

# Levels, please.

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Continuing with this short series about basic radio engineering, we look at sound levels.

Back in the 1970's in the early days of Independent Local Radio, it was the IBA that set the broadcasting rules. Everything from the weight of the stylus on the record decks to the amount of wow/flutter on tape machines had to be checked to precise standards by a team of engineers.

These days with the advent of processors, compressors and limiters using computerised audio playout systems it would seem these old military style standards have gone. But producing a quality product should always be forefront of any radio station.

Most radio stations use an expensive audio processor such as the Orban Optimod™ at the end of their transmission chain to short out any audio discrepancies and to boost the sound to the maximum permitted levels – often to make the sound “big and rich”. But these expensive items can only polish the original sound signal from the studio.

If the audio from the studio is too loud it can be distorted, and this distortion may be amplified and cause annoyance to the listener. Most analogue op-amps have limited “headroom”. This headroom is the max that a signal can be amplified before it becomes distorted and so setting the correct levels at the mixing desk is as important today as it was in the 1970's.

Any exceptionally loud audio signal like a pneumatic drill can cause distress. And a distorted sound signal can also cause the brain to think there is something wrong and make us feel uncomfortable. A similar type of loud high frequency tone has been used in areas where gangs of youths gather to deter them gathering and make them move away. So if we create an uncomfortable distorted sound, it is likely to drive your listeners away also!

The measurement of sound is the decibel (db). On some audio equipment we may see VU meters. These volume units' meters show the level of the audio signal, and as 0db is our ideal level we should set the gain controls or fader so this level is reached. This should prevent any distortion and offer the ideal listening experience. The problem with VU meters is that they may not show the overall peak of the audio segment, and so most radio stations outside of the USA use PPM – Peak Programme Metering.



Now be careful with PPM as different countries have different adaptations. Most European countries have their PPM's set so 4PPM correlates to 0db. And so when we play a music track, the desk PPM's should peak to 4 on the PPM meter. Microphone channels should be set a little higher. We don't often speak in a constant audio level and so, because of these peaks and troughs, we often set the microphones a little higher and peak to about 5.5/6PPM.

We can also use some equipment that will help us. And some of this equipment is now very cheap to obtain. One of the most important items to have in your "transmission chain" is a compressor/limiter. You can now get a four channel compressor/limiter/gate for as little as £120. So what will it do?

Let's take a look at the limiter. Set at 0db this will clip and loud audio and prevent any loud peaks of audio to shock the listener. Note that it will not prevent distortion; it will only stop the audio peaks so ensure your levels at the desk are set correctly.

The gate or Expander Gate will "turn off" the channel if the audio is low. It is normally used with microphone channels. When you have a number of microphones "open" in a studio, this can cause phasing (a complicated effect when open microphones are picking up sound and it is mixed with the main mic). The gate can be set so if the mic isn't being used, it will automatically mute that microphone. It is not normally used in the transmission chain as any low audio (e.g. a classical piece of music) may be muted accidentally.

The compressor can "smooth" the audio level and in some cases can add gain so boosting some low audio levels whilst compressing louder audio to give an overall smoother sound.



The use of heavy compression can lead to affecting the frequency range of the audio and making the audio sound duller, so use with care.

Once set correctly, it can be left to do its thing and via a distribution amp (DA), the audio can then go on its merry way to the wards, streaming service, logging PC, etc. The most important bit of this article is to ensure your presenters watch their levels at all times. If you start with a great piece of audio, don't destroy it!

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