Sensitivity to Variables

There is a reason why cone breakup has been such a problem for the industry. While cone breakup is a cone problem, it is sensitive to a few very important off-the-cone variables.

For this imperfect investigation of the problem, I offer two five-inch diameter transducers. The two transducers use identical soft parts. Soft parts includes the cones. The two transducers have the same cone.

There are three differences. The height of the baskets is different. One is shallower.

The two voice coils have different windings. One is lower in inductance. The lower inductance voice coil is capable of feeding higher frequency energy into the system.

Finally, and most important, because the height of the baskets are different yet the cones are the same, the mounting position on the voice coil former is different. With the shallow basket, the cone mounts much closer to the top of the voice coil winding than on th deeper basket.

Figures one and two show the impulse and frequency response of the soft parts mounted in the deep basket with the higher inductance voice coil winding.

Figure One. Impulse response of deep basket five-inch polypropylene cone transducer.

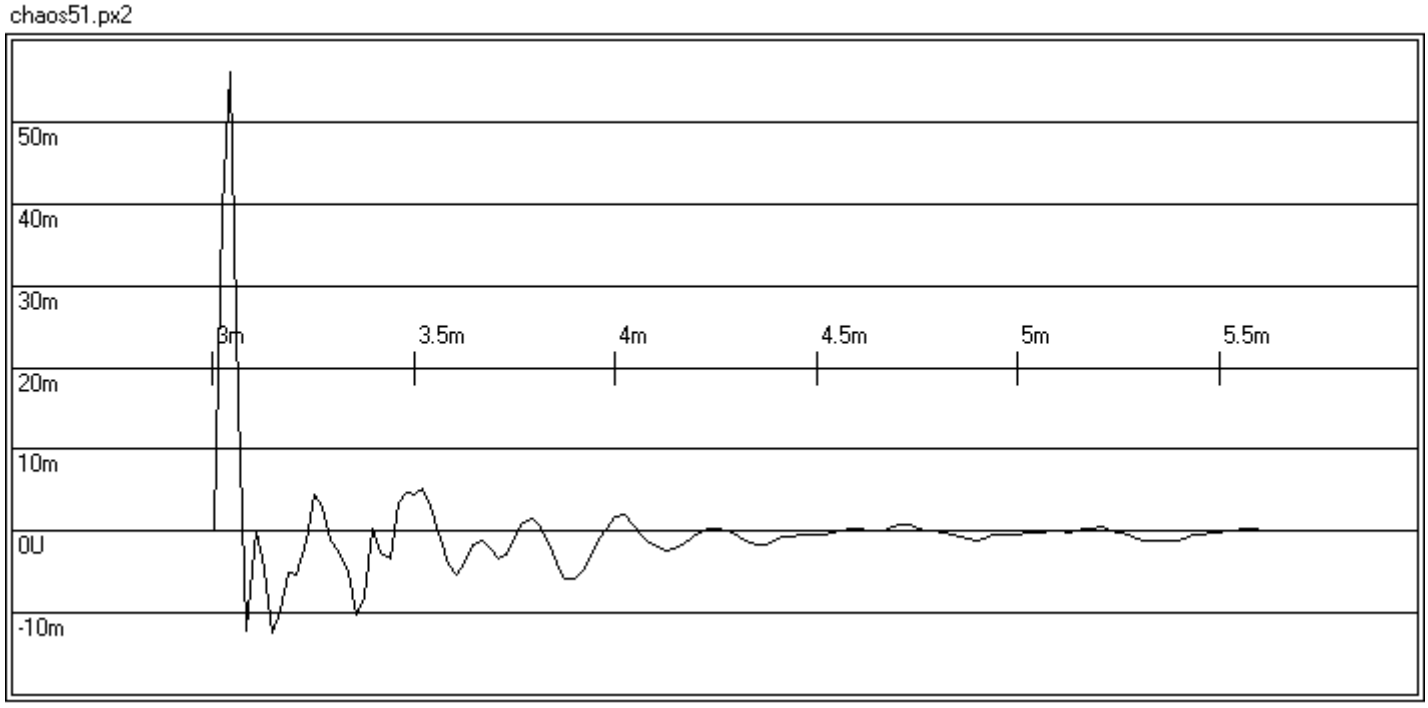
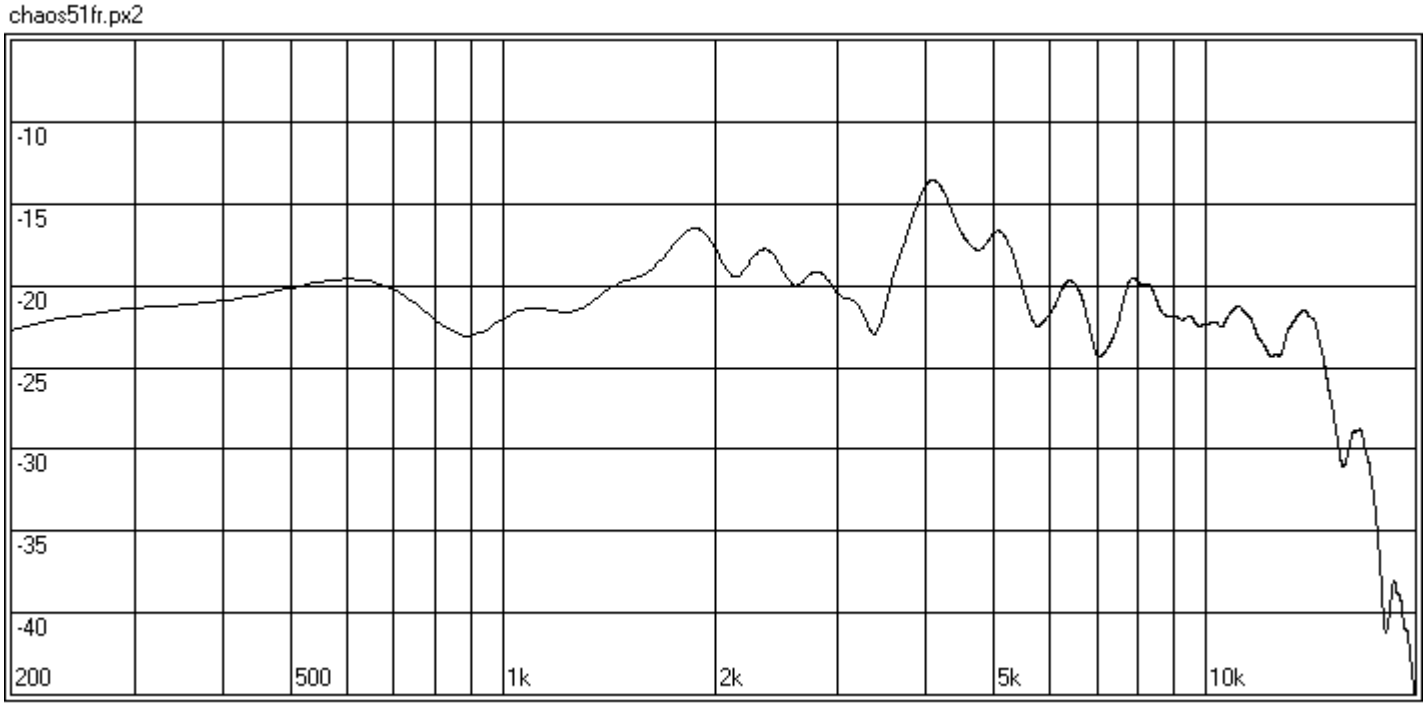


Figure Two. Frequency response of deep basket five-inch polypropylene cone transducer.



Figures three and four show the impulse and frequency response when the soft parts are mounted in the shallow basket with the lower inductance voice coil winding. The lower inductance voice coil gives the transducer a little more high frequency response. Even ignoring this high frequency difference, by performance, there is little to indicate that identical soft parts are used in the two transducers. The vibration mode pattern has completely changed. The old vibration modes have disappeared and new one have appeared.

While the cone is identical for the two transducers, it is still the vibration modes in the cone that is responsible for most of the differences in performance. And it is a variable off the cone that is causing the different patterns of vibration modes. The critical variable in this case is the change in where the cone mounts to the voice coil former.

The height of the cone is the same, but the basket is shallower. As a result, the cone attaches to the voice coil former closer to the top of the voice coil winding. That change is what is causing the different vibration modes.

Figure Three. Impulse response of identical soft parts mounted in shallow basket and with lower inductance voice coil.

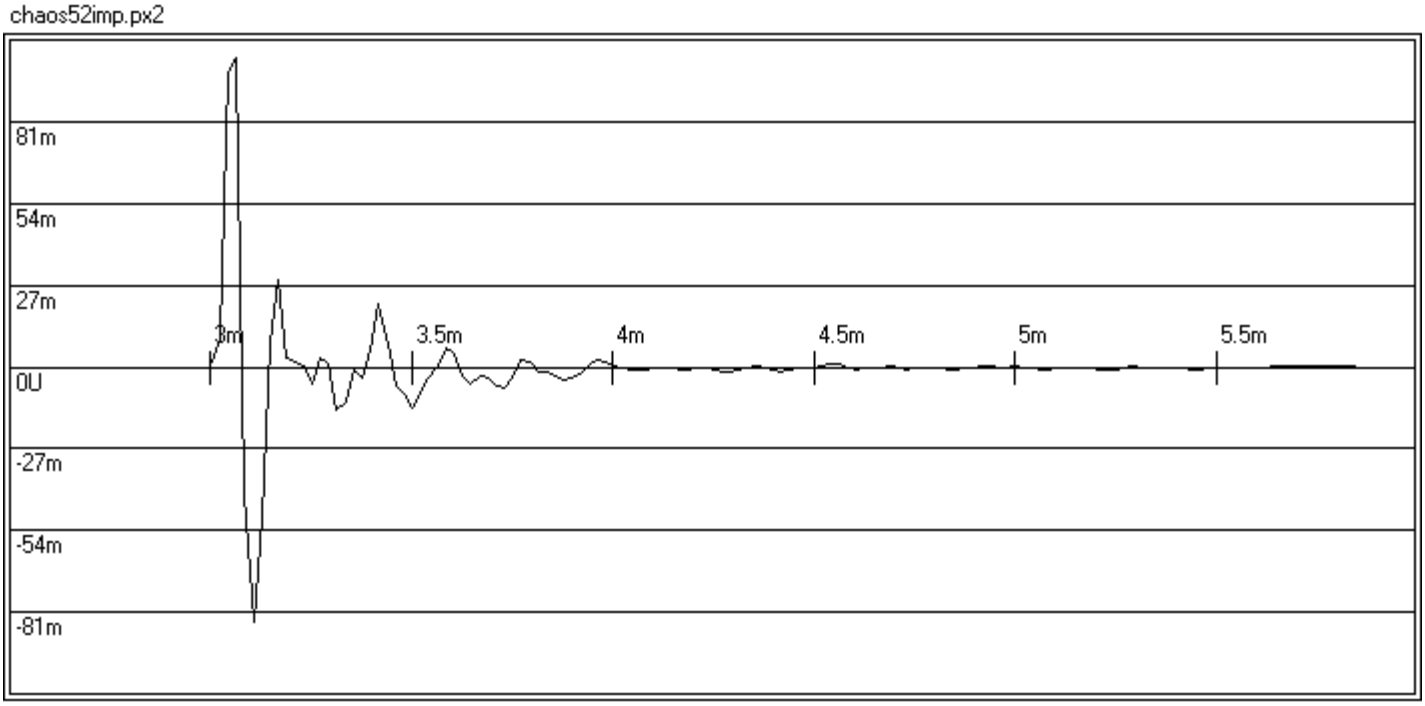
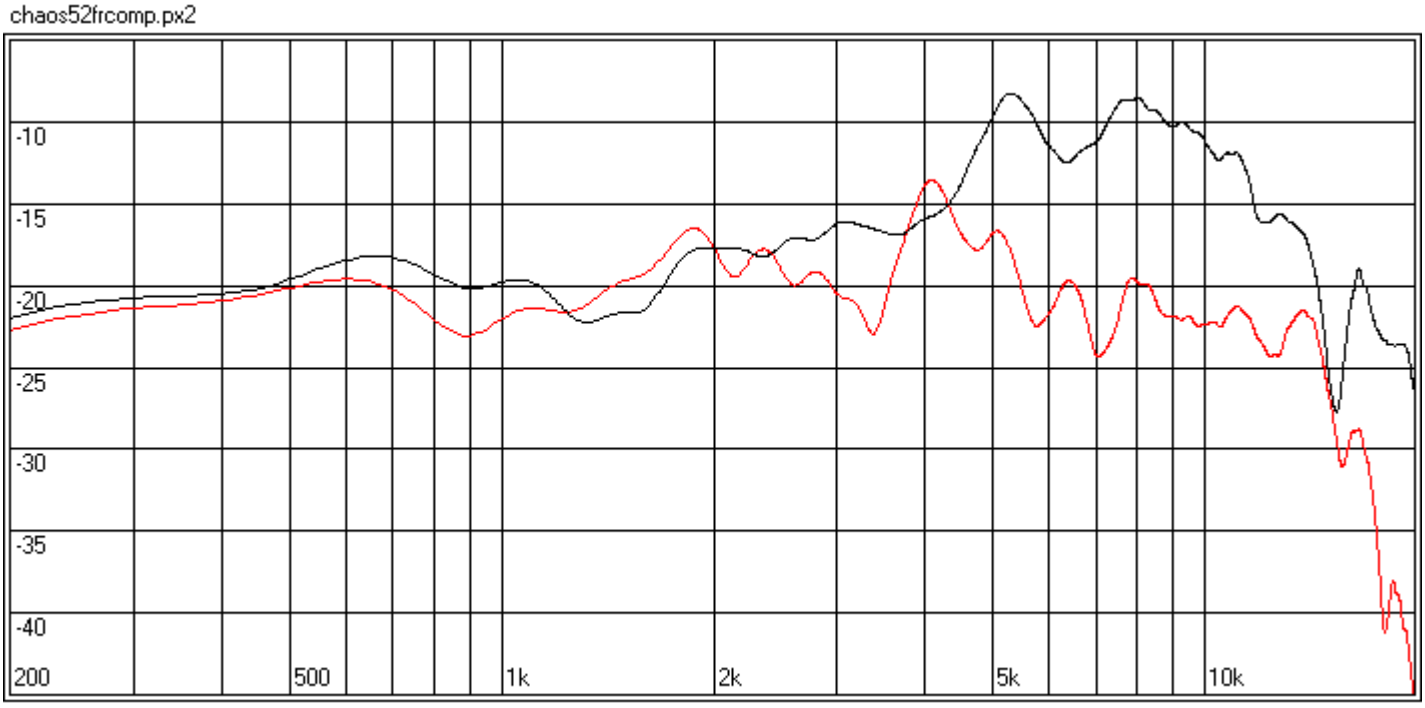


Figure Four. Frequency response of identical soft parts mounted in shallow basket with lower inductance voice coil. Deep basket frequency response overdrawn in red for easy comparison.



While the change in the attachment of the cone to the voice coil former is why the response changed, it is still the cone that is vibrating differently. Despite the complexity and severity of the vibration modes with the shallow basket transducer, even this cone can be turned into a Whispercone ™.

Figures five and six show the impulse and frequency response of the shallow basket five-inch transducer after the cone has been dimpled to turn it into a Whispercone. By making the cone a Whispercone, the response is now significantly better than it was for either the deep or shallow baskets.

Figure Five. Impulse response of shallow basket five-inch transducer with cone modified to Whispercone ™ standards.

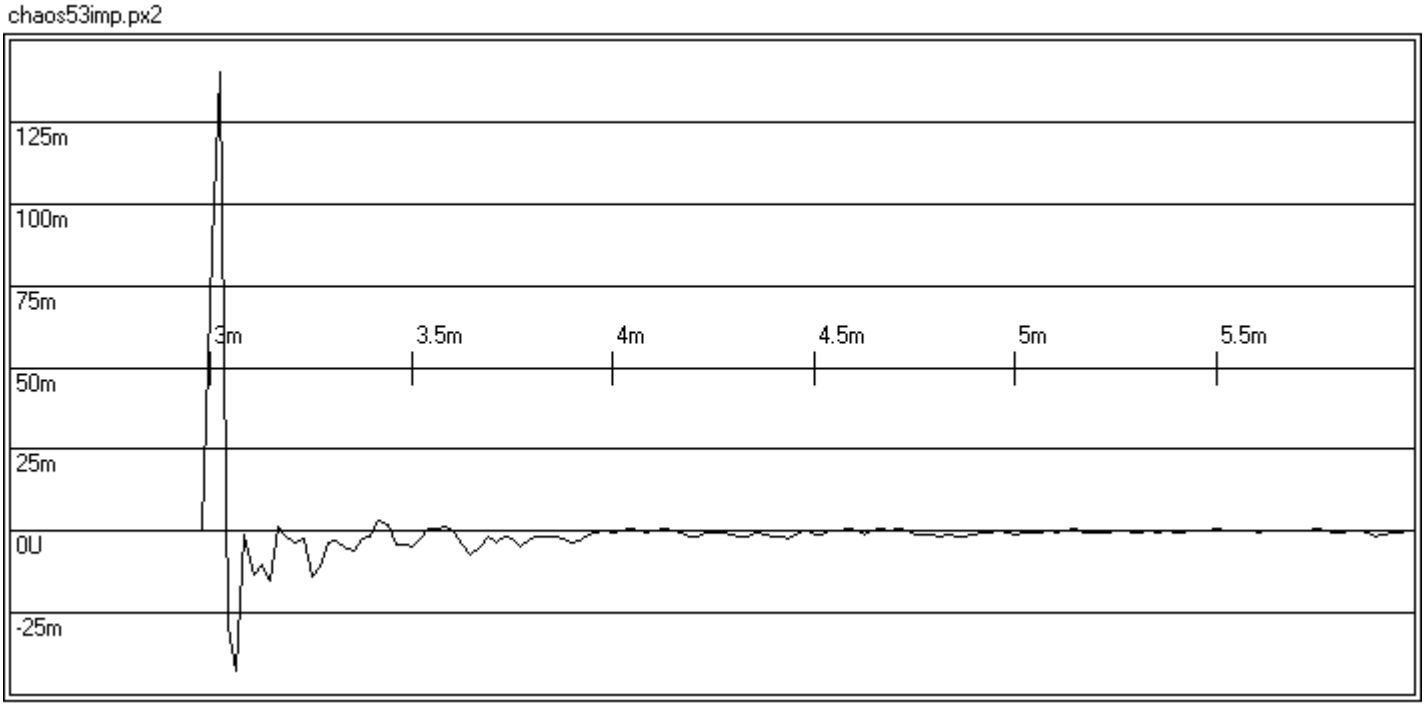


Figure Six. Frequency response of Whispercone ™ shallow basket five-inch transducer. Stock shallow basket response is overdrawn in red for easy comparison.