

# Rules for Proper Gain Structure

## *Rule #1*

Bring up your signal to line level as early as possible in the audio chain. This is the job of preamps or mixer trim/gain knobs.

## *Rule #4*

Keep faders and knobs at Unity Gain as often as possible. Designated as a “0”, a “U” on certain mixing boards or at the 12 o’ clock position. If you’re not sure read your user manuals.

## *Rule #7*

Master faders should be higher than channel faders for correct gain structure. Use your mixer preamps to set levels. If you must use the faders, only lower them never raise them above Unity Gain.

## *Rule #10*

As always, use your ears. Don’t rely on metering alone when making engineering decisions. If you or your client thinks it sounds good, it does.

## *Rule #2*

The more expensive a piece of gear is, typically the more headroom and the quieter (lower noise floor) it is.

## *Rule #5*

If you have to boost or attenuate gain, do so with the earlier component.

## *Rule #8*

Noise reduction software should only be used as a crutch. Don’t wait to “fix it in the mix” or “fix it in the mastering” if you can avoid it. Laziness leads to lower quality.

## *Rule #11*

Rules are meant to be broken. Sometimes you may want to have clipping, distortion, saturation, or noise as a creative effect!

## *Rule #3*

Every component adds noise. Microphones, preamps, equalizers, compressors, A/D converters, etc.

## *Rule #6*

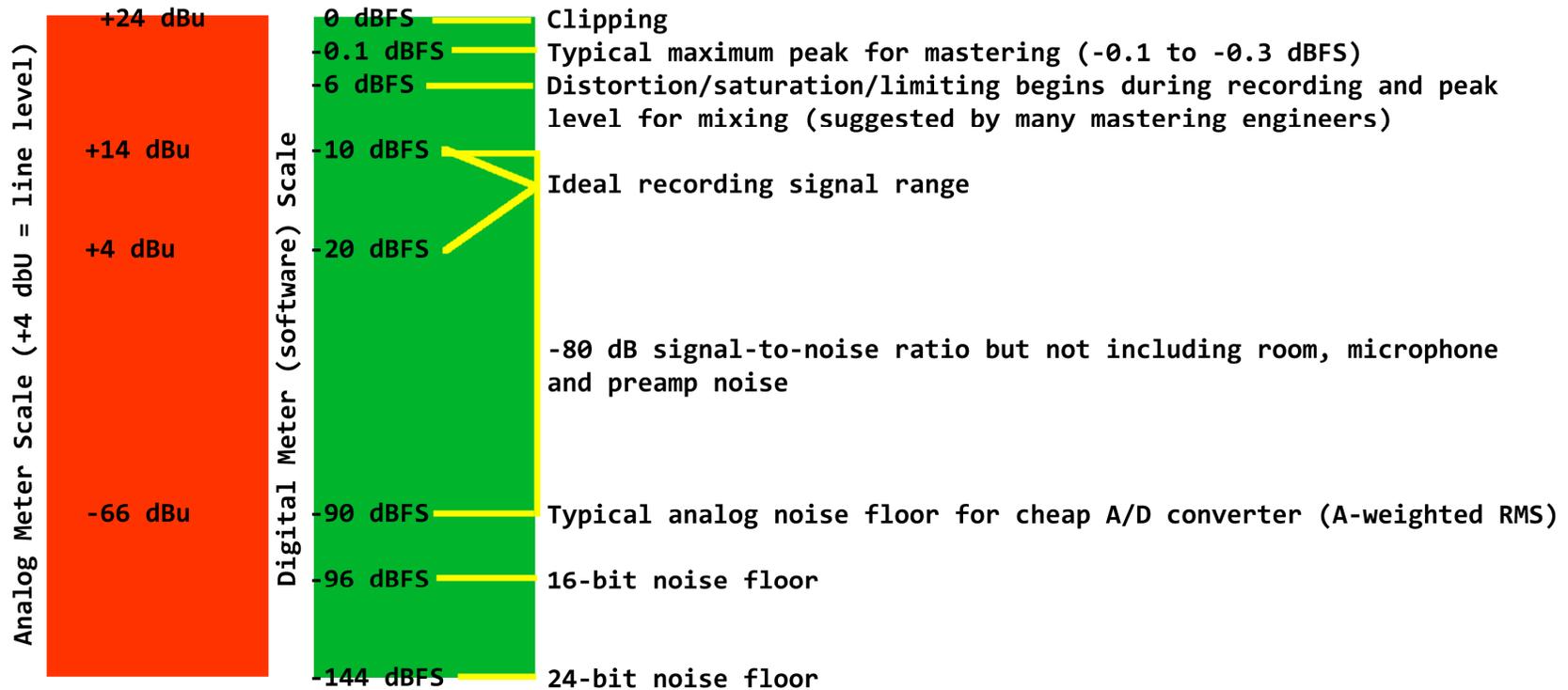
Gain staging is still important when mixing in the box with floating point processing. This is because plug-ins modeled on analog hardware expect nominal signal levels.

## *Rule #9*

Once you start processing a signal, be it compression, equalization or any number of things, adjust for changes in output level. Example: Compression lowers signal level (that’s why it’s called gain reduction) so raise it and boosting EQ requires a reduction in output level.

Conclusion: If you’re aiming for professional recordings and mixes gain staging properly is essential. It minimizes noise and unwanted audio distortion. Recording/mixing at well below max level (-10 dBFS to -20 dBFS) allows for louder and cleaner masters. After all, the end product is what matters most. The old axiom of “use up all the bits” no longer applies in the age of 24-bit recordings and gear with lower noise floors.

# Minimizing Distortion and Noise for an Optimal Signal



\*Not to scale