GUIDE TO GAIN STAGING IN OUR MIX

It is important to use gain staging in order to preserve maximum fidelity on the faders for fine adjustments. A fader is most accurate around 0dB, the further down we pull the fader, the less accuracy we will have for adjustments.

RECORDING

Although this first point isn't part of the mix-down process, it's important to track our vocals at the correct gain going into the channel when recording.

With a mixing desk, this will usually be between -6dB and 0dB. When we put this into a DAW, this RMS value should be between -12 and -16dBFs.

We shouldn't be seeing any peaks higher than -6dBs. If a signal has been recorded 'too hot' there is not a great deal that can be done to rectify it, other than by adjusting the input gain and trying again. Adjusting the channel fader in a DAW will not alter the input gain. It will only alter the playback volume, which will not rectify the issue.

INDIVIDUAL TRACK GAINS

A standard error with mixing is to have all of the individual channel volumes too high. This is easily rectified by setting up our default channel presets at a lower volume, which should help us get into the habit of keeping each track with approximately 12 – 18dBs of headroom. A problem with this however, is that we now won't have unity gain set on all of our faders. (Faders set to zero.) Another way of resolving this issue is to use a utility plugin as an insert, and pull the gain down on this.

By doing this we are keeping the channel fader free for adjustments later on, and also reducing the gain at the start of the signal chain so that we aren't running a hot signal into any plugins that we may decide to use. This also means that individual tracks will sum together to give more head room in the mix busses.

MIX BUSSES

Our strategy is to move from the source, through the signal path, making sure that our gains are set with plenty of headroom at every step of the way. This ensures that we are slowly increasing the gain throughout the process in a controlled manner, rather than just boosting it all at one point and creating a clipped signal later on in the chain.
Here at the mix-bus, we may be summing a number of different parts. Problems often arise with drum busses, where we may have a number of very strong transients sounding at the same time. The sum of these transients will usually cause peaks and clipping, typically on the 2nd and 4th beat of a bar in house music, as this is when the clap, snare, and kick are likely to hit at the same time.

At the mix bus input stage we should still have a decent amount of headroom, by this point in the signal chain our mix should be well balanced and we shouldn't see any crazy fluctuations or peaks on the bus channel.

This is also the place where we would apply bus compression to tame any of these stronger transients, as well as using EQ to make tonal adjustments and notch out any unwanted frequencies, which will aid in creating more headroom. A good figure to work to when leaving the output of the mix bus, is around -3dBs to -6dBs, dependent on our type of audio. And what we intend to do with the mix-down.

At this point its not uncommon for a number of busses to then be summed together yet again to a further summing or pre-master bus. This is where any final adjustments and gain staging can be made. This also means that we have the opportunity to treat all of our separate mix busses separately whilst still giving them one final summing bus treatment to give the mix a cohesive sound.

The output of the Pre-master can once again be around -6 to -3dBs. Many mastering engineers will be grateful for any amount of headroom whatsoever.

Finally we have the master bus. Here is where we can apply our DIY mastering chain, typically consisting of:

• EQ
• Compression
• Stereo treatment/widening
• Limiting

At this point we can use maximizers and limiters to bolster the gain.

This could be anywhere from -6dB of headroom, right up to as loud as -0.01dbs. A fairly standard level is -0.3dBs for .Wav files or -0.5dB if the track is intended for mp3.

We will cover limiting in a later book in this mix series, however just as a quick tip, we recommend not brick wall limiting. (Smashing the input gain into a limiter to get an increase in volume at the expense of dynamic range)

Applying more than around 4dB of gain reduction on a final limiter is usually a sign of a poor mix-down, which can easily be rectified by going through the mix and checking the balance, gain staging and peaks of all the parts at each of the stages listed above and fine-tuning.

We can find the instruments which are causing the limiter to kick in and treat these elements at source as we feel appropriate, then we will find that when we go back to the limiter, we should now only need to push the limiter by 1 or 2 dBs in order to increase the RMS level of our track to a decent perceived loudness.

If we do this correctly, we won't be squashing as much dynamic range out of our track at the final stage. Remember to remove this DIY mastering chain if we are sending the mix to a professional mastering engineer.

Do not confuse gain reduction with input gain on a limiter. Due to the use of software, some engineers may allow plenty of headroom within the constituent parts of their mix. If the mixing has been done well then there shouldn't be too much fluctuation in level caused by rogue transients. This will mean that the mix engineer may have to use a lot of input gain before any gain reduction starts to show on the limiter. This is absolutely fine, and likewise only using a small amount of input gain on the limiter would also be fine if that is it all that is required to see a small amount of gain reduction. The important thing to be monitoring here is the consistency and amount of gain reduction, not necessarily the input gain.

GAIN STAGING SUMMARY & KEY POINTS

- Gain staging is the process of ensuring the levels are set correctly at all stages of the signal flow within our mix

- Levels should not exceed 0 dBFS within our DAW In analogue circuitry, pushing input signals above 0dB can add nice colour and compression to a sound As tracks are mixed, they will cumulatively sum together to use up headroom

- Headroom is defined by the dynamic range

- Bit-depth is directly related to dynamic range

- Mastering engineers expect between -6 and -3dB of headroom to work with at the mastering stage

- We can use compressors to stop signals clipping at the recording stage

- Recording into a mixing desk should be done at the optimum signal to noise ratio, usually between 0 to -6 dBu

- Recording into DAW's should be done at an RMS value of approximately -12 to -16 dBFS (This equates to +4dBu or 0VU, however this should not be taken for gospel because the dynamic range and RMS of a vocal is likely to be very different compared to that of an overdriven bass guitar)

- Use utility plugins to alter gain instead of using automation on channel faders

- At various stages in the mix process we may wish to set our faders to unity gain

- Signals should not only be below 0dBFS on a track by track basis, but also on the inputs and outputs of each device in a chain as well

- When a track is mastered, its normal for it to have between -0.01 to -0.5dB of headroom for printing to CD or .mp3