



Minimizing noise when using VSX 26/48

Maximizing gain structure in a Sound Reinforcement system is a very important to maximize headroom, which keeps distortion at minimum acceptable levels, while keeping the noise floor at it's minimum. There is always a compromise/trade off to be considered. You can make a system to have less hiss and noise but you will have less headroom and therefore will be more likely to run out of headroom. On the other hand you can have lots of headroom but end up with a system that has more background noise and hiss. It's up to the user. Traditionally rock shows/pop music can stand quite a lot of noise in the system as the show itself is quite loud. Also the ambient conditions are so loud from general room noise, chairs moving, people dancing and shouting , bar fights, etc ... system noise just gets lost. Just the opposite would be the case considering a pastor in a church with a single lapel mic. Making your compromise depends on the application.

For "rock shows" Peavey has often suggested running amplifiers with their gain controls wide open. Because Peavey amps have DDT to protect the amps and speakers this is most often a very good compromise. It gives the operator much more latitude in setting up a mix because now the mixer and inline gear will have much more headroom. It does come at the expense of higher background hiss and noise.

It should be noted that it is in no way necessary to have the controls all the way open to get full power output (in Watts) from power amplifiers. Is just a matter of how hard you push from the other end. Even large power amps need only +6 or +8 to drive them to full and most modern mixers can output +18 to +24. If you never drive you mixer to it's full output you are wasting 10 to 16 dB of headroom. This does assume that you are operating your mixer correctly and have not clipped the board prior to the output. Turning down the input attenuators by 10 to 16 dB would reduce the background noise by an equal amount. It does however reduce the "fudge factor" of bad mixing technique by the same 10 to 16 dB. There's no free lunch.

Using a VSX 26 to directly drive the inputs to a power amp requires special consideration. This is because typical amplifiers provide 30 dB or more gain to the post processed signal. All Peavey amps are "constant gain" and provide 32 dB of gain regardless of maximum power output in Watts.

Amplifier gain amplifies both the signal and quantization noise produced by the VSX 26. Attenuating the signal via the VSX's output controls only corrects the signal portion of the noise. To obtain the best case signal to noise ratio, two things must be done. The VSX's channel output should be at 0.0 dB (the default setting) and the signal applied to the amplifier must be attenuated so that the full-scale output of the VSX matches the full scale output of the amplifier.

The formula is:

$$\text{AMPLIFIER ATTENUATION(db)} = \text{AMPLIFIER SENSITIVITY(dbu)} - 24(\text{dbu})$$

Examples:

Amp sensitivity	Vrms	dBv	dBu	Input attenuation	dB best	dB Rock
	1	0	2.21		-22	-15
	1.22	1.7	3.94		-20	-12
	1.5	3.5	5.74		-18	-10
	2	6	8.23		-16	-7
CS3000					-16	-8
CS4000					-16	-8
CS4080Hz					-14	-6
PV900					-23	-15
PV1500					-21	-15
PV2600					-18	-10
PV3800					-16	-8

Choosing a gain structure often involves making a compromise between best signal to noise ratio and reasonable working range to avoid distortion. It would be reasonable to subtract 6 - 10 dB of input attenuation from the above figures for a Rock show where S/N ratio is seldom a problem while using the above supplied numbers if the system were used in a house of worship.

It is important to remember when using the factory presets for Peavey speakers that **all amplifiers be set to the same gain**. It is probably best in most cases to select the proper drive for the subwoofer amp and adjust the other amps to match it. *Once an attenuation amount is decided upon ... apply it to all the amplifiers in the system.*