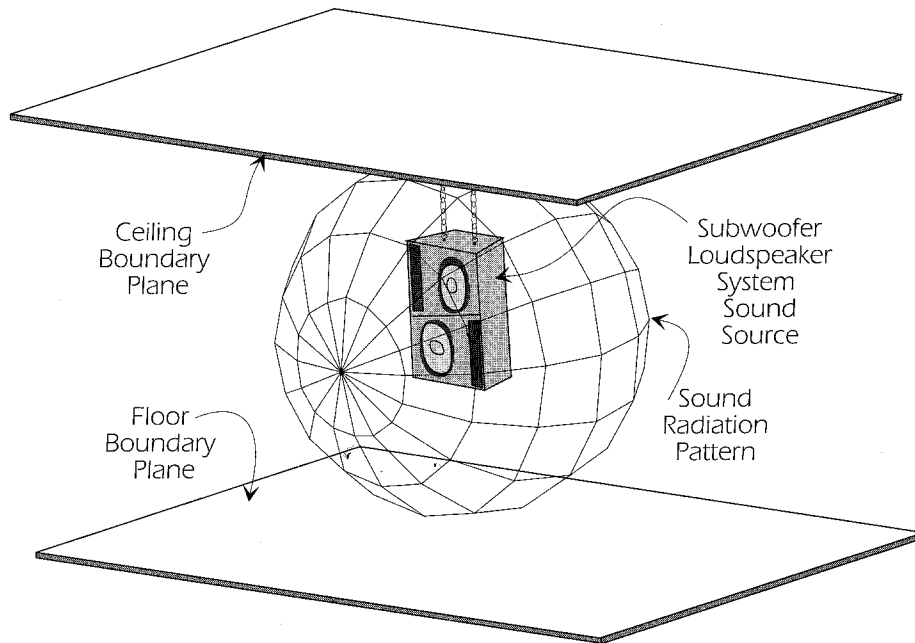


## APPENDIX A: SUBWOOFER PLACEMENT

The criteria for optimum subwoofer location are quite different than those for the main loudspeaker systems. While the main system is aimed for ideal coverage of the intended audience, the subwoofers' inherent omnidirectionality makes coverage virtually irrelevant. Subwoofers should be placed to optimize coupling to the room. A few examples of subwoofer placements and the effects they can have on performance follow.



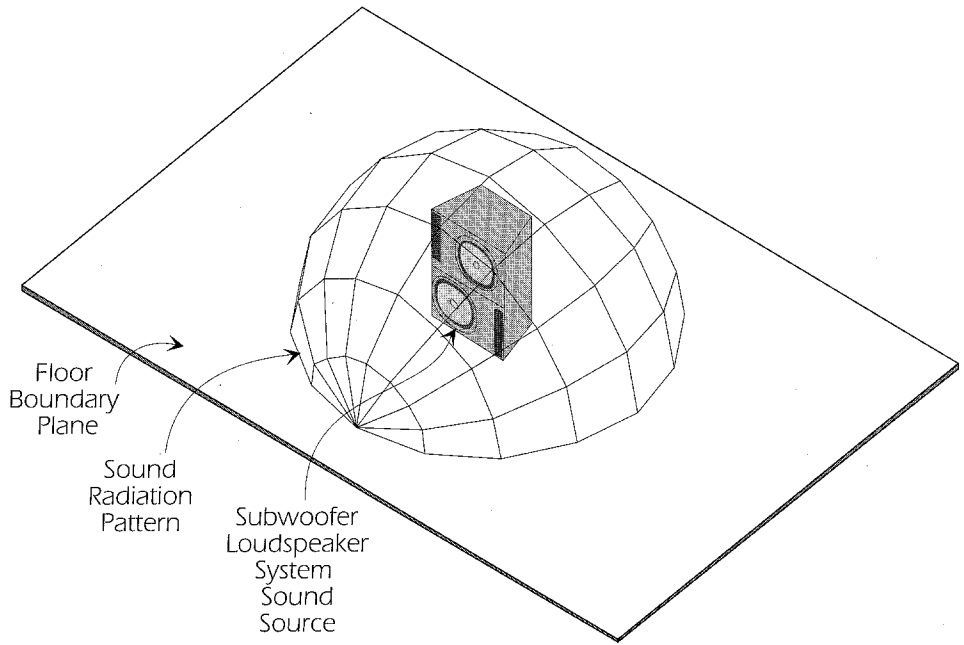
### Spherical Radiation

When a loudspeaker system is suspended in free field and is reproducing frequencies whose wave lengths are larger than the size of the front baffle of the system, it radiates energy into a full sphere, as pictured above. Long, low frequency sound waves do not "see" the baffle, so the system acts as a true point source, radiating equal energy in all directions.

Subwoofers are suspended in free field when they are flown or hung in arrays with full range systems. As the illustration above shows, half the sound energy is radiated up into the ceiling, and is totally wasted in all but very few applications. You will experience the same loss of apparent low frequency output when subwoofers are placed on portable staging. Since the portable staging is "transparent" to low frequency sound waves, the same spherical radiation occurs and the subwoofers cannot couple to the room properly.

Subwoofers should be stacked on the ground, floor or other acoustic barrier even if you are flying the main system. If you must fly your subwoofers, use the subwoofer +6 dB boost. You will still need double the number of subs to produce the same apparent low frequency level as ground stacking.

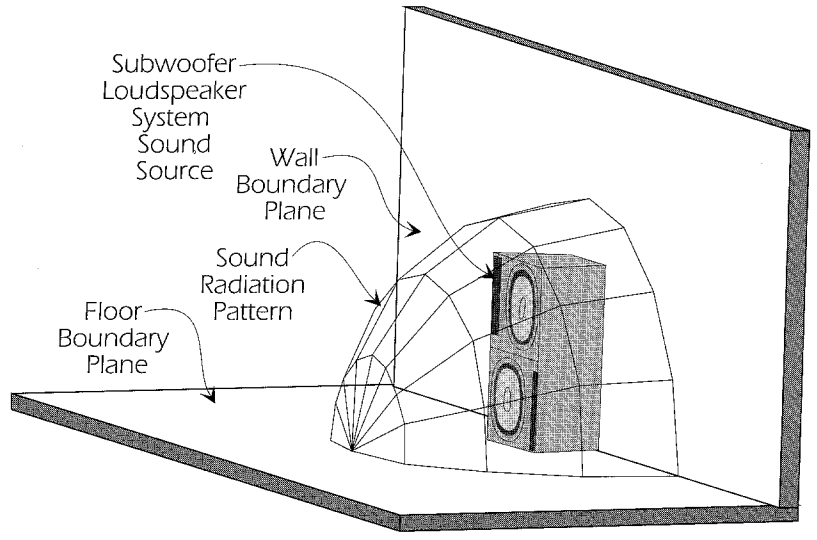
Most manufacturers, including EAW, specify low frequency systems into half space (see next section). You should decrease the rated sensitivity and maximum sound pressure level specifications by 3 dB (or half) if you plan to fly your subwoofers.



**Half Sphere Radiation**

Half sphere radiation, as its name implies, occurs when a subwoofer system is loaded into half space, by simply placing it on the floor. This increases the output at any point at a given distance within its radiation pattern by 3 dB as compared to its free field performance.

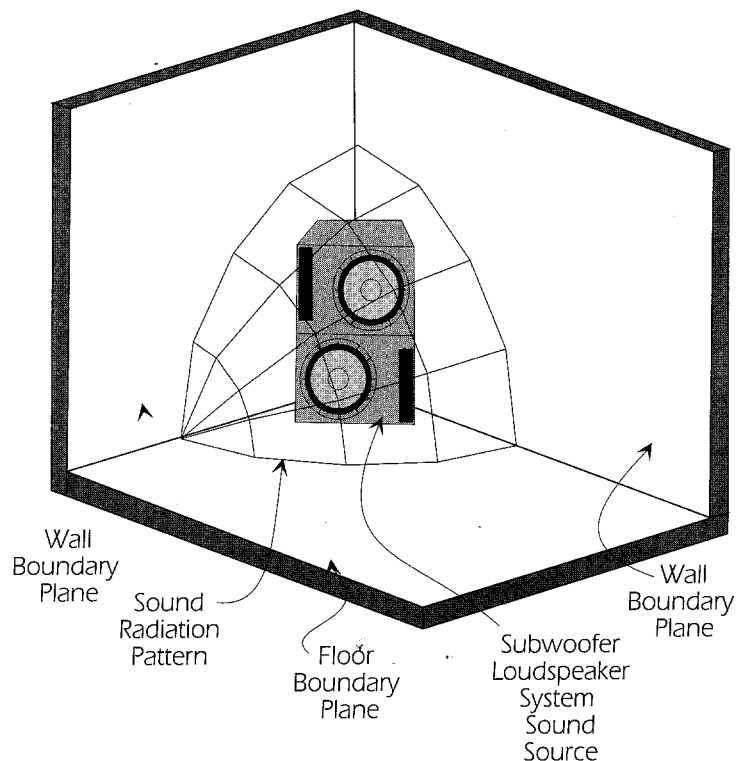
This is the typical situation in most applications, and the use of the sub bass boost EO becomes a question of personal taste. With most systems (KF300i/SB330) reference flat response occurs when the sub bass boost is defeated, but many people prefer a slightly emphasized deep bass and use the sub bass boost to produce it.



**Quarter Sphere Radiation**

Quarter sphere radiation occurs when the subwoofer is placed at the intersection of the floor and a wall. If a given venue allows this type of placement, it is a good way to increase low frequency output. It should be noted that for this placement to work the wall must be acoustically reflective at low frequencies. Most walls built with a wood frame and plaster do not reflect low frequencies. Instead, they pass them through or absorb them by vibrating sympathetically with the sound source.

Subwoofers placed so as to offer quarter sphere radiation exhibit 6 dB more output at a given distance than in free field and 3 dB more output than if radiating into half space. In most applications when a subwoofer is radiating into quarter space the use of the sub bass boost EQ is not recommended, unless you want strongly emphasized bass.



### **Eighth Sphere Radiation**

Eighth sphere radiation occurs when the subwoofer is placed on the floor in a corner. While this type of location is rare in portable applications, it can be effectively used in many permanent applications. As noted above, the walls must be rigid and acoustically reflective for this technique to work.

Eighth sphere radiation increases the output of a subwoofer at a given distance by 9 dB as compared to free field, 6 dB as compared to sitting on the floor in half space, and an additional 3 dB as compared to quarter space loading. In many installed applications, corner placement allows the use of fewer subwoofers than normal. The need for the sub bass boost EQ will be determined by the ratio of subwoofers to main systems in a particular application. Ideally audio test equipment would be used to determine the optimum MX300i setting in these conditions.