



Performance Media Industries, Ltd.

Keep the Bottom Line Simple
11/2004

by A. Grimani

My arms are deep in a cabinet filled with fiberglass poking around in zero visibility at the rear panel of a subwoofer that has suddenly given up the ghost. It was working yesterday, but today the cone is as silent as the eye of one of those hurricanes that keep harassing our poor countrymen in Florida. I am dreading the scratchy feeling that I know will prevail on my arms after this audio surgery, and I am wondering which of the multiple controls may have gone into failure mode. I flip switches, push buttons, plug connectors, and finally try the power button a few times. Bingo! It works again. With trepidation, I go on to finish this calibration session, but I know that if the power switch failed once, it will fail again.

Later that day, while eating lunch, I start thinking, "Why do they put all these controls on subwoofers?" All I really need is an input connector and a polarity switch. I spend most of my time finding ways to defeat the filters, the level controls, the boundary correctors, and the bandwidth extenders, because most of those functions are performed in the A/V controller -- and that's where they should remain! So why-oh-why are subwoofers studded with controls, inputs, selectors, and more these days? I think it's all about keeping up with the Joneses, and that's a really bad idea.

It's a bad idea because each and every one of these controls and associated circuits is prone to failure. Imagine what would happen if your body were pounded by the constant vibration and acceleration that a subwoofer playing a film soundtrack undergoes. None of your bones would survive the treatment. Neither do switches and potentiometers, which are mere mechanical devices that control electronic circuits. They just aren't made to be shaken around inside a vibrating, gyrating subwoofer. The controls are bound to fail. Maybe this Status Quo is acceptable for products sold through standard retail markets, since repairs and service are funded by the consumer. But I contend that these failures are unacceptable in the high-end realm where people expect products to work flawlessly well beyond normal warranty periods.

Subwoofers commonly have the following controls and functions:

- Stereo L/R inputs that sum two channels into the subwoofer
- A Mono “Theater” input that may have different low frequency extension, may bypass the filters, or may do nothing special at all
- An LFE input that may feed filters and level controls the same way as or differently from the other inputs, or that may have a different gain factor
- A level control with excessive range from fully off to so much gain that just blowing on the input jack produces 100dB sound level
- A low-pass filter control to set the subwoofer crossover cutoff when you use the sub in a system without an external crossover
- A polarity control for switching the polarity of the subwoofer to best match the main speakers
- A phase control, which is a souped-up version of the polarity control, that provides continuous adjustment of the phase relationship between the sub and the main speakers in the crossover region
- A high-pass filter control for adjusting a line level crossover for the main speakers in a stereo setup without an external crossover
- Stereo L/R outputs to feed amplifiers for the main speakers when there’s no external crossover
- Room correction filters to compensate for inherent standing wave bass resonances
- A power button to turn the subwoofer on
- An Always ON/Signal Presence ON selection switch
- An LED to tell you that the subwoofer is ON (sometimes a dual-color LED to tell you when it’s just plugged in and when it actually turns on with signal presence)

Now, notice that a great majority of these controls are only useful in systems with old-school stereo preamps and amplifiers which don’t have built-in crossovers, etc. These controls accommodate about ten consumers nationwide. All the other millions of people don’t need any of that. Manufacturers put all those controls on there to remain competitive, because none of them want to risk losing a sale just because they are under-featured.

Here’s the list of what you really need in a subwoofer for a properly designed home theater system:

- An input connector (single-ended AND balanced would be nice)
- A polarity switch to optimize the crossover region (in most cases a continuous phase control is unnecessary)
- An LED to tell you the thing is ON

That's all folks! Anything else is pretty much useless and prone to break over time.

Of course, the subwoofer needs to have a preset gain, which should match common speakers. That means an output level of 88dB for a 100 mVrms input signal around 60 Hz. Also, it should have extension down to 20 Hz on the low end, with a 12dB/octave tapered response to compensate for the inevitable room gain that occurs below 30 Hz in small rooms. (Research from Louis Fielder and Eric Benjamin documented this effect in the June 1988 issue of the Audio Engineering Society journal.) The subwoofer should also be reasonably linear up to at least 250 Hz so the frequency response in the crossover region will be as smooth as possible. Finally, it should play *really* loud without significant distortion or signs of distress.

Any other controls, features, settings, and more are just adding cost to the product and potentially reducing reliability. Like I said before, those controls already exist in the majority of mid-to-high-end A/V controllers. Also, the controls on some subwoofers can be so complex and bewildering that they get in the way of achieving proper sound quality. It is up to you to ask for simplified subwoofers from manufacturers. They want to build what you will buy; all you have to do is ask!

This article is based on a column published by A. Grimani in Residential Systems magazine November 2004.