

(2) My other gripe, the equation does not account for energy beyond the -6 db down points, look at the table below.

HORN #1

freq	spl at 1/2 coverage angle in horizontal					spl at 1/2 coverage angle in vertical					DI
	45deg	50deg	55deg	60deg	65deg	30deg	35deg	40deg	45deg	50deg	
1k	-6db	-8db	-5db	-3db	-6db	-6db	-7db	-5db	-3db	-7db	7.5

You can see that the coverage angle by definition of this horn is 90x60 at 1k which results in a DI of 7.5. Now check this one out.

HORN #2

freq	spl at 1/2 coverage angle in horizontal					spl at 1/2 coverage angle in vertical					DI
	45deg	50deg	55deg	60deg	65deg	30deg	35deg	40deg	45deg	50deg	
1k	-6db	-8db	-9db	-11db	-13db	-6db	-8db	-9db	-11db	-13db	7.5

Again by definition, horn 2 has the same DI. the difference? In the real world horn 1 would be putting more energy where we don't want it.

When I first started playing with THX criteria for our cinema products I soon found out why they wanted us to take so many frequency responses around the speaker and it was to obtain a true directivity index. If you average all the freq response curves that you take around the speaker or horn and average them, you get a power response. If you subtract that power response from the on axis response, you get.....ta da.....a true DI. and in fact, Floyd Toole describes why it is advantageous to use this. So using this method, horn #1 would have a DI of about 6 while horn #2 would have a DI of 7.5 and now the number correlates to what we hear.