

Case Study: Does Time-Aligning and Polarity Matching Subs Produce Better Response Curves?

7/20/2020

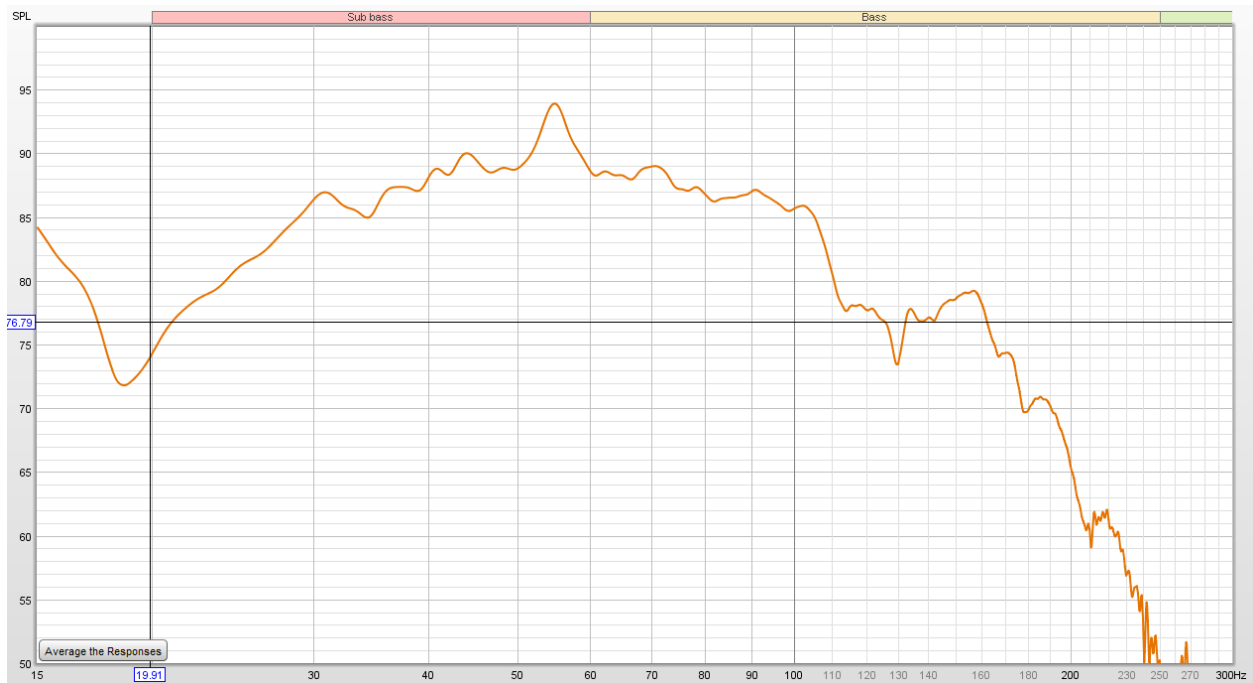
Sub configuration:

- Two subs on front wall at $\frac{1}{4}$ and $\frac{3}{4}$ points, both subs 12 feet from MLP.
- Two subs on rear wall co-located side-by-side at the midpoint, 4 feet from MLP.

Two front subs frequency response, Dirac off:



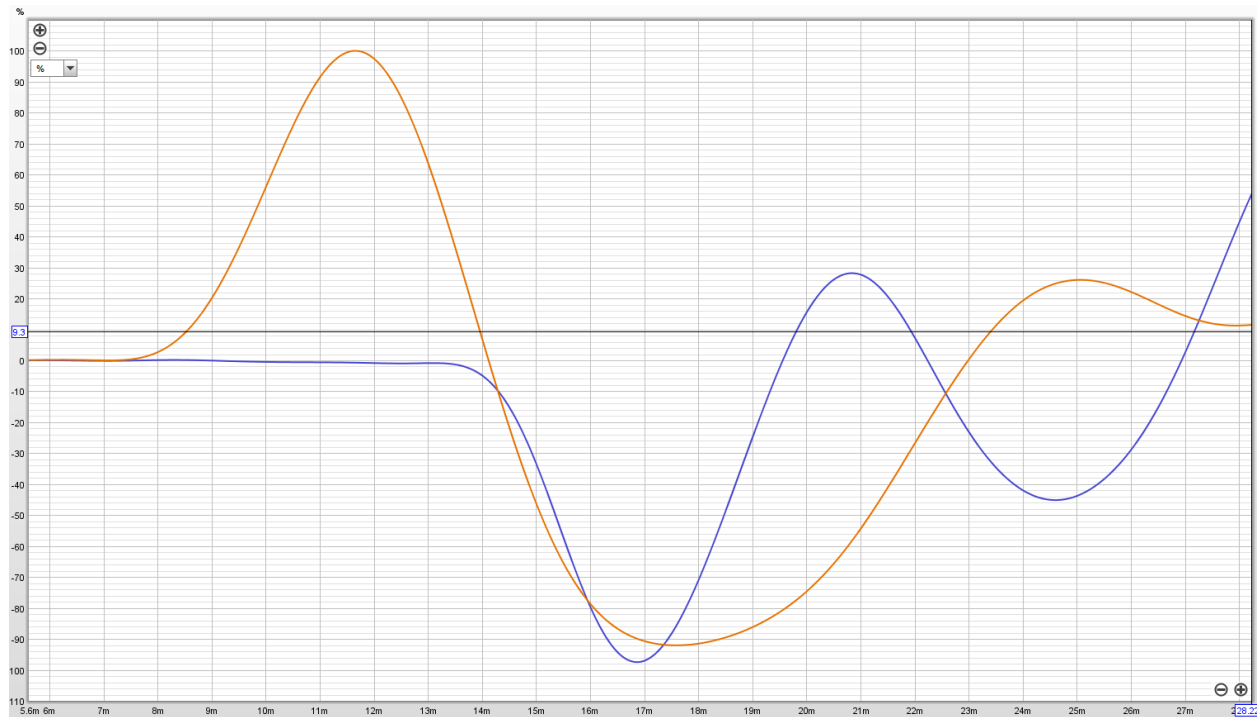
Two rear subs frequency response Dirac off:



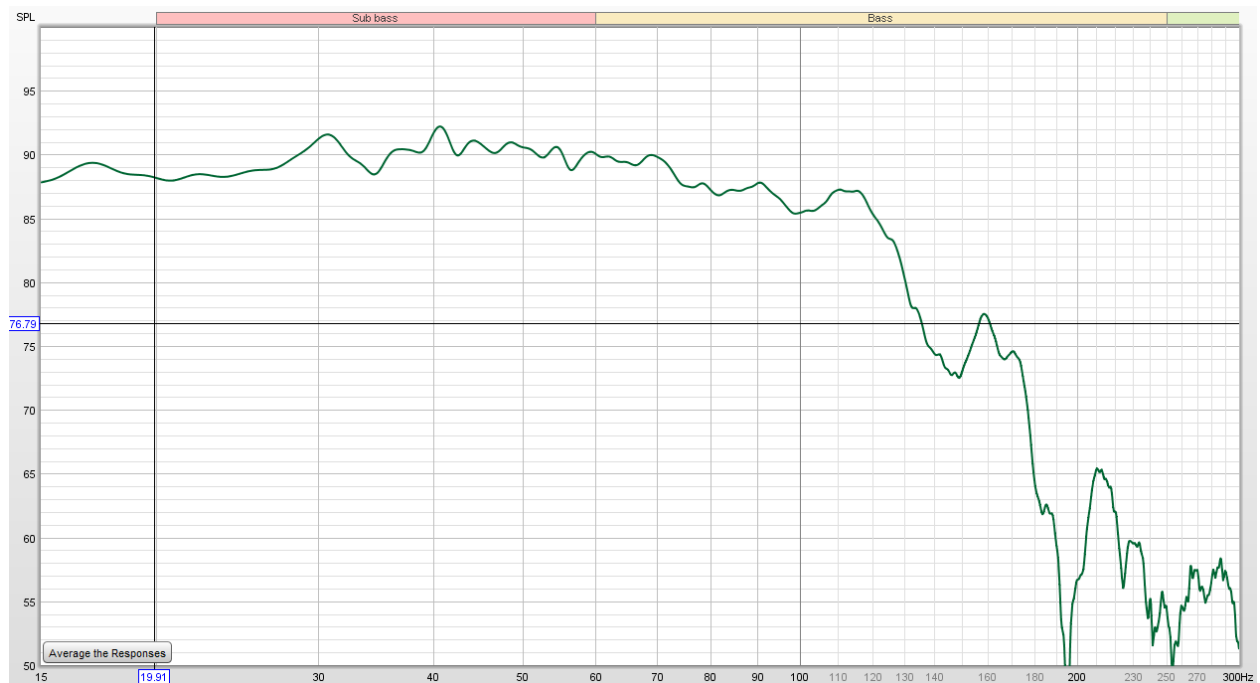
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Impulse response for front and rear subs, showing opposite polarity:



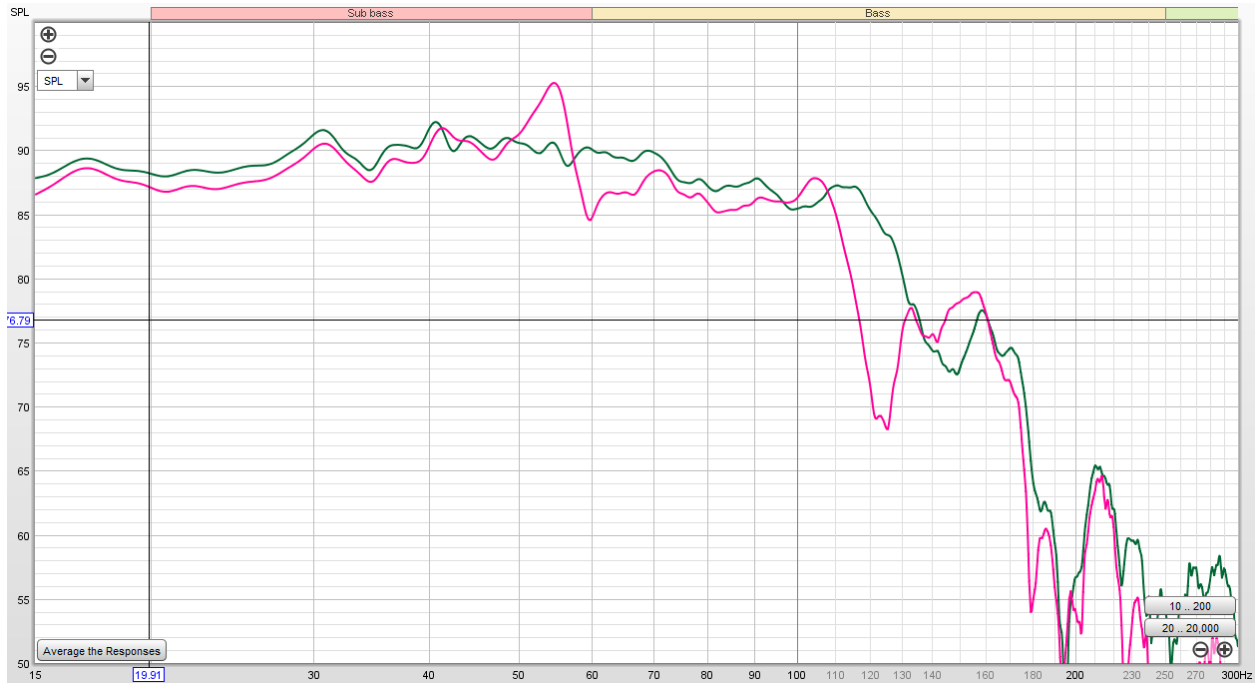
Combined response all four subs (Dirac off), with rear subs having original (opposite) polarity:



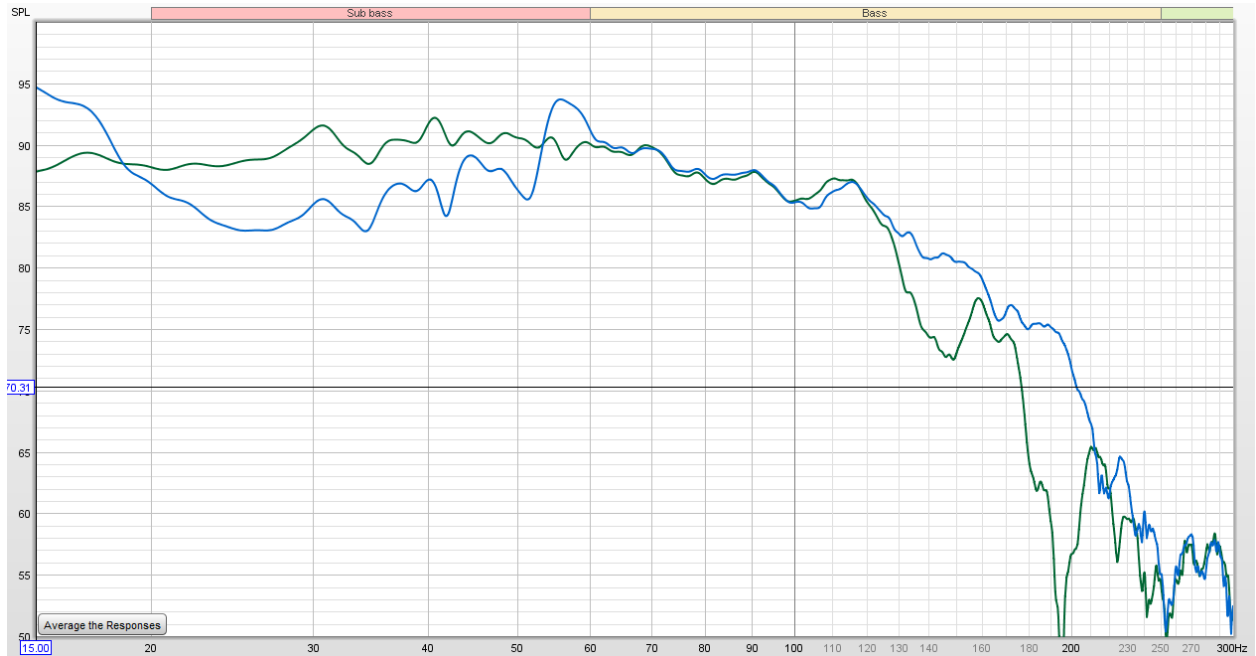
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Combined response all four subs (Dirac off), with rear subs with reversed polarity (Red) and rear subs with original polarity (Green). Conclusion: matching polarity does not necessarily result in better frequency response.



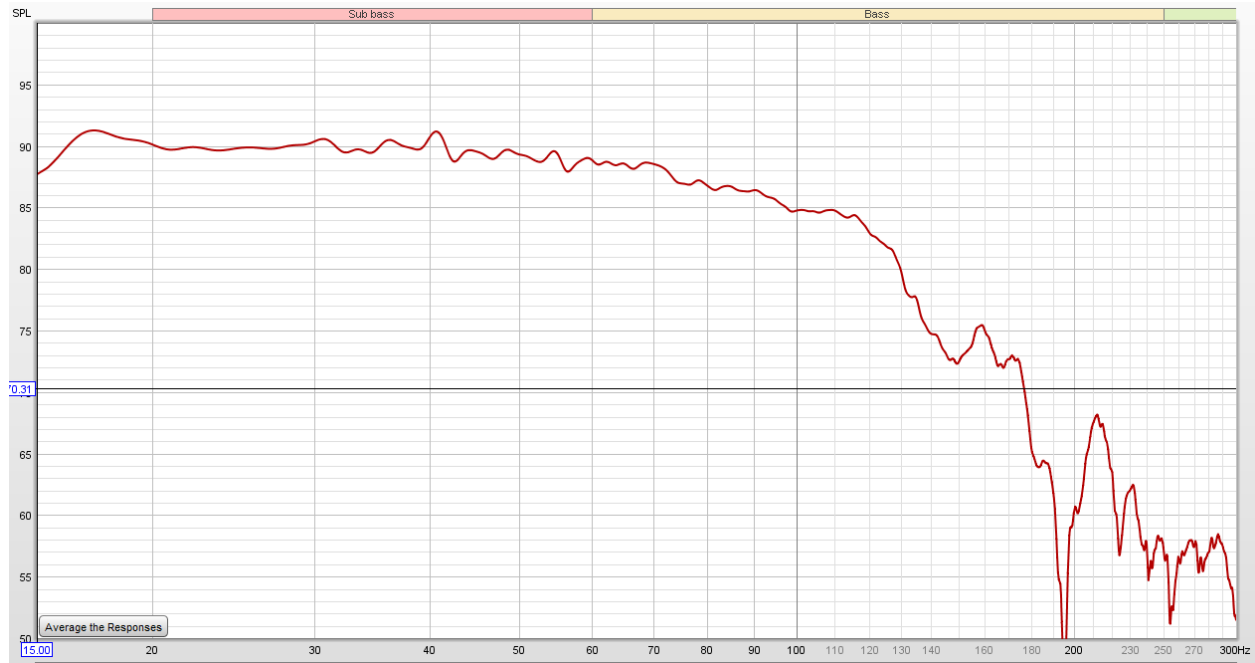
What about time-aligning the rear subs? Front subs @12ft, rear subs @4ft, distance difference is 8ft, or 7.1ms delay. Adding the delay, or time-aligning (Blue), does not produce a smoother frequency response:



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Finally, the combined sub response without time alignment, and without polarity matching, with Dirac Live correction applied:



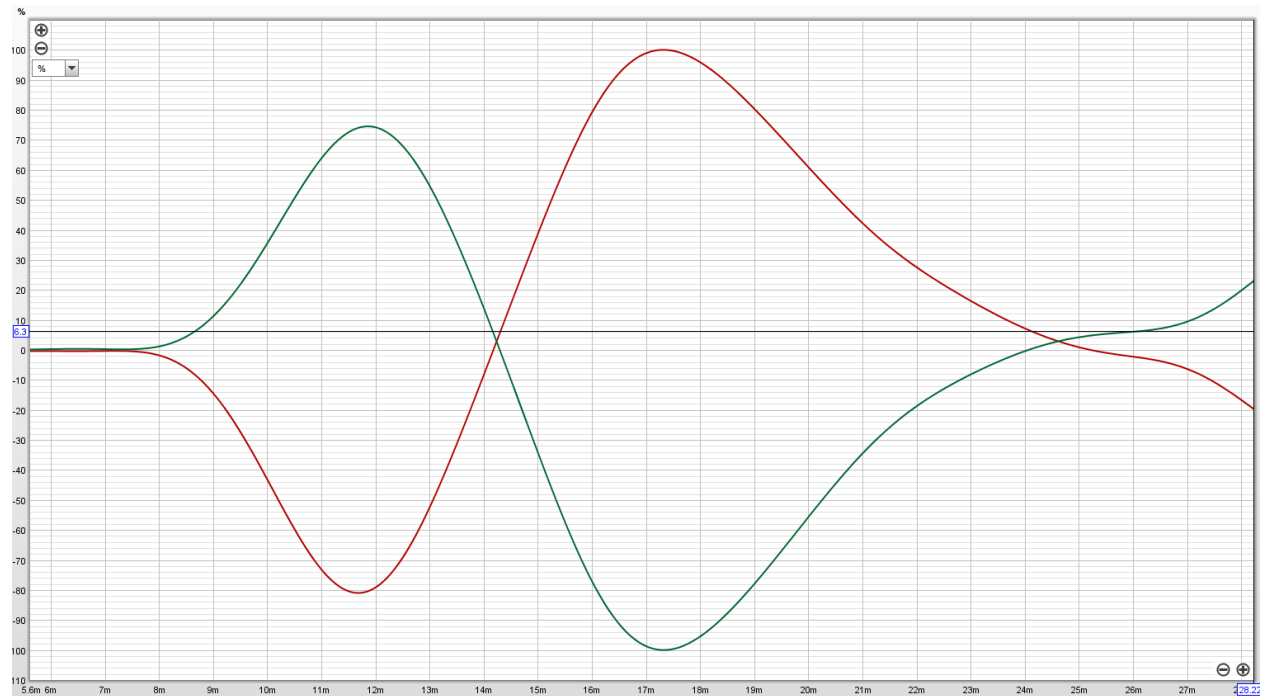
Conclusions

While it may seem intuitive that time-aligning subs and matching sub polarity should result in the best frequency response results, this analysis has shown that this is not always true. For all set-ups, it is recommended that **measurements be taken** with and without time alignment, and with and without polarity matching, to ensure the best decisions are made.

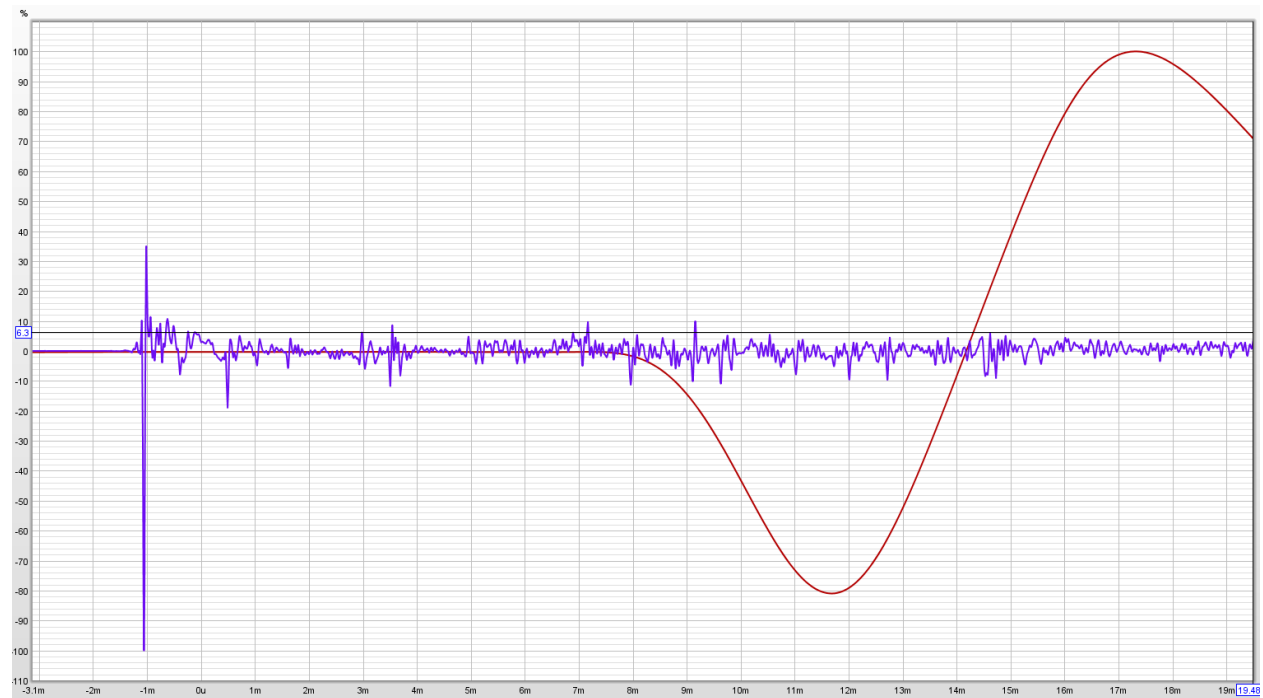
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Interesting side observation: Applying Dirac Live calibration automatically inverts the combined sub polarity so that polarity matches the mains. Combined sub polarity with Dirac off (Green) vs. Dirac on (Red):



Polarity of Center channel (Blue) vs. combined subs (Red), showing same polarity:



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