



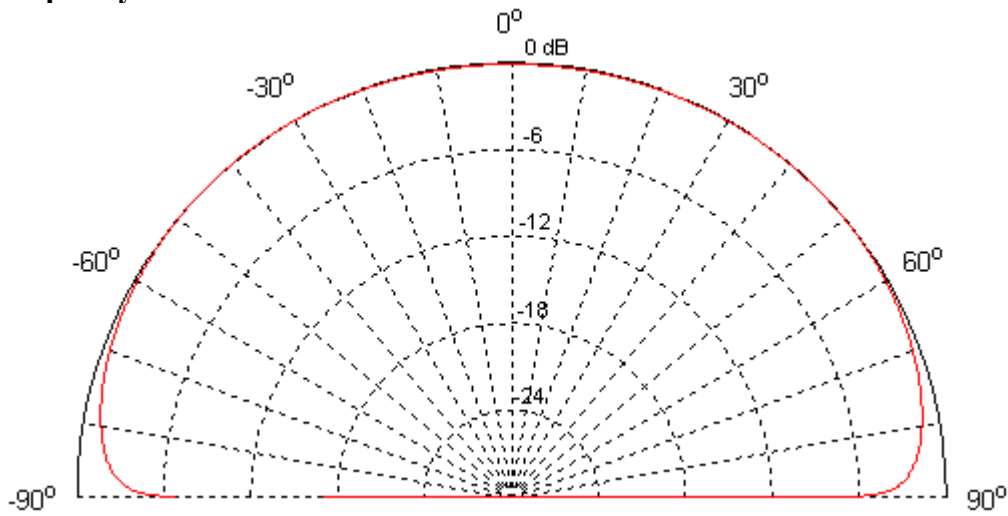
Pragmatic PHA family of high-performance line-array speakers in Public Address (PA) Systems

Pragmatic PHA family of high-performance line-array speakers offer unique advantages in Public Address (PA) systems applications over other traditional PA Systems and other line-array / column speakers utilizing 3" and 4" speakers. Traditional PA Systems are heavy and bulky, based on standard large speaker drivers, usually horn drivers and 15" to 18" sub-woofers. These act as point sources with standard sound dispersion performance. The sound intensity or loudness (dBspl) of these systems is much higher near the speakers and drops off at an inverse square rate of $1/d^2$ (d is the distance from the speaker) The sound intensity drops off exponentially and hence listeners at a distance have a much reduced sound level, making it difficult to listen to the program.

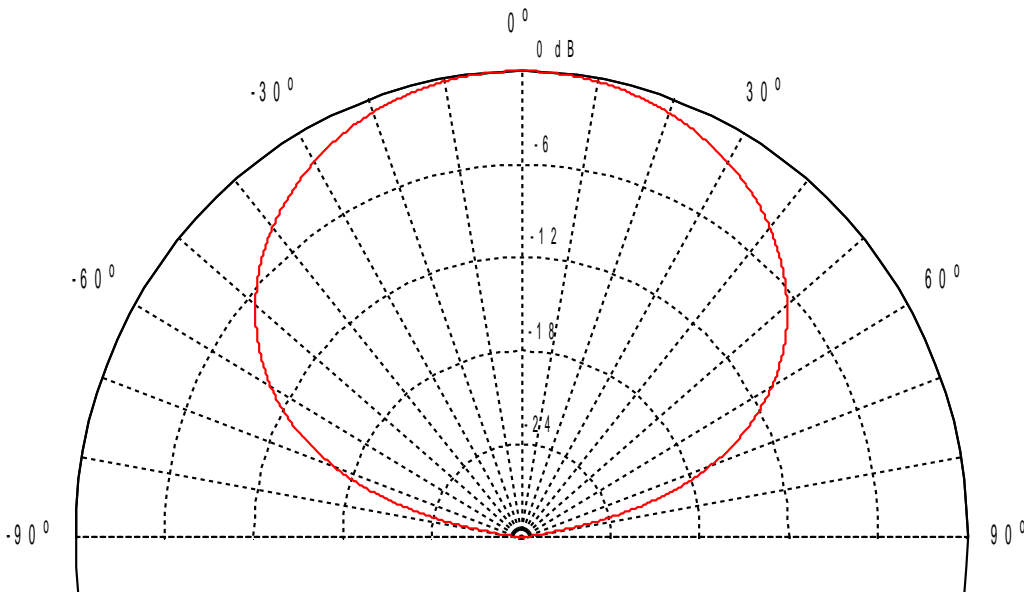
Many manufacturers have introduced vertical array / column speakers with an accompanying sub-woofer as an alternative solution to the traditional PA Systems. These columns use a few 3" or 4" speakers for the mid to high frequencies, typically 6 to 8 speakers used in their column speakers. Some manufacturers compliment these mid-range speakers with a couple of high-frequency tweeters. The accompanying sub-woofers typically use 10" to 12" speakers. These column speakers offer many advantages over the traditional PA Systems. They usually have a better sound dispersion compared to the traditional PA systems and the sound intensity does not quite drop off at the inverse square rate of the distance to the listener. Unfortunately, the 3" and 4" speakers also introduce some additional problems due to its size. Combing effect is observed in the mid-frequency range for all of these manufacturer's speakers. One manufacturer positions the speakers off-axis to minimize the combing effect, but doing so also eliminates the advantages offered by the line-array effect. Another manufacturer has used digital signal processors (DSP) to mitigate the combing effect in the mid-frequency band at an increased cost and power penalty. Others do not address these combing issues in the mid-frequency band at all. Also, these PA systems are closed solutions and systems designers find it very difficult to use third-party amplifiers, mixers or sub-woofers with these column speakers.

Pragmatic offers a very unique solution for the PA System with its high-performance line-array speakers and a high-efficiency compact sub-woofer. The Pragmatic line-array speakers use unique 1" high-performance full-range speakers in a vertical column. These small piston speakers with its unique array positioning completely eliminate the combing effect in the audio spectrum. It produces a very uniform sound dispersion and a very linear sound intensity drop-off. Hence the sound level for listeners at a distance is also very high, making it easy to listen to the program. The Pragmatic PHA family of line-arrays are complimented with 8" or 12" sub-woofers. The modular design of the Pragmatic PA System, allows systems designers to mix and match between the various sizes of arrays, sub-woofers and mixer/power amplifier combinations. They can also use the Pragmatic line-array speakers with other manufacturer's sub-woofer, mixers and power amplifiers to truly customize their PA Systems solutions. The horizontal dispersion plots at various frequencies show the performance difference between Pragmatic PHA family of line-arrays and other manufacturers columns speakers.

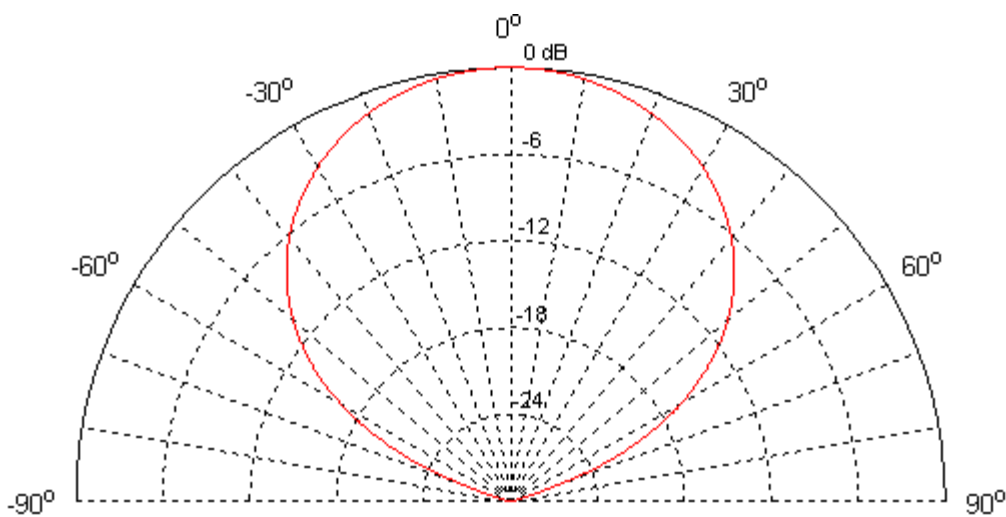
**Horizontal dispersion plots of Pragmatic PHA and other manufacturers with 3" and 4" columns
Frequency = 2.5KHz**



Pragmatic PHA
family of speakers

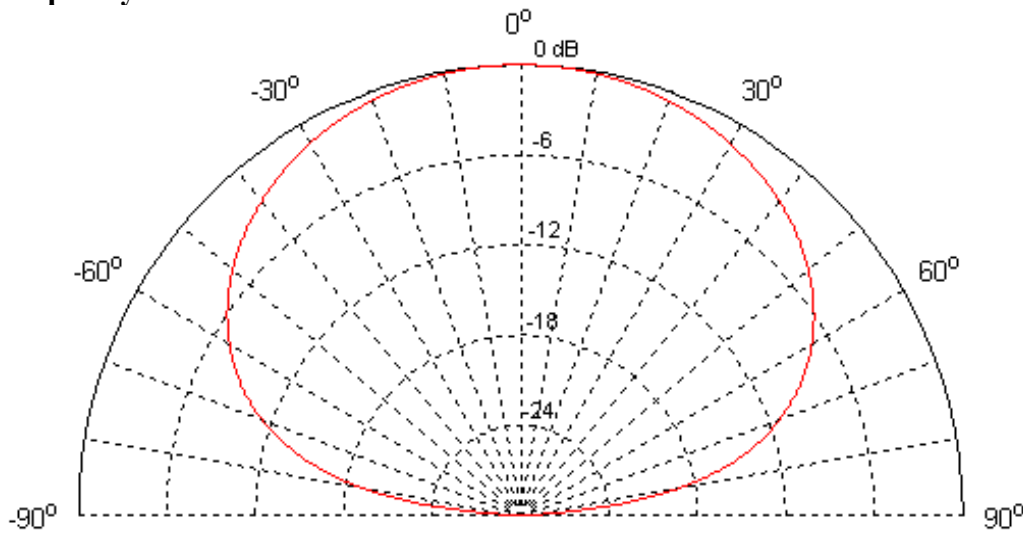


Manufacturers with
3" speakers in their
column array

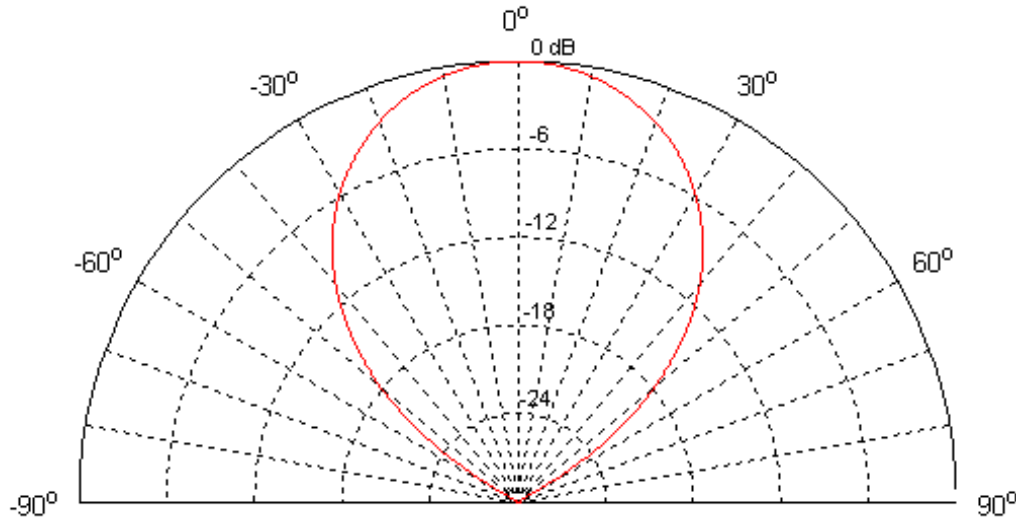


Manufacturers with
4" speakers in their
column array

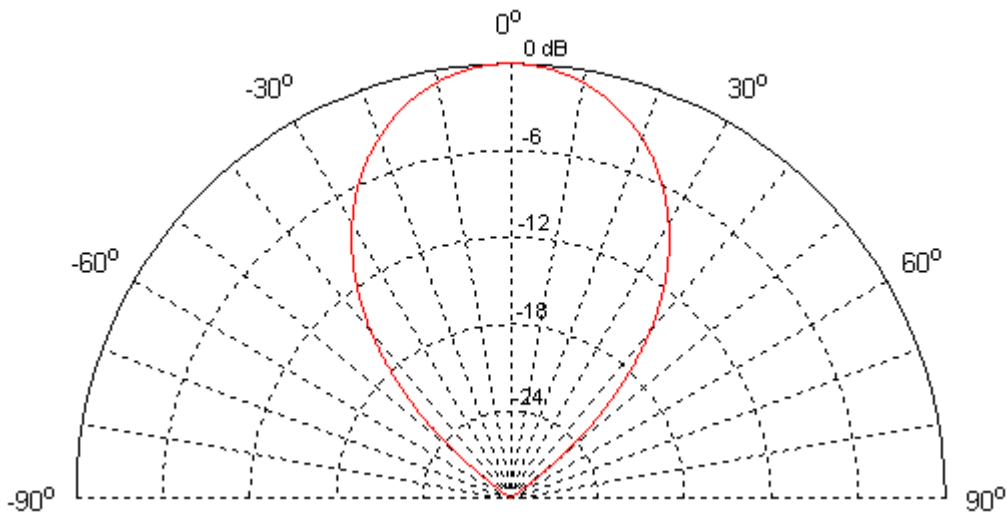
**Horizontal dispersion plots of Pragmatic PHA and other manufacturers with 3" and 4" columns
Frequency = 5KHz**



Pragmatic PHA family of speakers

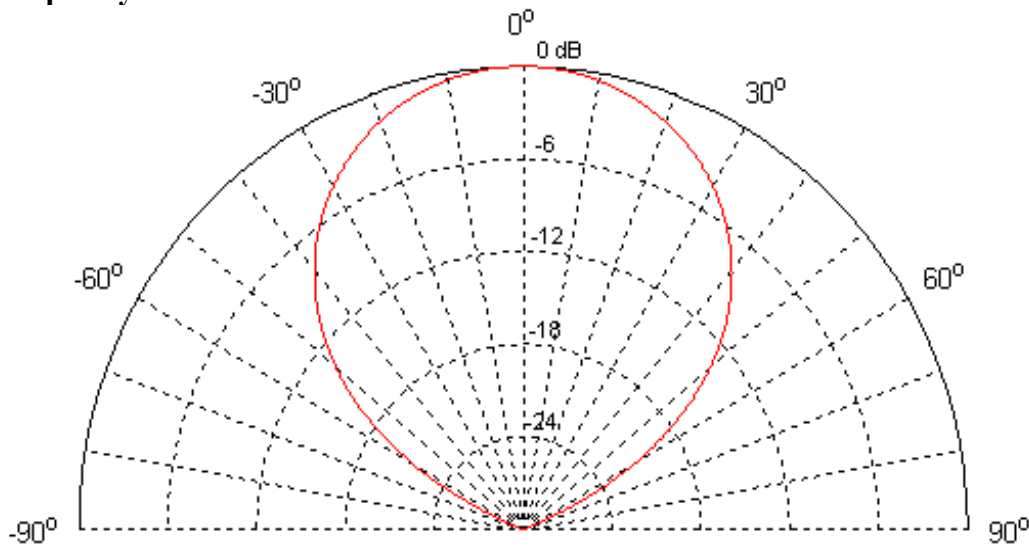


Manufacturers with 3" speakers in their column array

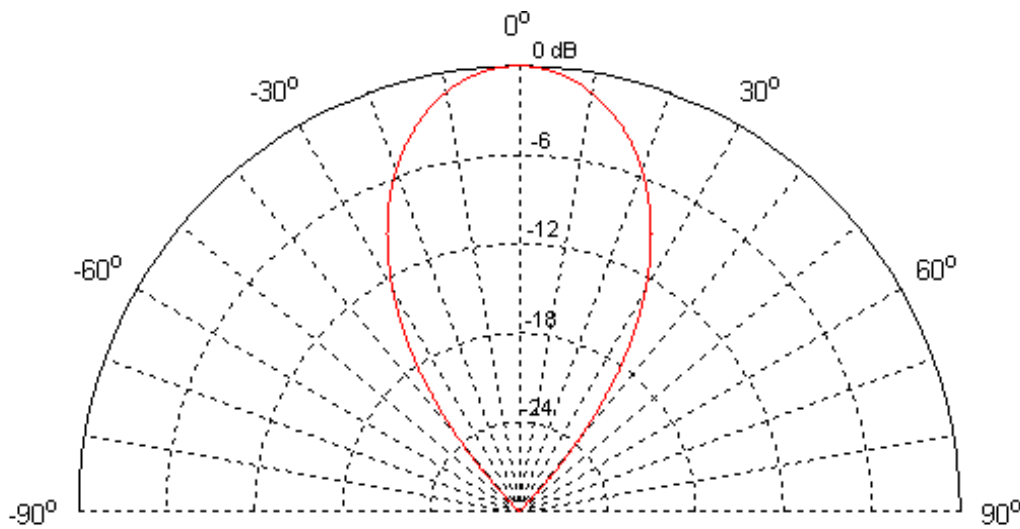


Manufacturers with 4" speakers in their column array

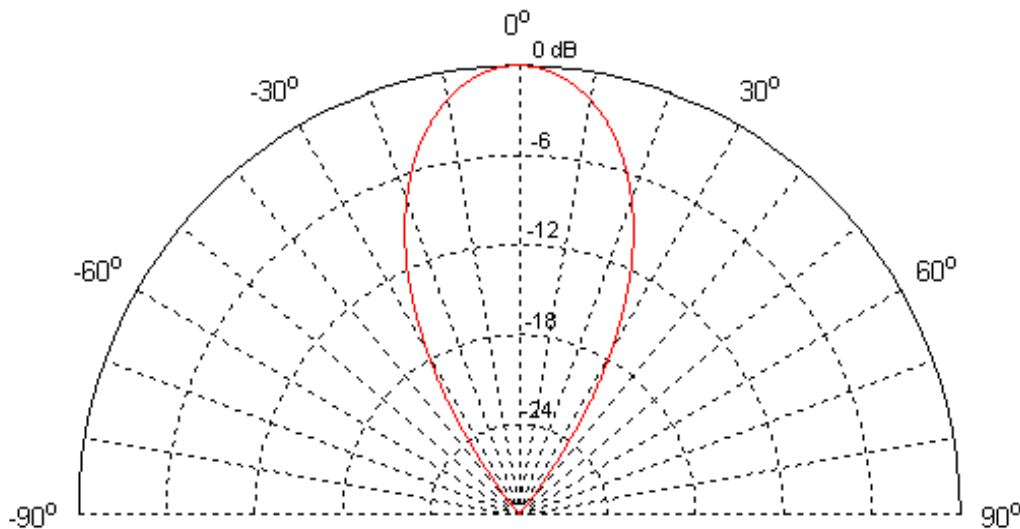
**Horizontal dispersion plots of Pragmatic PHA and other manufacturers with 3" and 4" columns
Frequency = 10KHz**



Pragmatic PHA family of speakers



Manufacturers with 3" speakers in their column array



Manufacturers with 4" speakers in their column array