

Amp Note 011

Calibrating the Limiters on the DNA SC48 with an amplifier attached

When using the Danley provided presets for the Danley loudspeakers, the limiters in the DNA SC48 are set to provide 0dBu maximum output level and it assumes that the amplifier provides 32dB of gain. These values may not be appropriate for the specific amplifiers in the system. It is important for optimum system performance and protection to appropriately set these values. This will render the best performance for the system.

The system should only require this configuration when you initially set it up, or if one amplifier is swapped out for a different model amplifier.

Amplifier Gain

The amplifier gain is a specified property of the amplifier and should be available on the spec sheet for the amplifier. If it is not on the spec sheet, it may be in the manual, but it should definitely be available from the amplifier manufacturer. As a last resort, it can also be measured. Please contact Danley Sound Labs if you need to measure the gain of your amplifier. The DNA SC48 utilizes the amplifier gain in dB. Some amplifier manufacturers specify the amplifier gain as a multiplier. These numbers are not equivalent. Common values for amplifier gain are 26dB and 32dB which are equivalent to 20X and 40X voltage gain, respectively. The gain of the amplifier must be in dB and **must** be entered in the System Engineer software on the XOver page, in the Limiters section, on the Amp tab. This must be done for each output channel individually. Setting this value is **required** for proper operation of the thermal and excursion limiters.

VX Limiter Threshold

The best way to set accurate limiters is to measure the actual output voltage of the amplifier. The VX Limiter Threshold setting is located in the System Engineer software, on the XOver page, in the Limiters section, on the VX tab. This must be done for each output channel individually. These are the steps to accurately set the limiters.

1. **Disconnect the loudspeakers!** We will be working with the maximum output voltage from the amplifier, you will be able to easily damage the loudspeakers if they remain connected to the amplifier during this procedure.
2. Use a sine wave generator to produce the measurement signal. This can be from any source; a bench top sine generator, mixing console (analog or digital), smart phone, etc. The frequency needs to be somewhere in the 45 to 70 Hertz range. The exact frequency is not that important, however you do need to send it at the level of +20dBu (or 7.20VAC when measured with your DMM). Connect this source to input channel 1 on the DNA SC48.
3. Select Module Preset "50: Clear" in input DSP A on the DNA SC48. This will remove all processing from input DSP A and output DSP 1. Connect output 1 on the DNA SC48 to the input of the amplifier.
4. Finally, hook an RMS reading volt meter to the output terminals of the amplifier. A common digital multi meter (DMM) will work well and is the preferred tool.
5. Turn on the amplifier and pass the sine wave signal from the generating device to the DSP and out to the amplifier. The level here should be close to +18dBu (or 6.15VAC when measured with your

- DMM). Be sure the input sensitivity knob on the amplifier is set to full up unless the adjustment is accounted for in the gain of the amplifier. It is always recommended to turn on any internal clip limiters that may be available in the amplifier.
6. The amplifier may be clipping at this point, depending on its input sensitivity and output capacity. Turn down the VX Limiter threshold control in the System Engineer software until the amplifier stops clipping. This threshold control is on the XOver page, in the Limiter section, on the VX tab.
 7. Measure the output level from the amplifier with the DMM. This is the maximum continuous output from this amplifier.
 - a. If it is below the prescribed voltage for the given loudspeaker, setup is complete and the limiter is set. Note the threshold value for later use.
 - b. If it is above the prescribed voltage, continue to lower the threshold of the VX limiter until the measured output from the amplifier is equal to or less than the prescribed voltage for the given loudspeaker. Note the threshold value that is required to meet this output voltage for later use.
 - c. The prescribed voltage for each Danley Sound Labs loudspeaker is provided in the chart below.
 8. Repeat this method for all amplifiers and loudspeakers to be used with this processor. A list should be generated noting the VX Limiter threshold values that correspond to a specific amplifier model used with a specific loudspeaker model. Once finished measuring voltage output from the amplifier, turn everything off and remove the sine generator. Hook up the DSP and amplifiers in the manner that suits the implementation of the system. Remember, bridging an amplifier typically results in +6dB of voltage gain. This means that the VX Limiter threshold will need to be adjusted by -6dB if the amplifier was not measured in a bridged condition but is going to be implemented bridged.
 9. Once the DSP and amplifiers are connected in the manner they are planned to be used, the loudspeakers and source may be added to the system.
 10. Using the System Engineer software or the front panel of the DSP, recall the appropriate presets for the loudspeakers which are connected to the amplifiers on the outputs of the DSP. By default, the VX Limiter threshold is set to 0dBu and the Amp Gain is set to 32dB.
 11. Adjust the VX Limiter threshold according to the values noted from measuring the amplifier.
 12. Enter the correct gain of the amplifier according to the manufacturer's documentation or the calculated gain from measuring the amplifier.
 13. Be sure to save the module preset into the provided blank preset slots 1-10. Please note that only four output DSPs can be attached to one input DSP.
 14. Kick back and enjoy the system with the knowledge that it is fully protected by the extensive suite of limiters provided in the DNA series products.

Loudspeaker Model	RMS Output Voltage
BC218	174
BC415	123
BC215	123
BC412	132
CS30	84
DBH218	123
DTS10	93
DTS20	93
GH40	111
GH60	111
Go2 8cx	75
Nano	12
Nano Sub	51
Mini	60
Mini 180 – 4 Ohm	72
Mini 180 – 16 Ohm	144
Micro	45
OS80	84
OS12cx	75
OS115	93
SBH10	108
SBH20	72
SBH20LF	78
SH25	93
SH46 Passive	111
SH46 Biamp Low	111
SH46 Biamp High	84
SH50	93
SH DFA	84
SH60	93
SH62 – Low	120
SH62 – High	82
SH64	156
SH69	93
SH75	84
SH95	60
SH95HO	72
SH96	156
SH96HO Biamp 2z RevE Low	105
SH96HO Biamp 2z RevE High	84
SH96HO Biamp 2z B&C Low	105
SH96HO Biamp 8 B&C High	84
SM60F	84
SM60M	66
SM80	84
SM80F Biamp Low	120
SM80F Biamp High	84

SM80M Passive	84
SM80M Biamp Low	78
SM80M Biamp High	36
SM90	72
SM96	84
SM100	72
SM100B	84
SM100F	120
SM100M	72
SM LPM	72
TH Mini 12	111
TH Mini 15	93
TH112	93
TH212	111
TH412	132
TH812	267
TH115	93
TH118	123
TH118XL	123
TH50	93
TH221	114