

Sound Source Dispersion and Directivity Factor

Some of the most commonly overlooked aspects of sound reinforcement are also the most basic, and, as with the majority of subjects, the most basic are usually of the highest importance. An excellent case in point is the significance of sound source dispersion and directivity factor.

If a sound system is to be designed properly, these two concepts must be known and understood by the sound system designer. Yet, in the past, many designers have not been well versed with the effects that dispersion and directivity factor have on all sound systems. They have been unaware that these two factors can be utilized to extend the overall system's efficiency, increase intelligibility, and diminish unwanted room reflections. They have been unaware that misuse of sound source dispersion and directivity factor will in almost all instances cause a sizeable reduction in the performance of the sound system. It is for this reason this paper is dedicated to introducing the sound system designer to these concepts, and try to communicate the magnitude of these concepts clearly and without a tremendous amount of technical terminology. The following fictional narrative has been constructed to be helpful in understanding the importance of sound source dispersion and directivity factor.

Super Neeto Sound Company was in the process of installing a sound reinforcement system in a medium-sized church with a balcony. They had decided to try to uniformly cover the entire audience with sound from a central loudspeaker cluster mounted from the ceiling of the room directly over the minister's podium. Since the system was meant only to reproduce speech, a frequency response of 250 Hz to 5000

Hz would be totally acceptable. With this in mind, the company carefully chose the proper high frequency compression drivers and low frequency loudspeaker enclosures that would adequately generate the desired frequency response; and then picked out the horns that the compression drivers would be mounted on before being installed in the suspended loudspeaker cluster. Super Neeto Sound had decided to install three of the same 90 degree horizontal dispersion by 60 degree vertical dispersion horns with identical com-

pression drivers on each. The directivity factor of the horns was 6. They mounted the horns in a contiguous vertical array with each horn mouth aligned precisely flush with the next, and with the high frequency compression drivers in synchronization. To complement the horns they decided to install two 15-inch vent loaded woofer cabinets which would be mounted directly underneath the horns. The suspended loudspeaker cluster was then constructed and hoisted into place: the top horn was aimed at the center of the balcony seating section,

Figure 1.

