

ONE SYSTEMS®

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OPTIMIZING SYSTEM PERFORMANCE WITH THE 112IM SUB

The One Systems 112IM Sub is a 12-inch (305 mm) subwoofer / bass module designed to augment the low-end response of a variety of other One Systems full-range enclosures. The 112IM Sub may be used with the 112IM, 212CIM, 108IM, 208CIM, 106IM and 103IM systems.

There are two basic configurations that can be used: The 112IM Sub may be set up in a “classic” subwoofer mode or in a mode that can essentially double the acoustic output from 50 Hz to the upper overlap frequency of between 80 Hz and 120 Hz. This second mode, known as “overlap” mode, is an ideal way to maximize low-frequency output and also improve very low-frequency polar control. The overlap mode is most suited for use with the 112IM and 212CIM enclosures and should not be used with other One Systems enclosures. The 108IM, 208CIM, 106IM or 103IM should be used with the 112IM Sub in “classic” subwoofer mode only, not in “overlap” mode.

Recommended processor settings are shown below for both the “classic” subwoofer mode and “overlap” mode. Both modes require use of a DSP (Digital Signal Processor) based crossover and two amplifier channels. An analog crossover may be used for the “classic” subwoofer mode in place of the DSP based crossover, but only a DSP-based crossover/processor may be used for the “overlap” mode.

SUBWOOFER MODE

Crossover Settings

Low-Frequency (112IM Sub) Output

The low frequency output from the crossover/processor should have a high-pass filter set to 45Hz and be a 4th order (24 dB/octave) Butterworth alignment. There should also be a low-pass filter set to between 80 Hz and 120 Hz. This low pass filter should be a Linkwitz-Riley alignment and be a 4th order filter. (NOTE: The low pass filter corner frequency of 80 Hz to 120 Hz is user-settable. This frequency may be adjusted based on user sonic preferences.)

High-Frequency Output (output above 80 Hz to 120 Hz)

The high-frequency output from the crossover/processor should have a high-pass filter set to be the same frequency as the frequency of the low-pass filter of the low-frequency output of the processor. (i.e., if the low-pass output of the low-frequency channel is 80 Hz, then the high-pass frequency of the high frequency channel should also be set to 80 Hz)

This high-pass filter should be a 4th order (24 dB/octave) Linkwitz-Riley alignment.

Summary

112IM Sub Channel

<u>Filter Type</u>	<u>Frequency</u>	<u>Filter Alignment</u>
High-Pass Filter	45 Hz	4 th order Butterworth
Low-Pass Filter	80 Hz to 120 Hz	4 th order Linkwitz-Riley

112IM Sub Channel Gain may be set to sonic requirements

High-Frequency Channel (output above 80 Hz to 120 Hz)

<u>Filter Type</u>	<u>Frequency</u>	<u>Filter Alignment</u>
High-Pass Filter	80 Hz to 120 Hz *	4 th order Linkwitz-Riley

*Note: The high-pass filter in the high-frequency channel must have the same corner frequency as the low-pass filter in the 112IM Sub channel

Parametric Filter Settings

Low-frequency channel parametric equalization may be used as follows: (2 parametric EQ's are recommended)

1. PEQ Frequency 60 Hz
 PEQ Gain 4 dB
 PEQ Bandwidth 0.3 Octave
2. PEQ Frequency 80 Hz
 PEQ Gain 2.5 dB
 PEQ Bandwidth 0.3 Octave

The overall gain of the low-frequency processor channel should be set to the user's sonic preference.

Any parametric equalization on the high-frequency output should be based on the specific recommendations of the enclosure type used. However, any EQ recommendations with center frequencies below the high-pass filter frequency should be set to 0 dB (i.e., not used). This document may be found on the One Systems web site:

<http://onesystems.com/technical-papers.php>

The technical paper is found in the Documentation section/ Technical Papers/ "Equalization and Filter Recommendations"

OVERLAP MODE

As noted above, the "overlap" mode utilizes both the 112IM Sub output and the output of the main enclosure in parallel in the low-frequency range. This mode is very effective when both lower frequency extension and increased level are required at low frequencies.

Crossover Settings

The low-frequency output from the crossover/processor should have a high-pass filter set to 45 Hz and be a 4th order (24 dB/octave) Butterworth alignment. There should also be a low-pass filter set to between 80 Hz and 120 Hz. This low-pass filter should be a Linkwitz-Riley alignment and be a 4th order filter. (Note: The low-pass filter corner frequency of 80 Hz to 120 Hz is user settable. This frequency may be set based on user sonic preferences.)

The second channel of the processor is now a full-range output. The crossover/processor should have a high-pass filter set to 45 Hz and be a 4th order (24 dB/octave) Butterworth alignment. Note that both the 112IM Sub and the main full-range enclosure are operating in parallel acoustically between 45 Hz and the low-pass filter frequency setting of the low-frequency output channel of the processor.

Summary

Low-Frequency (112IM Sub) Output

112IM Sub Channel

<u>Filter Type</u>	<u>Frequency</u>	<u>Filter Alignment</u>
High-Pass Filter	45 Hz	4 th order Butterworth
Low-Pass Filter	80 Hz to 120 Hz	4 th order Linkwitz-Riley

Full-Range Output

High-Frequency Channel

<u>Filter Type</u>	<u>Frequency</u>	<u>Filter Alignment</u>
High-Pass Filter	45 Hz	4 th order Butterworth

Full Range Channel Delay. See important note below for necessary delay settings for the full range channel.

IMPORTANT NOTE

In the “overlap” mode, the acoustic summing of the low-frequency section (low-frequency DSP output) and the full-range section (the second DSP output) will require delay applied to the full-range output. The specific amount of delay required will be based not only on the group delay associated with the low-pass filter of the low-frequency channel, but also based on the physical location of the 112IM Sub relative to the full-range enclosure. This delay will substantially improve the summing of the two woofers and produce superior low-frequency output.

The recommended initial delay on the full-range (second DSP channel) should be approximately 5 mSec to 6 mSec. This value can then be varied to achieve the best low-frequency summing between the two enclosures. In general, the lower the frequency of the low-pass filter in the 112IM Sub channel, the larger the required time delay on the full-range channel. (Approximately 6 mSec for an 80 Hz low-pass filter frequency on the 112IM Sub channel to 5 mSec for a 120 Hz low-pass filter frequency on the 112IM Sub channel. Just remember not to get confused, the delay should be applied to the full range channel, not the 112IM Sub channel!)

This delay value may also require additional “tuning” based on the relative physical location of the two enclosures, and will require some user experimentation if the two enclosures are physically separated.

Parametric Filter Settings

Low-frequency channel parametric equalization may be used as follows: (2 parametric EQ's are recommended). This equalization should be applied to both the 112IM Sub's channel AND the full-range channel. It is recommended that any low-frequency equalization be the SAME for both the 112IM Sub's channel and the full-range channel. The values listed below may be adjusted to suit sonic requirements but, as always, care should be exercised when boosting to insure adequate amplifier headroom is maintained.

- | | |
|------------------|------------|
| 1. PEQ Frequency | 60 Hz |
| PEQ Gain | 4 dB |
| PEQ Bandwidth | 0.3 Octave |
| 2. PEQ Frequency | 80 Hz |
| PEQ Gain | 2.5 dB |
| PEQ Bandwidth | 0.3 Octave |

The overall gain of the low-frequency processor channel should be set to the user's sonic preference.

Any parametric equalization on the full-range output should be based on the specific recommendations of the enclosure type used. However, any EQ recommendations with center frequencies below the high-pass filter frequency should be set to 0 dB (i.e., not used). This document may be found on the One Systems web site:

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