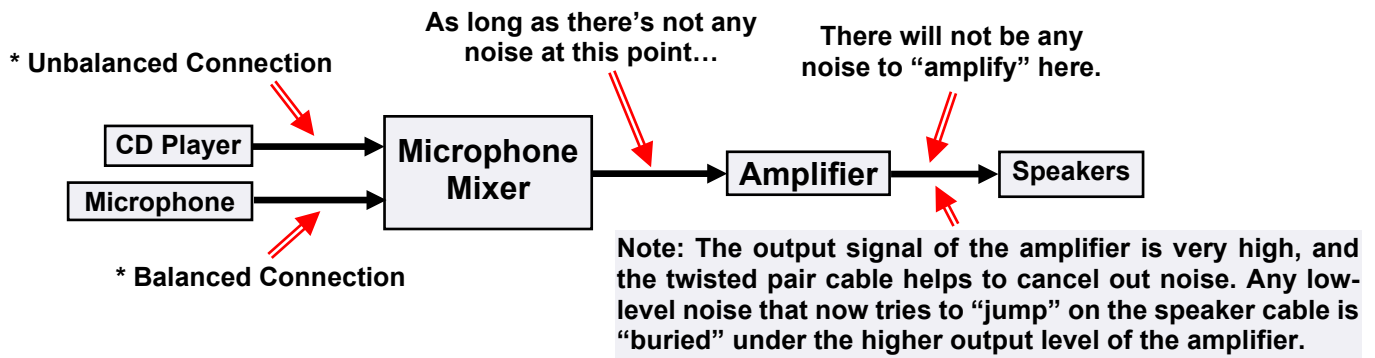


# Noise / Interference / Gain Structure – A Basic Understanding



## Gain Structure – What you should know!

Gain structure is the process used to Optimize an audio system where the levels can be adjusted in multiple stages of inputs and outputs. Setting the gain at each signal amplification stage to achieve minimal noise and distortion will provide your audio system with the best signal-to-noise ratio and dynamic range possible.

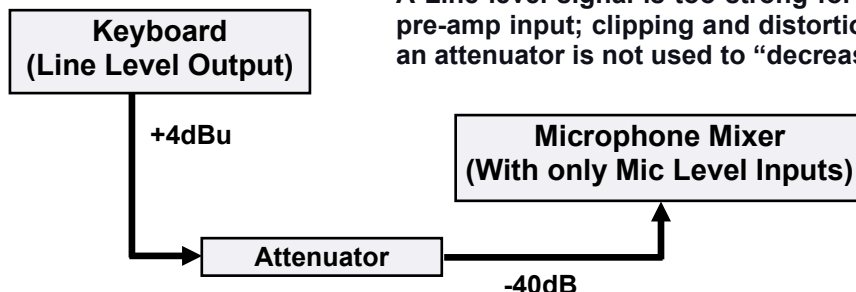
### Gain Structure / Audio Notes / Tips:

- Poor gain structure can cause noise to occur – even in the most expensive audio equipment.
- Over-driving can produce Distortion / Clipping. Under-driving can produce unwanted noise.
- Clip lights can flash occasionally – this shows you are utilizing a wide dynamic range.
- Clip lights should not stay in the red for a consistent period of time – Solid Red means Stop!
- When setting up the PA system, start with setting the Mixer and Signal Processors to get their optimum signal level (which would be "Meter Zero" on the Mixing board). Then, adjust the amplifiers input sensitivity control last.
- Absolute Levels – Are calculated "exactly" by a meter and / or analyzer.
- Relative Levels – Are where it sounds right by feel, and subjective to each listener. We all do not hear sound the same – what sounds great to the listeners, may not sound good to you.
- Human Ears – Are not calibrated, not consistent, there are threshold shifts, there are times where you may not perceive level changes unless you are viewing a meter.
- Keep the number of Open Mics to a minimum. Mute microphones when not in use.

Setting up the gain structure of a sound system should be accomplished by a trained audio technician that thoroughly understands the process (which means an audio technician with lots of sound system experience). Gain structure is only mentioned here to ensure the reader understands there is more to setting up a sound system than just hooking the speakers to the amplifiers and turning the system on. There is a process, and it takes a trained "ear" and the right equipment to make a sound system as efficient as possible.

## Attenuators

These are devices that "decrease" (attenuate) signal strength. Example: Let's say you have a microphone mixer (with only mic-level inputs) and want to connect a line-level device to it. An attenuator can decrease the line level signal and "convert" it to a microphone signal level.



A Line level signal is too strong for a microphone pre-amp input; clipping and distortion will occur if an attenuator is not used to "decrease" the signal.

[Video Clip!](#)



Whirlwind  
#IMP PAD

Whirlwind IMP PAD Attenuator  
Available in -10dB, -20dB,  
-30dB, and -40dB versions.