

Dialing in Subwoofer Phase (Phase Aligning Sub to Main Speakers)

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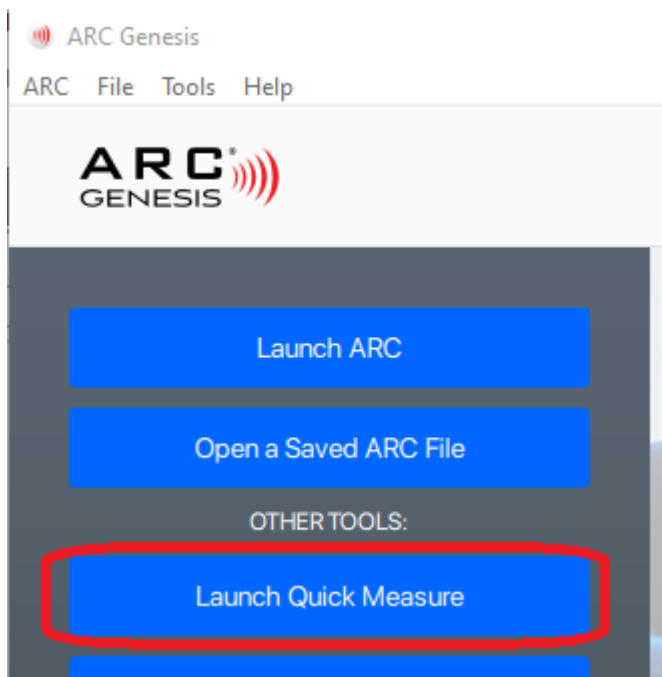
- Phase aligning the subwoofer to the main speakers will make a significant impact to the quality of your system's bass. Since all electronics (including subwoofers) have some sort of inherent delay, there is no one size fits all setting here that works for everyone since all rooms, and systems, are different. Therefore, it is important to tune the subwoofer to your system specifically. Current MartinLogan Dynamo "X" series subwoofers (600X, 800X, 1100X, and 1600X) offer a wide variety of phase adjustment to help fine tune the phase to get the timing dialed in much more accurately. This process explains how to properly dial in the phase of your subwoofer so that it aligns with the main speakers at your chosen crossover point.

- This process is only possible with electronics that offer "Bass Management", meaning listening distance and crossover settings. All modern surround receivers and processors will contain these bass management controls and many 2 channel systems are beginning to offer this as well. To make a long story short, since it's happening in real time already, it is not possible to "speed up" the signal sent to the subwoofer so it aligns perfectly with your speakers. Instead, properly configured bass management slightly delays (measured in milliseconds or fractions of a millisecond) the signal sent to your other speakers so that they arrive at the correct time with your subwoofer (and other speakers). For example: You hear the sound from the speakers closest to you before anything else (since they are closer to you). To compensate for this, the processor will delay the signal on the speakers that are closest to you so that the sound from the farthest speakers arrive at your ear at the same time. Unless you sit within a perfect circle of speakers, this listening distance adjustment is necessary to create a properly balanced, 3 dimensional sound field. This is how all listening distance adjustments work and is completely normal behavior for properly tuning a system. Please be sure to set these controls on your receiver or processor before proceeding to the next steps. **It may be necessary to add extra "distance" to your subwoofer(s) actual physical distance setting in order to properly dial in the phase since the distance setting helps compensate for any DSP processing time that occurs in your system. We will address this again in STEP 4.

- STEP 1: REVERSING SPEAKER POLARITY - Wire the Front speaker that is closest to the subwoofer out of phase (reverse red and black speaker wire connections) and then safely disconnect the other Front speaker so it does not play during this process.

Note: If using multiple subwoofers, you can either choose to continue using the same Front speaker the whole time, or pause and repeat Step 1 again so that you are always using the Front speaker closest to the subwoofer. There are several variations of this technique where you perform this process by wiring both Front speakers out of phase (instead of disconnecting one) or even using just the Center channel or other channel closest to each sub. For the sake of this write up, we are assuming you are using the same Front speaker (with reversed polarity) the whole time.

- STEP 2: POSITIONING YOUR SUBWOOFER(S) - In reality you will likely only have a few positions in the room to choose from, but if you are lucky enough to have plenty of placement options, this step is crucial to provide the best baseline for system tuning. Using the “Bass Crawl” method illustrated in the MartinLogan subwoofer setup video (YouTube: <https://youtu.be/uzC1MufCQLk>) or by using the “Quick Measure” feature in ARC Genesis (see below), find the placement for your subwoofer that provides the smoothest response with the least amount of frequency peaks and dips. Contrary to what you may have heard about subwoofer placement not being critical since bass is “non directional”...this is simply false. Bass is very easily “localized” when the subwoofer has not been properly integrated into the system. Proper placement is only part of the process, but can dramatically impact your final results.



Pictured: ARC Genesis Quick Measure Feature (ARC Enabled Subwoofer or AV Receiver/Processor required)

- STEP 3: CONFIGURING BASS MANAGEMENT - If your AV receiver or processor has a “Double Bass”, “Extra Bass”, or other “LFE + Main” subwoofer setting, please disable it. The subwoofer should be set to “LFE” only, with the LFE channel set to the default of 120Hz (since the LFE track has content up to 120Hz).

Access the setting in your receiver/processor often called “Speaker Setup”, “Bass Management”, or “Speaker Size.” Usually you get an option of “Large” or “Small.” Almost no speaker should be set to “Large” even if it is physically large. In reality “Large” = Not Bass Managed. “Small” = Bass Management is engaged. For most speakers/systems “Small and 80Hz” is a good starting point for each channel. Remember that even though your speaker may be rated to well below 80Hz, the room dimensions and the placement of the speaker in the room may be working against the speaker and negatively impacting its bass performance. In general, the subwoofer(s) will be better at playing these lower frequencies as subwoofers are both optimized for this purpose and can also be moved around the room independently of the speaker so that the optimal location for bass output can be found without compromising the speaker's performance (see Step 2). Room acoustics and speaker/sub positioning play a large part in this process. Do not be afraid to experiment here. Consult your speakers' published specifications and make sure you choose a crossover setting above its lowest rated output.

As mentioned above, 80Hz is a good starting point for most systems. You can either use this recommendation, or experiment with the different crossover settings offered in your processor. For more experienced users, you can also do some measurements to help make the proper selection.

If you choose to use the measurement option, you will need to use either an RTA or the “Quick Measure” feature in ARC Genesis (Pictured Above). Since an RTA is not a common household item, several mobile apps are available for this if you don't have an ARC Genesis enabled product that you can use to measure the speaker.

Using the RTA or “Quick Measure” in ARC Genesis (ARC enabled Integrated amplifier, preamp, processor, or receiver required) you can see how each of your speakers are measuring in your room, in real time, at your listening position. Using these readings, you can determine a proper crossover point where the sub can begin blending in at the lower frequencies.

Since using the measurement process to determine a good crossover point requires some knowledge around interpreting measurements as well as how to use measurement equipment, it is not recommended for everyone. Again, 80Hz is a great starting point to jump in and start experimenting with this process.

- STEP 4: MAKING THE ADJUSTMENTS WITH TEST TONES - Play a test tone (**with your system in Stereo mode if it is a multichannel system**) equal to your chosen crossover point from Step 3. IE: 80Hz tone for 80Hz crossover. These are widely available on streaming services (Qobuz, Tidal, YouTube, Spotify, etc.). Try and find a track that does not “pulse” in volume and is just a constant tone. If you can set this track to repeat, it will make this process much easier. Just search for “X” Hz test tone where “X” is your chosen crossover point.

All listening/measurement should be done from the main listening position and with only 1 subwoofer at a time. Balancing the speaker volume and subwoofer volume using an SPL meter (or your system's automatic setup microphone) ahead of time is recommended.

Using the test tone, you can now begin the adjustment process. Begin with the sub gain/volume at around -15db (or slightly below halfway if using a sub with physical knobs). You will have the best results by beginning with the sub phase at 0 (inverted polarity *not* selected, if available) and using the subwoofer distance setting control in your electronics (usually called “speaker distance” in the menus) to get as close as possible to the ideal. Use the subwoofer distance setting and adjust the distance of your subwoofer until the bass is measuring/sounding the *quietest* to you. This is why you wired your speaker out of phase, since it is much easier to hear when the bass gets really quiet as opposed to getting slightly louder. You may find that the distance control needs to be set to a higher number than the actual physical distance from the sub to your listening position. This is completely normal. If you are unsure of the distance setting that sounds quietest, go with a higher distance setting since we can make fine adjustments using the phase control later.

After getting as quiet as possible using the subwoofer distance control, you can now adjust the phase control on the subwoofer until the bass is as quiet as possible with the goal to make it “disappear.” It will be obvious when you get it right because you should have no sound, or very little sound. Use the Phase control dial and the “inverted” toggle switch (if present) to find the quietest point. The MartinLogan Subwoofer Control App (for Dynamo 600X, 800X, 1100X, and 1600X) makes this process infinitely easier to do right from your listening position. If using a subwoofer without app control, having a helper to make adjustments while you listen to the changes will be far less tedious.

- STEP 5: Alternate between phase and volume controls until you find the optimal setting where the most cancellation is occurring. Avoid turning the subwoofer too far down where its output will no longer be useful in your system, of course. On the other hand, make sure not to turn the subwoofer up too much where it drowns out the main speakers either.

- STEP 6: Once you find the point of maximum cancellation (bass sounds/measures the quietest), turn the sub off and repeat the process on the other sub(s) (if applicable)

- STEP 7: Flip the phase (speaker wire red and black) back to normal on the main speaker and reconnect the one you disconnected. If using a variation of this technique, connect all speakers back to normal at this time.

- STEP 7: Reconnect any subwoofer(s) that were disconnected.

- Enjoy new found levels of Bass Accuracy!