Subject: Push-pull benefits quantified
Posted by Wayne Parham on Thu, 25 Oct 2007 15:22:15 GMT
View Forum Message <> Reply to Message

I've measured a handful of basshorns over the years and built a small database of measurements

basshorn subwoofer with other basshorns.

Below you'll see several response curves of various basshorns. Some have a single driver, others have two. But only one has dual-drivers configured push-pull. This helps isolate the benefits, and to identify them with the push-pull drive. SPL is shown in blue and distortion in violet. Pay attention to the distortion curves, which tell the story:

At 100 watts, most have low distortion:

Bassmaxx Deuce, 100 watts @ 10 meters

Bassmaxx Z5, 100 watts @ 10 meters

Fitzmaurice Titan 48, 100 watts @ 10 meters

Fitzmaurice Tuba 24, 100 watts @ 10 meters

JTR Growler, 100 watts @ 10 meters

Still loafing at 200 watts, distortion starts to come up on some but not too bad:

Bassmaxx Deuce, 200 watts @ 10 meters

Bassmaxx Z5, 200 watts @ 10 meters

Fitzmaurice Titan 48, 200 watts @ 10 meters

Fitzmaurice Tuba 24, 200 watts @ 10 meters

JTR Growler, 200 watts @ 10 meters

400 watts is where you really start to see distortion begin to rise. It's not a lot of power, but heat and excursion start to have an effect. Pay attention to the lowest frequencies. Distortion rises from asymetrical cone motion and response shape begins to change slightly from heat.

Bassmaxx Deuce, 400 watts @ 10 meters

Bassmaxx Z5, 400 watts @ 10 meters

Fitzmaurice Titan 48, 400 watts @ 10 meters

Fitzmaurice Tuba 24, 400 watts @ 10 meters

JTR Growler, 400 watts @ 10 meters

Thermal effects are more evident at 800 watts. Distortion is quite noticeable too. The fact that the one push-pull design in this lineup exhibits lower distortion than the others is evidence that cone motion asymmetry is responsible for a great deal of distortion. The push-pull configuration is effective at cancelling this kind of distortion, and horn folds attenuate higher harmonics.

Bassmaxx Deuce, 800 watts @ 10 meters

Bassmaxx Z5, 800 watts @ 10 meters

Fitzmaurice Titan 48, 800 watts @ 10 meters

Fitzmaurice Tuba 24, 600 watts @ 10 meters

JTR Growler, 800 watts @ 10 meters

Thermal effects are clearly evident at 1600 watts. Distortion is much higher too. In fact, most basshorns have distortion louder than the fundamental at low frequencies near horn cutoff at high

Bassmaxx Deuce, 1600 watts @ 10 meters

Bassmaxx Z5, 1200 watts @ 10 meters

LABhorns will not survive this test for the same reason, unless cooling plugs are added. With cooling plugs, the thermal effects are minimized, even at this power level.