

## Inches and Watts Don't Matter (It's what comes out that counts)

This article covers an important topic for anyone who buys powered subwoofers and powered towers. It has lots of words, not many pictures so bear with us here.

When shopping for powered subwoofers you can't help but notice that manufacturers and retailers are always talking about the number of Watts and the diameter of the drivers in powered speaker products, particularly subwoofers. It seems that all you have to do is choose the model with the greatest number of Watts and biggest driver diameter for the buck and you're done. Of course savvy audiophiles like most of our readers have learned from experience that the numbers don't tell the whole story. There are plenty of 12-inch, 1000 Watt subwoofers that sound awful and don't play particularly loudly. Inches and Watts are poor predictors not only of the quality of the bass but also the quantity of the bass. How can that be?



The first thing one has to understand is the relationship between amplifier power and acoustical output. All other things being equal a 100 Watt amplifier plays only 3dB louder than a 50 Watt amp. Three dB is not a whole heck of a lot louder; in fact many researchers feel that anything less than a 3dB difference is not perceived by most people as being subjectively louder.

The next thing to consider is the sensitivity (often mistakenly referred to as efficiency) of the acoustical system—the driver(s), bass radiator(s) or ports and enclosure. A 3dB increase in acoustical system sensitivity means that only half as much power is required to achieve the same amount of sound output. If all other things are equal an acoustical system with 90dB sensitivity driven by a 100 watt amplifier will play just as loudly as a system with 87dB sensitivity driven by a 200 watt amplifier.

One last factor is how the power of the amplifier is regulated. Virtually all speakers with built-in amplifiers use some sort of compression and power limiting to prevent distortion, driver stress and all sorts of bad noises. Poorly designed limiters/compressors can under some conditions severely limit the amount of power that actually gets to the woofer driver(s).

Couple that with the fact that manufacturers do not use the same measurement criteria when quoting amplifier power and you can see that relying on amplifier power specs is a chancy thing. That doesn't mean that power isn't important, it is, but a power spec on a data sheet is not a great predictor of actual performance.

At Definitive we specify amp power and driver/bass radiator size just like everyone else—buyers expect to see those specs and we would be uncompetitive if we didn't. But in the design process we don't obsess about "Inches and Watts", we obsess about designing a holistic system where all the parts are optimized to achieve the best audible result. We obsess about what comes out of the box.

## Loud & Low

Lately we have been using a measurement technique referred to as Loud & Low to assess the output performance of our powered woofer systems. With this method we measure the maximum output at 6 different low frequencies before hitting a predetermined distortion level. Loud is great but if the woofer system doesn't reach down to the very low frequencies with low distortion, what good is it?

At least one audio magazine, Sound+Vision, uses a similar method in their test reports. Recently that magazine measured two tower loudspeakers (in separate issues). One tower (Brand A) claims a 1200 Watt amplifier, two active drivers and two passive radiators. The other (Brand B) has a mere 300 Watt amplifier, one measly 10 inch active woofer driver and two 10-inch bass radiators. Despite winning the inches and watts battle, the \$500 more expensive Brand A performed much worse according to Sound+Vision's measurements.

	Brand A	Brand B
CEA 2010 Ultra Low Bass (20-31.5Hz)	82.5 dB SPL	103.6 dB SPL
CEA 2010 Low Bass (40-63Hz)	87.7 dB SPL	110.5 dB SPL

Holy cow! If this were a Little League game the umpire would have invoked the slaughter rule. Brand B has a 21.1dB output advantage on the Ultra Low Bass range and a 22.8dB advantage in the Low Bass range. That's huge! How can Brand A even use the word "subwoofer" with poor output like that?

By now you're dying to find out the brands of speakers. Well Brand B is the Definitive BP-8060ST and the other is.....you'll have to figure that one out on your own.

## So How Do I Choose?

You're probably asking yourself these questions: How can I know what the real performance is of a subwoofer or powered speaker? How do I choose?

There are no easy answers here, pal. Even if all speaker manufacturers adopt exactly the same Loud & Low measurement techniques (not bloody likely), these numbers alone only tell part of the story. There is the *qualitative* part that no measurements can describe, such as control, detail, musicality, timbre accuracy and so on. And then there are the aesthetic considerations—would you accept a subwoofer the size of a refrigerator for the sake of 3dB higher Ultra Low Bass output? Bottom line is you still have to use your own ears and eyes to choose the subwoofer or powered tower that best meets your needs, aspirations and budget. But if you're looking for a shortcut, you can always just choose Definitive Technology.