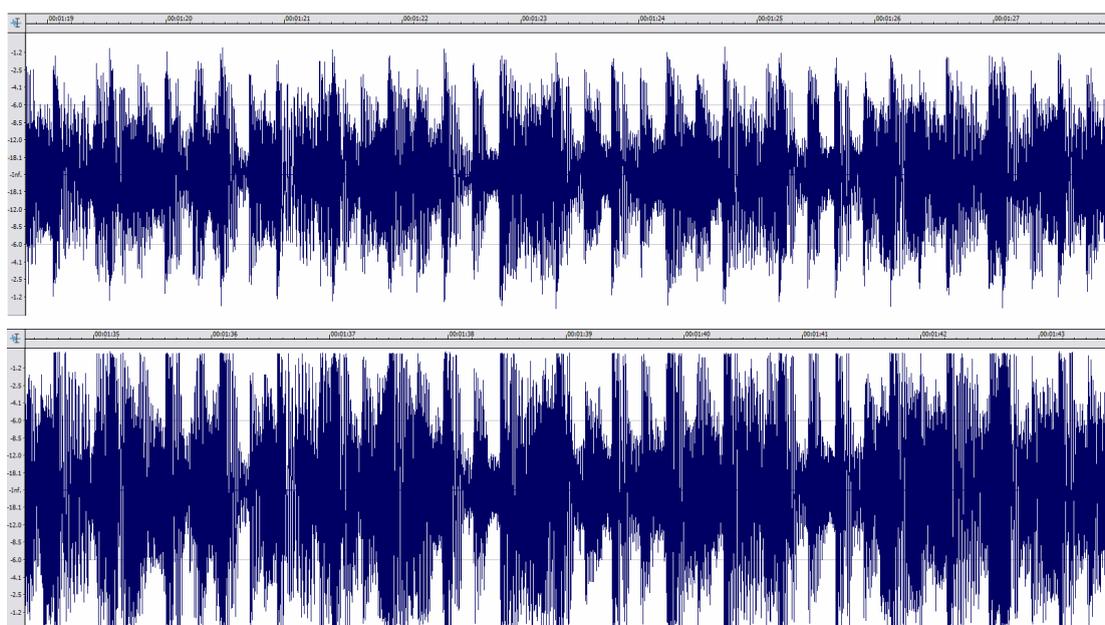
If the input signal is too quiet (rare) the effective bit depth of the signal is reduced so lowering quality, conversely if the input signal is too loud (more common) dynamic range is squashed (no room to breathe) and even worse if it goes over – known as clipping – it produces a most noxious square wave form (poison for the mind). After MP3s this is probably the most common cause of bad sound in today's world, particularly when it comes to the output stage of club mixers most of which do not sound good in the first place. To sum up if you do not use all the level you can without clipping you will lose low level audio information.

Although this is a departure from the recording process I have been describing it is a good moment to mention that myself and thousands of other sound engineers in the world have spent years begging djs to keep their output levels out of the red because once the line drive amps are overloaded or clipped the signal is trashed and there is no retrieving it. In fact the idea of being as loud as possible is primitive and pointless as the sound guy will have limiters and/or compressors to protect his system from unprofessional behaviour anyway.

Returning to the recording process bear in mind that every effect and plug-in used has a cumulative, degenerative effect. Do not go in and out of the analogue and digital domains more than is necessary because every time it happens the signal is going through A to D or D to A converters which are notoriously difficult and expensive to get good. Most of them will degrade sound quality. Less is nearly always more in audio. Preservation of the integrity of the original signal is what should be striven for. So we finally get to the stereo end result which may be nice and clean and of sufficient resolution. Two horrible events may now take place. Firstly, it will be imagined that we are in some kind of, "how much volume can we cram onto this medium" competition.



**Top waveform nice level, bottom waveform silly level**



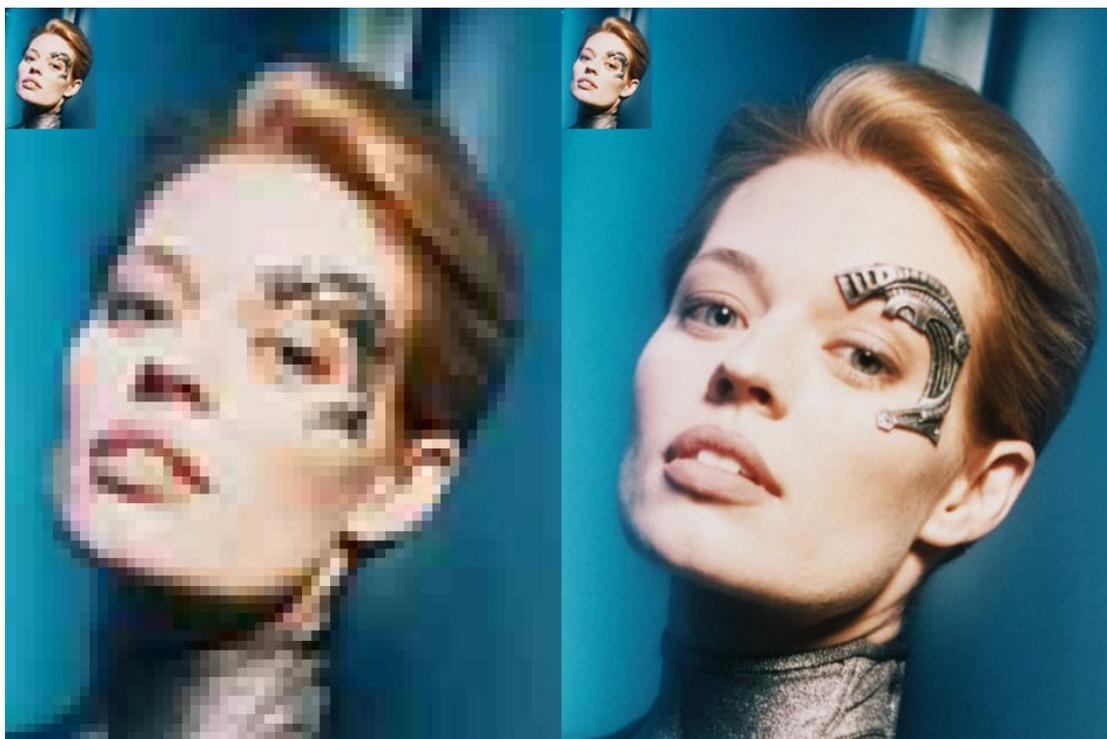
**Same as above but expanded**

It will have the life compressed out of it leaving no dynamic headroom. The final insult will be downgrading to MP3 for the web so people can fill their heads with sonic mush from their iPods.

To put some perspective on the MP3 format, a CD wav file at 16 bit 44.1 KHz is not enough information for true audio and an MP3 is only 10% of that! 24 bit 96 KHz is more like it and could exceed analogue in transmission of detail and information. When I listen to an MP3 version of a CD wav

file I hear bass with missing low frequency extension and also the notes are shortened so the tails are missing which altogether makes it sound weak and insipid. More annoying are the high frequencies which are the opposite of translucent and crystalline, being fizzy and crunchy. I can't stand it. The worst thing of all however, is the loss of space and dimension depriving the listener of involvement, feeling and spiritual motivation. High quality stereo audio generates a 3 dimensional left, centre, right sound stage. I think most people appreciate this. When one is deeply, emotionally involved with quality stereo sound a space of light, colour and energy opens up within and the listener becomes the sound. It is a place where much can be experienced and learned which is why I am banging on about sound quality.

MP3s are just about ok being used with the internet and iPods but they have no business being used in professional situations such as clubs and shows. Just imagine taking a low resolution internet picture and then enlarging it to the size of a house wall. Up close it just looks like a pixelated mess. The same thing happens with audio.



**Representation of quality loss due to compression**