

# 350W Subwoofer Amplifier

From Rythmik Audio

www.rythmikaudio.com

Thanks for purchasing this 350W Subwoofer Amplifier. The amplifier is designed for home theater application. It features an extension (or rumble) filter that can be used to correct the bass roll-off of the subwoofer and/or to adjust for room response in the bass band. In addition, the amplifier is packed with other standard features such as both speaker level and line level inputs, high-pass line outputs (12db/oct) for the satellite speakers, continuously adjustable crossover frequency (40-160hz) for the subwoofer output, automatic on/off switch (activated by input signal), and a subwoofer volume control. Mated with a high quality subwoofer driver, its [350W@4ohm](#) output is enough to shake your room. Thermal protection and short circuit protection circuitry ensure long-lasting durability.



Note: 1. The auto on is only available on left channel input.

2. This amp is intended to be used with a HT receiver, where phase control is not needed. For musical applications, where phase control is important, we recommend the special edition amps.

## Technical specs

Crossover frequency control	Continuously variable for the subwoofer from 40hz to 160hz, 2 <sup>nd</sup> order characteristic (12db/oct).
Phase control	Continuously adjustable phase lag control on the subwoofer from 0 to 180 degrees. Not recommended to use. Please use delay time adjustment on the home-theater receiver to adjust the phase.
Power switch (Auto ON/OFF)	When the switch is in the auto position, the amplifier will turn on when the left channel input signal is present. There are also ON and OFF positions that can override this function.
Volume control	Adjust the output level of subwoofer.
Line in	These are line level RCA inputs. Use them to connect pre-outs or preamplifier outputs. These inputs are summed as mono. It is the preferred input method. Mono line level signals needs to connect left channel input. See setup section for more explanation.
Line out	This line level RCA outputs is high-pass at 100hz (-3db) for satellite output if the amplifier(s) driving the satellite has a line level direct inputs.
High Level in	Speaker level input. Use these inputs when the line level outputs from your receiver are not available. Connect these inputs directly from the amp outs the drive satellite (or front) speakers.

High Level out	Speaker level outputs to drive satellite speakers when one uses the speaker level inputs. <b>It is not recommended</b> to use these outputs
Frequency Control (Extension Filter)	This controls the frequency of the extension (or rumble) filter. Three positions are available: 14hz, 20hz, and 28hz. The damping factor (or inverse of Q value) can be controlled separately (see below).
Damping Control (Extension Filter)	This controls the damping factor of the extension filter. Three positions are available: low, medium, and high. Combined with 3 positions in the frequency control, there are a total of 9 combinations.

### Extension (or rumble) Filter

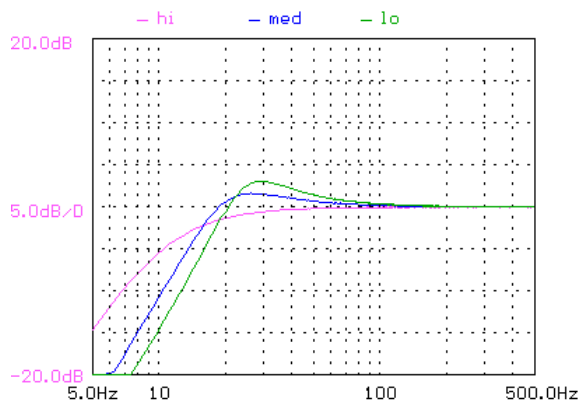
Two toggle switches beneath the binding posts constitute the extension filter controls: one controls the frequency (14,20,and 28) while the other controls the damping factor (inverse of Q value). These switches control the frequency response contour in the lower bass band. They serve three purposes: 1) limit the excursion when excessive rumble signal is present in the input (with high damping setting), 2) reduce “room gain” if it becomes noticeable (with high damping setting), and 3) minor boost at the lower end to further extend the bass extension (with med and low damping settings). 3) is mostly recommended for vented box or large sealed box. For small sealed box (2cu ft or smaller), we recommend Linkwitz Transform circuit board that we offer.



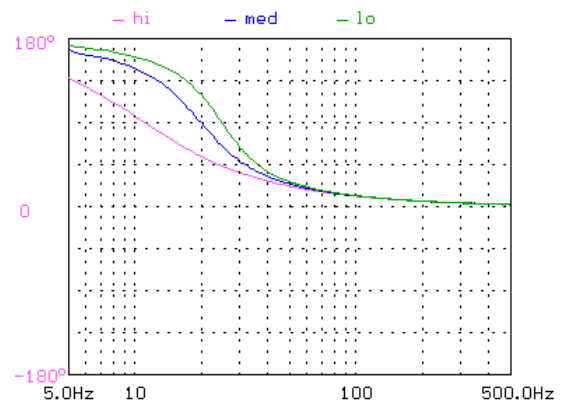
“Room gain” is the boost of signal energy in the bass band inside a close room due to heavy wall reflections. Excessive room gain can blur the bass or change the spectral balance of sound. High damping setting can be used to reduce its impact. It is a Bessel filter with  $Q=0.6$ .

On the other hand, small vented box has a tendency of premature roll-off. To compensate that, we provide med damping (1.5db boost) and low damping (3db boost).

**Graph:** The frequency response when the frequency setting is at 20hz is shown in Figure 1 for 3 different

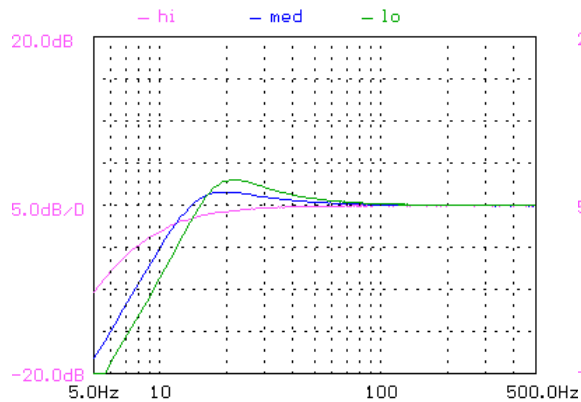


**Fig 1** 3 damping settings at 20hz

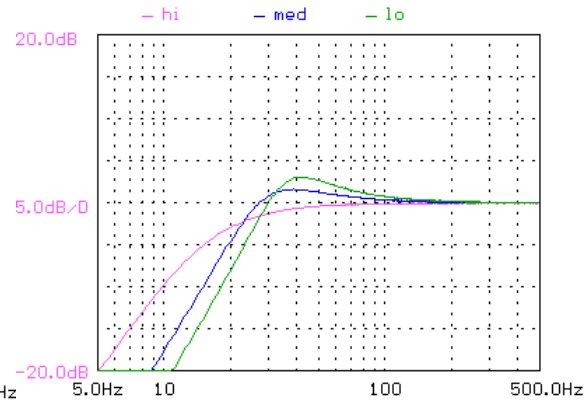


**Fig 2** Phase response of Fig 11

damping settings. From top to bottom are low damping, medium damping, and high damping. The Q values are approximately 0.60, 1.07, 1.33, for high, med, and low damping, respectively. The boost for med (low) damping is about 1.3db (3db). The true  $-3\text{db}$  points is somewhat lower than 20hz. Therefore one should think of this frequency setting as where the roll-off starts, not where  $-3\text{db}$  point is. Figure 2 is the phase response. Figure 3 and 4 are the response when the setting is at 14hz and 28hz, respectively. **Finally,**



**Fig 3** Response of 3 damping settings at 14hz



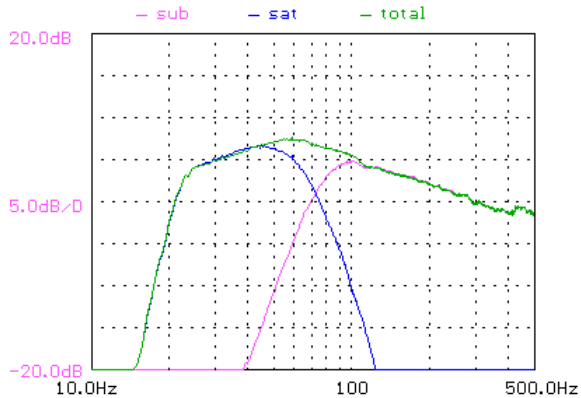
**Fig 4** Response of 3 damping settings at 28hz

to bypass this filter, one can set the frequency to 14hz and damping to high.

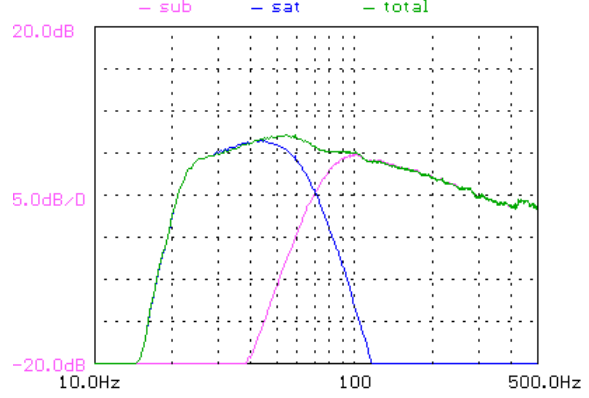
## System hookup

### Home Theater Receiver

In this setup, the Line-out outputs are not used. The build-in crossover in Home Theater receiver for sub and satellite will most likely follow Lucasfilm's recommendation of 24db/12db Linkwitz/Riley. That is, 24db/oct for the sub and 12db/oct for the satellite. The anticipation is that the 12db/oct roll-off of the satellite's natural frequency response will make the overall response as 24db/24db, an intended setup for Linkwitz/Riley filter. This immediately rules out vented/ported speakers as front/satellite speakers because the setup will become 24db/36db. Phase alignment is very important. Without correct phase alignment, the response won't be smooth. On the other hand, there are simply too many options in the menu and too easy to make unwary mistakes in a HT receiver. For instance, the delay time adjustment, if not adjusted correctly, can affect the phase alignment, and thus the blending of sub to front speakers. Therefore, when the blending is not as smooth, we recommend to go to delay time adjustment menu on you HT receiver and make sure the settings are correct.

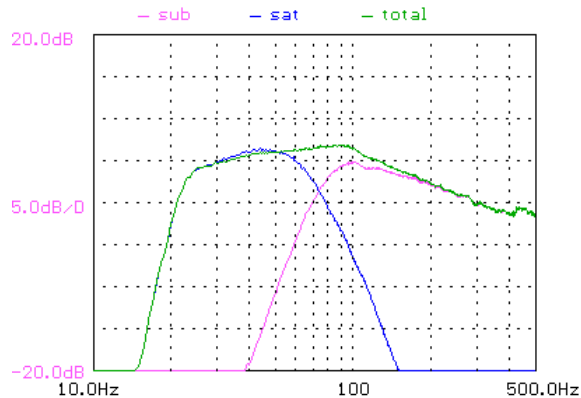


**Fig 7** Response when crossover is at 2 o'clock

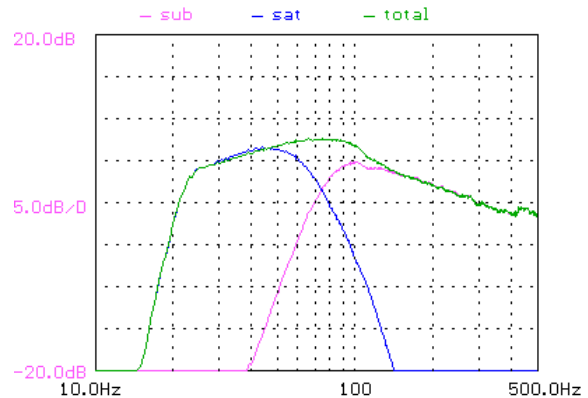


**Fig 8** Response when crossover is at 1 o'clock

In addition, make sure the subwoofer is enable in the speaker configuration menu (that means set the front speakers as “small” so that the low frequency signal is redirected to subwoofer). Connect the subwoofer output on the receiver to the left channel line input. Set the phase to 0 and crossover to max (5 o'clock position) as a starting point. Gradually fine-tune the crossover and phase controls to get the best result. It is recommended to keep the phase control at 0 degree and crossover control between 1 to 5 o'clock. Whenever possible, use crossover control instead of phase control. The main reason is that Linkwitz/Riley setup theoretically will have phase alignment between the subwoofer and satellite at the crossover point.



**Fig 5** Response when crossover is at 5 o'clock



**Fig 6** Response when crossover is at 3 o'clock

For comparative purpose, Figure 5-8 (taken from a Denon AVR-4800 receiver) shows the result when crossover control is at different setting (5, 3, 2 , and 1 o'clock respectively) while phase control is set at 0 (or 7 o'clock). Note that in Figure 18, a dip is about to form at the crossover point.

## Other Recommendations

This subwoofer amplifier is **NOT** recommended for sealed box speakers with DC voice coil resistance of less than 2.5 ohm, nor for vented box (passive radiator) speakers with DC voice coil resistance of less than 3.0 ohm. Otherwise, the thermal protection circuitry will be activated more often.

## **Auto-off**

It takes about 20 minutes to enter the standby mode even after the input signal is shut-off. This is a feature, not a bug, because it prevents unnecessary on and off switches.

## **Reset the amp**

After triggering the protection circuitry, one can reset the amp by either 1) turn the power switch on the plate to off position and then back to on position, or 2) unplug the power core and then plug in again. The former is recommended.

## **Support**

Your satisfaction is paramount to us. Please feel free to ask us questions or give us feedback.