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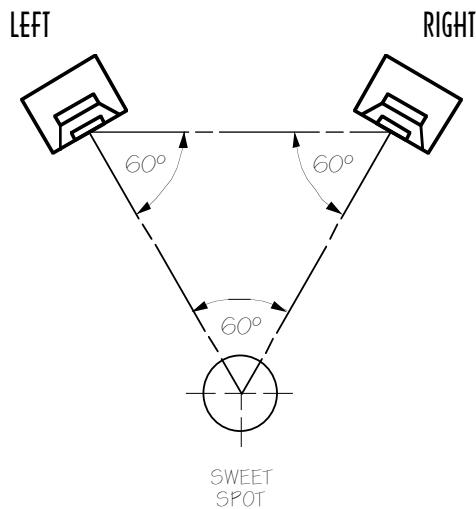
PLACEMENT OF SPEAKERS

The placement and the listening environment can completely compromise the performance of any speaker. No matter how much it costs or how flat its response can be, speaker performance can be very different than what we expect if it is in the wrong place... It is important to understand near-field speakers limitations and listening environment interaction to get the most out of a monitoring system.

FITS WITHIN A CIRCLE

The common practice for stereo listening dictates that both speakers must be equally distant between them and between the sweet spot, the acoustical center of the speaker must be at ear height pointing to listener's ears and the sound path must be free from obstructions.

The typical stereo layout is shown below:

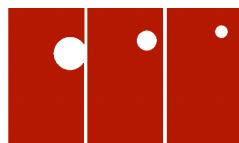


Left and right speakers are angled 30 degrees each side of the sweet spot centerline and speakers acoustical centers projections joins at sweet spot position.

A simple recommendation is to place the sweet spot behind the listener's head, not just in front of his face. It will make speakers point right to listener's ears.

When it is not possible to align speakers acoustical center at ear height, going higher and tilting them (a few degrees) will help keep the speakers pointing to listener's ears.

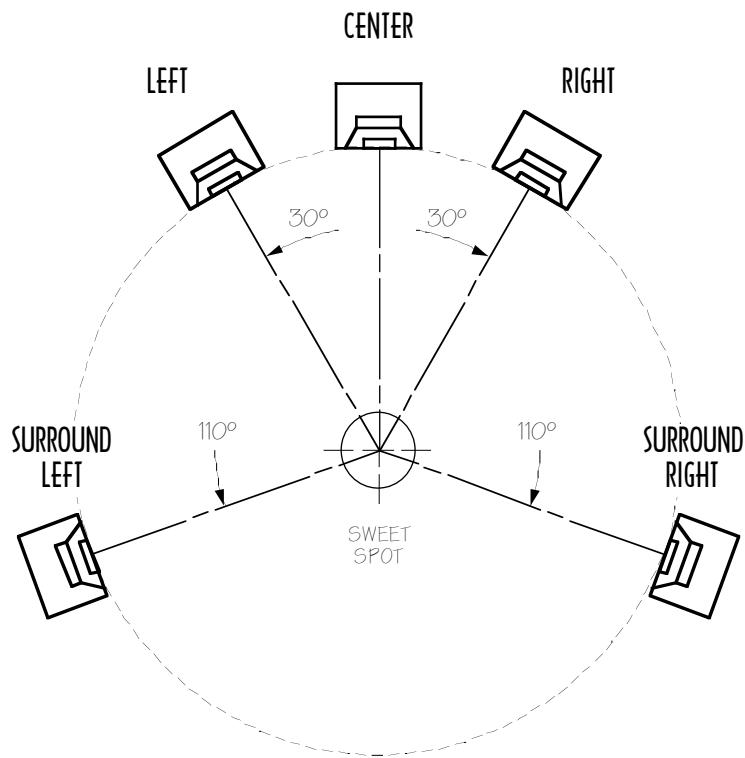
While in a stereo system similar conditions are applied to each speaker, surround 5.1 arrangement will not make the exception. Sometimes finding the right place for two speakers is a tough duty, can you imagine how hard could it be with six?



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The ITU (International Telecommunications Union) recommendation ITU-R BS 775-1 set the standard for the 3/2 stereo format. It provides one additional center channel and two additional surrounds channels to the existing left and right channels offering enhanced quality to the stereophonic presentation.

The 3/2 stereo layout is shown below:



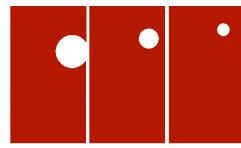
The left and right speakers remain in the same place maintaining compatibility between 2/0 and 3/2 stereo formats. A center channel symmetrically placed between left and right channels and two surround speakers angled 110 degrees from centerline completes the array.

30 degrees is the preferred angle for left and right channels, but sometimes they can be arranged a few degrees away (5 degrees max.), as there is a real source (center channel) and not a phantom image formed by a stereo pair.

Surround channels can be positioned with less restriction than front channels, as human perception is not so good in the rear.

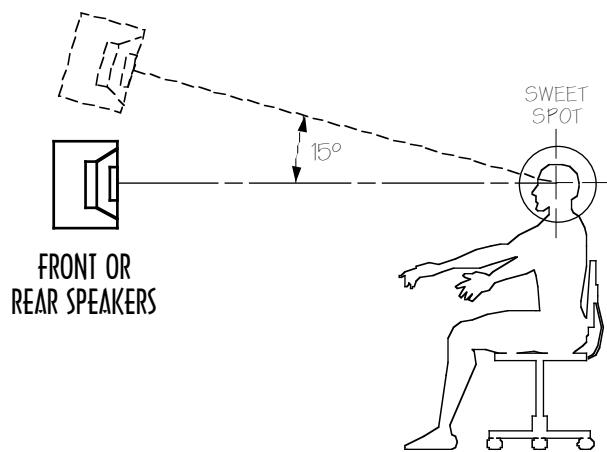
All channels sources must arrive at sweet spot at the same time. This means that all speakers should be at the same distance from the listening position (placed in a circle with the sweet spot at the centre of the circle). When it is not possible, the nearest speakers must be delayed in time to electronically equal the path traveled by the farthest speakers.

Correct aligned speakers will ensure the smoothest response of the system.



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Ideally all speakers should be placed at the same height in the horizontal plane with the acoustical centers at ear level. Sometimes speakers must be raised if windows or computers screens are in the way. As the system is intended for the horizontal plane "only" (there are no speakers above and below to allocate sources in the vertical axis), it is not recommended to go over 15 degrees to avoid perceiving sounds coming from above.



When choosing, designing or installing any speaker system there is a very important factor to consider: the listening distance. This information, provided by the manufacturer, specifies the range where we freely can move and keep listening to the speakers and, obviously, the limits for placing the sweet spot.