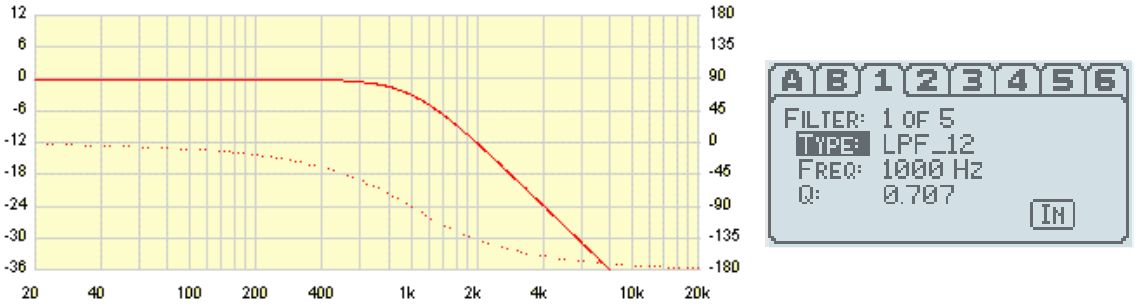
VSX™ Loudspeaker Management Systems

VSX Output Filters

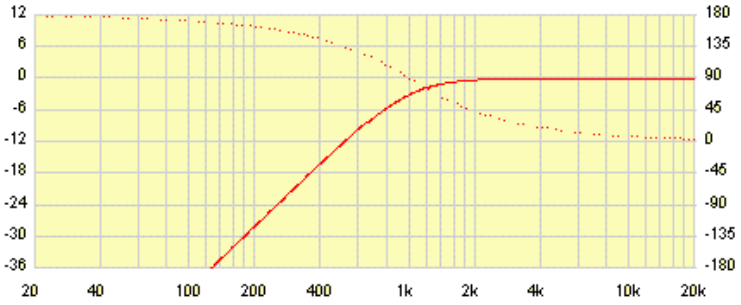


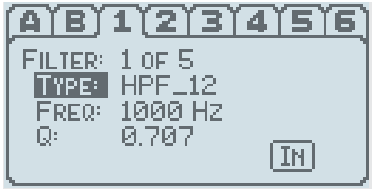
VSX Output Filters

The following is an overview of the filter types in the output of the VSX processors Each filter can be independently configured for one of twelve different filter types using the drop-down box. The Level and Frequency controls are available as parameters for all filter types. The third control may be available depending upon the filter type and may be defined as Bandwidth (in octaves) or Q. Each filter type is shown below with a sample plot displaying the indicated control settings:

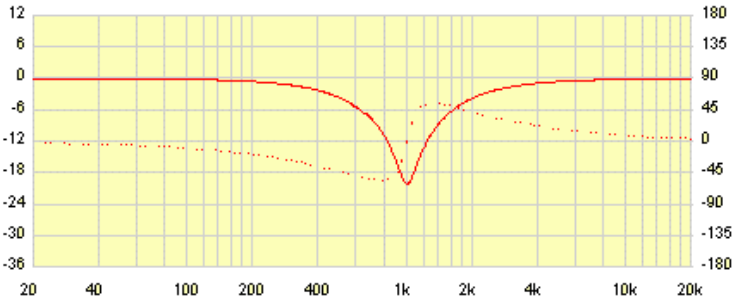


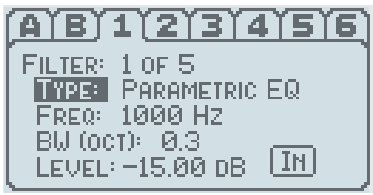
LP_12 - 12 dB/oct Low Pass filter. The phase is shown as a dotted line (scaled on the right).



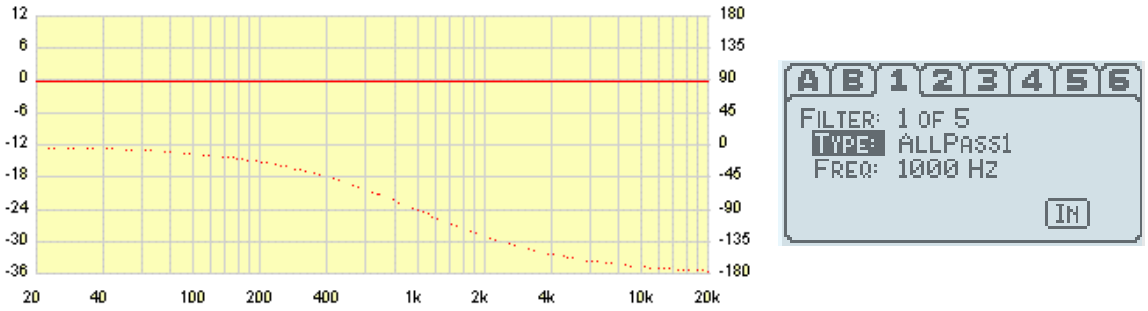


HP_12 - 12 dB/oct High Pass filter. The phase is shown as a dotted line (scaled on the right).

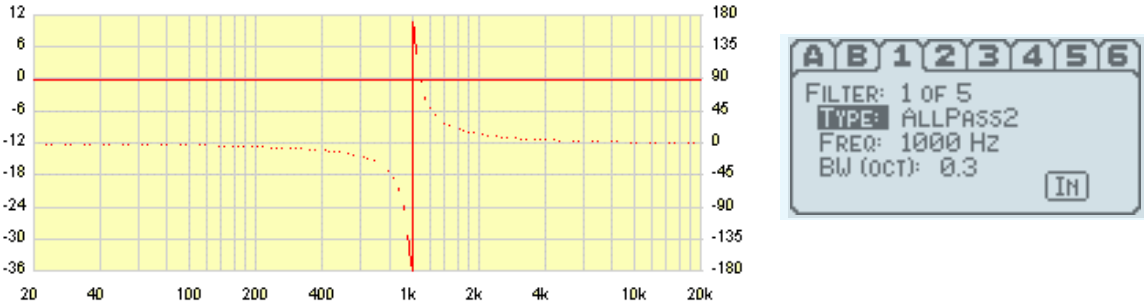




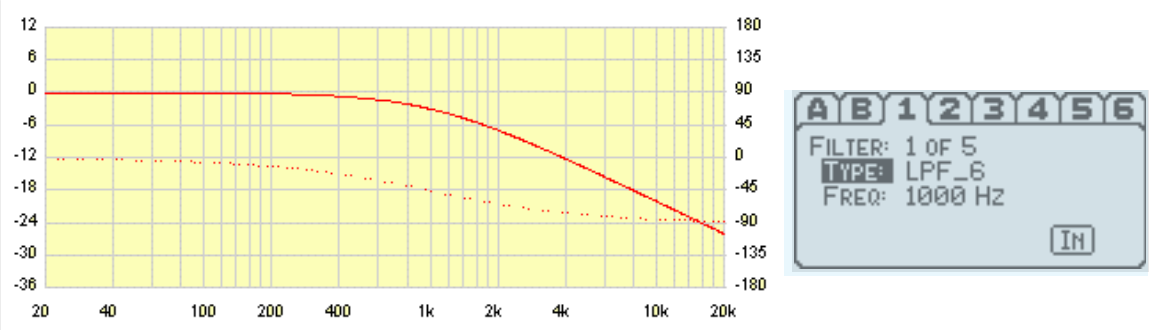
PEQ – Fully Parametric Equalizer. The phase is shown as a dotted line (scaled on the right).



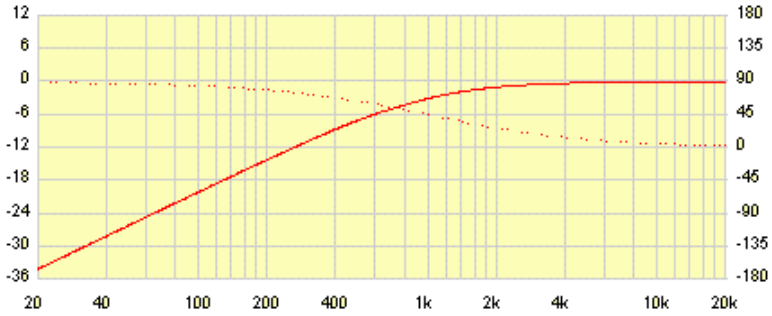
A-P 1 – 1st Order All Pass. Frequency Response is unaffected but the phase shifts by -180 degrees (dotted line). Note that the phase shift is –90 degrees at the corner frequency setting. In this case it is 1000 Hz.



A-P 2 – 2nd Order All Pass. Frequency Response is unaffected but the phase shifts by -360 degrees (dotted line). Note that the phase shift is 180 degrees at the corner frequency setting. In this case it is 1000 Hz.

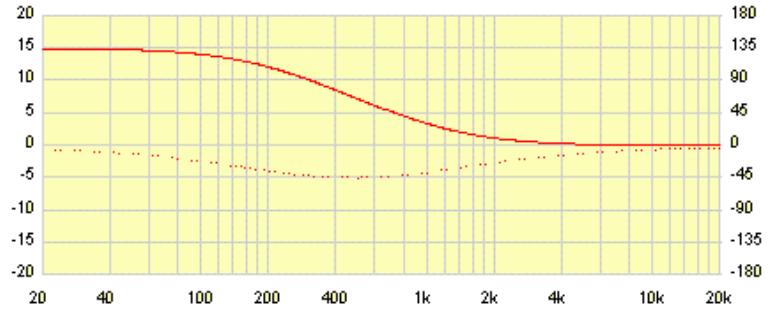


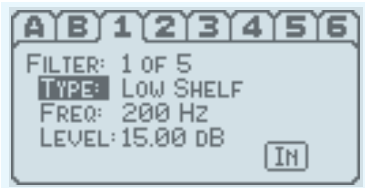
LP_6 – 1st Order Low Pass Filter. The phase is shown as a dotted line (scaled on the right).



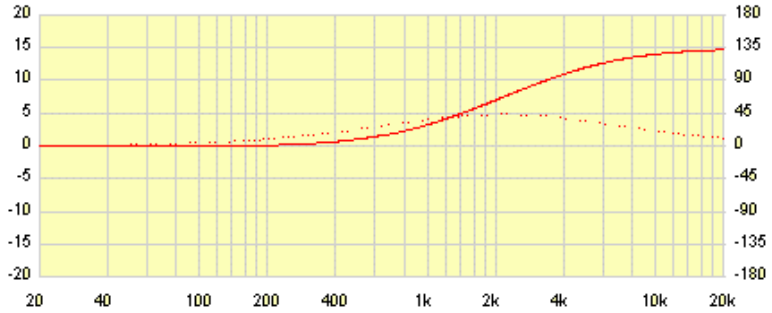


HP_6 – 1st Order High Pass Filter. The phase is shown as a dotted line (scaled on the right).



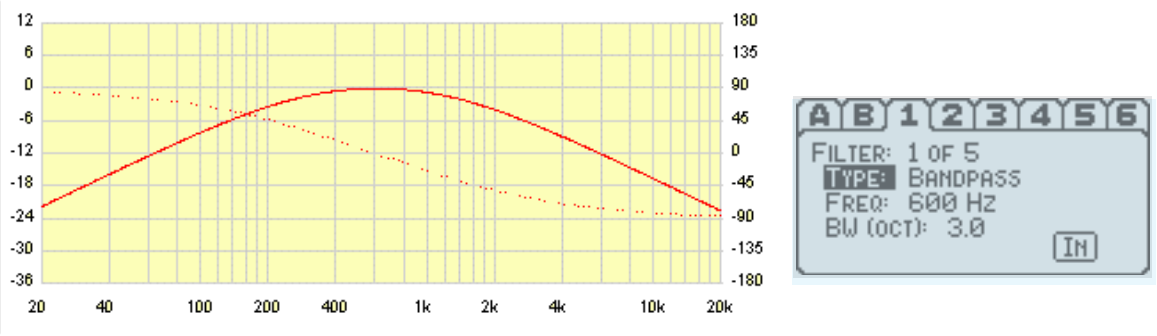


L_SHF – Low Shelving EQ. The phase is shown as a dotted line (scaled on the right).

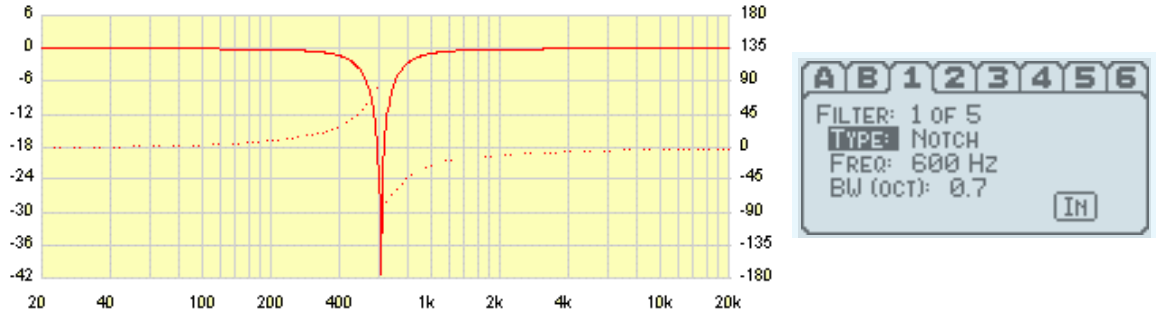




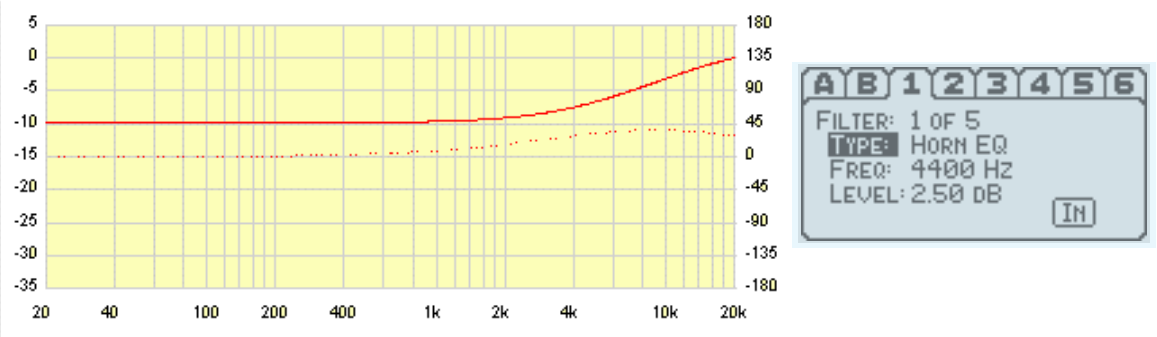
H_SHF – High Shelving EQ. The phase is shown as a dotted line (scaled on the right).



B-P – Band Pass Filter. The phase is shown as a dotted line (scaled on the right).



B-S – Notch Filter. The phase is shown as a dotted line (scaled on the right).



HORN – EQ for CD Horn. The phase is shown as a dotted line (scaled on the right).

			Comments
	Audio Channels	3 inputs/6 outputs -VSX 26 5 inputs/8 outputs-VSX 48	RTA Mic input can be summed with Line inputs.
	LED Metering	2 inputs/6 outputs-VSX 26 4 inputs/ 8 outputs-VSX 48	LED STATUS: Red = -0.5 dBFS and higher (Clip) Red & Green = -4 to -0.5 dBFS Green = -4 to -40 dBFS Off = below -40 dBFS
	Mute Function	Front panel switch and LED for each input and output	LED STATUS: Red = Muted Off = On
ANALOG INPUTS	Input Trim Range	-6 to +6 dB	Software controlled
	Line Sens Settings	+24 dBu or -10 dBV	Software selectable
	Line Input Impedance	4.4k k ohms	Electronically balanced
	Line Max In	24 dB	
	Line Input CMRR	55 dB	
	Line Input Crosstalk	-90 dB	20 Hz to 20 kHz
	Line Input Dynamic Range	110 dB	A-weighted, 150 ohm input termination
	RTA Mic Gain Range	+20 to +60 dB	Approximately 1/2 dB steps
	RTA Max In	+2 dBu (.98Vrms)	Gain = 60 dB, 22K BW
	RTA Input Impedance	2.2 k ohm	Electronically balanced
	RTA Input CMRR	55 dB	
	RTA Input EIN	-123 dB	A-weighted, 150 ohm input termination
	RTA Phantom Power	+48 volts	Software controlled
	AES Input	On XLR 1	Software selectable between left channel analog line input
OUTPUTS	Output Full Scale	+24 dBu	Balanced
	Output Impedance	150 ohms	Electronically balanced
	Minimum Load Impedance	600 ohms	Maximum output @ 600 ohms = 22.5 dBu
	Dynamic Range	105 dB	A-weighted
ANALOG INPUT-TO-OUTPUT	Total Harmonic Distortion (+ Noise)	0.007 %	20 Hz to 20 kHz, 22 kHz BW filter, +4 dBu signal with 20 dB headroom
	Frequency Response	20 Hz to 20 kHz	± 0.5 dBr referenced at 1 kHz
	Dynamic Range	105 dB	A-weighted, 150 ohm input termination
	Latency	‹ 1 mS	Propagation delay from input to output

DIGITAL	Sample Rate	48 kHz	QUANTIZATION 24-bit 256 x-over-sampled Delta-Sigma AD, DA
	Digital Processing	~100 32 bit MIPS	Uses Analog Devices BLACKFIN processors, 40-bit accumulators
	DSP Cycle Speed	500 MHz	
CONTROL/MEMORY	USB	2.0 PC, Memory Stick, PDA Connection	
GENERAL	Dimensions	19" (48.26 cm) W 12.25" (31.12 cm) D 3.5" (8.89 cm) H	without connectors
	Net Weight	11.6 lbs. (5.26 kg)	
	AC Power Input Voltage	100 ~ 240 VAC	47 ~ 63 Hz Universal Power Supply
	Power Consumption	14 watts @120 V	163 mA
	Power Dissipation	TBD BTU (TBD kcal)	@ 100 V
	Agency Compliance Listings	UL, CUL, CE, FCC part 15, Class B	Pending

1. All specifications are typical for any channel(s). 2. All measurements are made in the digital domain. 3. All specifications are for an AC line input of 120 volts RMS. 4. All input measurements are made using a 40 ohm balanced source impedance at +24 dBu full scale. 5. All measurements are made with gain/attenuation set for unity.

Features and specifications subject to change without notice.

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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:

AMPLIFIER ATTENUATION(db) = AMPLIFIER SENSITIVITY(dbu) - 24(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.*

Project/Preset

VSX 26

XOVER		filter	dB/oct	freq		dB		filter	dB/oct	freq
Xover 1	LP				Level		HP			
Xover 2	LP				Level		HP			
Xover 3	LP				Level		HP			
Xover 4	LP				Level		HP			
Xover 5	LP				Level		HP			
Xover 6	LP				Level		HP			

Graphic input

A input	40Hz		50Hz		63Hz		80Hz		100Hz		125Hz	
	160Hz		200Hz		250Hz		315Hz		400Hz		500Hz	
	630Hz		800Hz		1kHz		1.25K		1.6k		2k	
	2.5k		3.15k		4k		5k		6.3k		8k	
	10k		12.5k		16k							
B input	40Hz		50Hz		63Hz		80Hz		100Hz		125Hz	
	160Hz		200Hz		250Hz		315Hz		400Hz		500Hz	
	630Hz		800Hz		1kHz		1.25K		1.6k		2k	
	2.5k		3.15k		4k		5k		6.3k		8k	
	10k		12.5k		16k							

OutputEQ		**1**	**2**	**3**	**4**	**5**	**6**		**1**	**2**	**3**	**4**	**5**	**6**
1	Freq							**4** Freq						
	BW							BW						
	Gain							Gain						
	type							type						
2	Freq							**5** Freq						
	BW							BW						
	Gain							Gain						
	type							type						
3	Freq							**6** Freq						
	BW							BW						
	Gain							Gain						
	type							type						

DELAY	**A**	**B**	**1**	**2**	**3**	**4**	**5**	**6**
Norm/Rev								
Time (ms)								

Dynamics	**A**	**B**	**1**	**2**	**3**	**4**	**5**	**6**
Thresh								
Ratio								
Attack								
Release								
Gain								