Subject: Push-pull configuration
Posted by Wayne Parham on Sun, 09 Nov 2003 11:14:49 GMT
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I haven't done anything with push-pull cornerhorns yet. It occured to me that it might be worth looking into, but I've got a "full plate" right now stretching into at least the first quarter of next year. It will require some time, and it will also require some fairly accurate distortion measurements, so the initial tests can be done in house but confirmation at an outside lab would be required for confidence. So this actually requires a fairly exhaustive complicated undertaking, at least for me to feel that conclusions are valid.I will say this though, and it is in the form of a thought experiment. This is what I would want to confirm or deny:The whole idea is that the diaphragm may be moving further in one direction than it is in the other, when an electrical signal having equal amplitude in both directions is presented to the motor. If this is true, and if it is caused by driver non-symmetries - either because the motor generates slightly more force in one direction than the other or because the suspension is stiffer when pushed in one direction - then the push-pull configuration might work, provided the electro-mechanical asymmetry is consistent between drivers.But there is another possible cause for non-linearity, particularly at high output levels. Pneumatic assymmetry is an issue that won't go away even if the drivers are mounted in a push-pull configuration. Consider that when the box is pressurized, it can be increased from 1 atmosphere literally to infinity. But when the box is depressurized, we have much less of a range, because it can only possibly go from 1 atmosphere to 0. Any excursion that would cause changes that approach this limit would become more and more assymetrical, which would increase even-order harmonics.Pneumatic assymetry is found in almost all loudspeaker arrangements, with the only exception being the dipole. Sealed boxes and high-compression-ratio horns have probably highest pneumatic assymetry, bass-reflex and bandpass cabinets less so, particularly bandpass cabinets with equal chamber sizes. Dipoles and infinite baffles create the least pneumatic assymetry. And this cause of assymetry would not be improved by mounting drivers in a push-pull configuration.So I think that there should probably be test conditions that isolated these two possible causes of assymetry. A single driver mounted on an infinite or open baffle will isolate electro-mechanical assymetries from pneumatic assymetries, because no chamber is present to be pressurized. Then, a single driver mounted to a box can be tested to see if this causes the cone to move further in one direction than another. And finally, a push-pull configuration can be tested, both in a box and on an open baffle. This series of test conditions would illustrate pretty well how much assymetry is present, and if there is enough to measure, what the major causes are.Honestly, after thinking about this, my gut feel is that we may not see a benefit that justifies the cost. Certainly, if more power is required than a single motor can deliver, then the cost of a pair of motors may be justified and in this case, mounting in push pull may be worthwhile. But I think that if my budget is fixed at say, $300, then I would probably rather buy a high-quality $300 woofer with low distortion than two lesser quality woofers costing $150, mounted in a push-pull configuration.Those are just some thoughts I've had since we discussed this configuration a few months back. It would be good to have some accurate data that could confirm or deny this, but I think for now, I'm sticking with the idea that it is probably better to buy one of the best you can afford rather than two of a lesser price.