

USHER

Speaker Placement Guide

Whether experiencing Usher loudspeakers for the first time or upgrading your system, we're delighted you've joined our family! Our welcome gift is this Speaker Placement Guide with complete information, suggestions, tips and tricks for best speaker placement in your listening environment.

We encourage you to read it through!

USHER

Contents

Sound Quality	page 3
Basic Considerations	page 4
Room Resonance Modes	page 5
The Rule of Thirds	page 5
The Rule of Fifths	page 6
Long Wall Placement	page 7
Light Room Treatment	page 8
Tips and Tricks	page 9

USHER

Sound Quality

Sound quality at the listening position depends on a number of highly interactive elements such as the speakers' radiation pattern and the effects of the reverberant acoustic field in your room. Placement influences tonal balance, the soundstage (width, height, depth, overall size and focus/imaging), smoothness, clarity, integration, extension at the frequency extremes, plus power and control in the bass.

It's easy to hear the influence of these diverse elements by walking around the listening area clapping your hands. Listen for the room's slap-echo, how long or short the sustain is, and notice changes in the reverberant quality of the sound as you walk about the room.

Then play strong, bass-heavy source material and move very close to the corners behind the speakers. You'll notice the bass "loads up" and becomes louder and more exaggerated the closer you come to the corner.

Think of the reverberant sonic field as if it were water. The speakers' sound reflects off side walls, the wall behind the speakers, and even the ceiling and floor. All this in-phase and out-of-phase energy creates exaggerated sound pressure peaks and nulls (standing waves) as they cross each other. One way to visualize this is by putting a half-filled glass of water on top of your speaker. The ripples that form when playing music are a direct analogy of what's happening with the acoustic energy in your room. Hint: Don't leave the glass on the speaker for too long!

The actual sound you hear at the listening position is the sum of these elements. Following the suggestions in this Speaker Placement Guide, including some modest room treatment suggestions, you'll find yourself close to excellent sound. With ever smaller adjustments of the speakers and seating position, you'll find the perfect balance for your room. When you get it right you'll wonder how you ever did without!

USHER

Basic Considerations

Best results are achieved when the listener and loudspeakers form a triangle with the listener sitting precisely between the two speakers and slightly farther away than the distance between the speakers themselves.

The closer the speakers are to walls and corners, the bigger the bass.

Close-to-wall placement reinforces bass frequencies, also called room gain. The speakers' bass energy is reflected from the walls into the room in phase with the direct energy from the speakers. Both direct and reflected sound waves reinforce one another at low frequencies making for riper bass. The closer you get to the corners, the more bass you'll hear.

On one hand this leads to a simple fix for boomy bass; just move the speakers out into the room from the rear and side walls. Minimonitor-type speakers may benefit from the boost, but full-range floorstanders can sound congested with bass way out of control because of room modes. Back-corner placement also kills the sense of spaciousness, imaging, depth, and clarity.

USHER

Room Resonance Modes

Standing waves or boundary effects room modes are mathematical in nature. They're high and low pressure areas that reinforce or cancel certain frequencies creating peaks and dips in the sound. If you're sitting in a standing-wave peak, the bass becomes boomy. If you're in a standing-wave null, the sound becomes "sucked out", thin, diffuse with no "body". Room modes are related to the distance between parallel walls and the amount they're excited depends on speaker positioning. Three methods of determining correct speaker position are described below.

I. The Rule of Thirds

One successful placement plan is called the Rule of Thirds. It calls for the speakers to be placed a third of the way out into the room from the wall behind the speakers and a third of the way in from each side wall. And the listening position should be a third of the way in from the wall behind the listener. Fine tune by nudging the speakers and the listening chair back and forth until the frequency response smoothes out, the bass becomes linear and tight, and the soundstage locks in as you adjust toe-in.

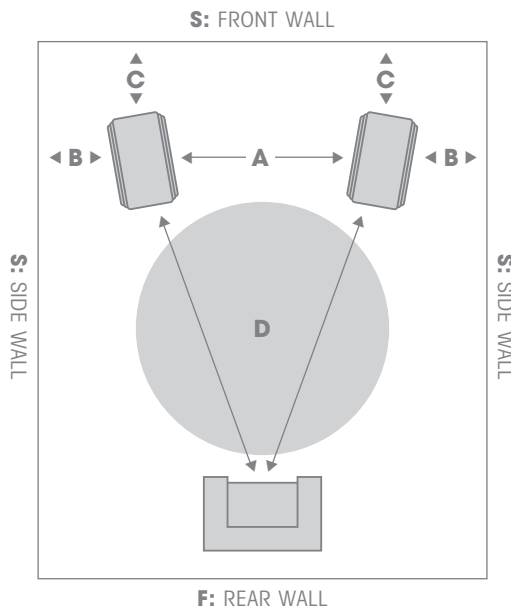
When applying the Rule of Thirds you may still wind up fighting the room's resonant modes depending on the room's measurements. One solution is to place your speakers by the Rule of Fifths instead of thirds.

USHER

II. The Rule of Fifths

The Rule of Fifths states that the distance between the speakers and the wall behind them should be approximately 20% of the total length of the room. And the distance from each speaker to the closest side wall should be about 20% of the total width of the listening room. The distance from the listening position to the wall behind the listener should be about the same as the distance between the speakers and the front wall, or about 20% in. Figure 1 below illustrates The Rule of Fifths.

D > A · B ≠ C · B > 60 cm · C > 50 cm / S: Absorptive Panel / **F:** Diffuser Panel



◀ **FIGURE 1: The Rule of Fifths**

- **D** (distance from speaker to listener) greater than **A** (distance between speakers)
- **B** (distance from speakers to side wall) not equal **C** (distance to wall behind speakers)
- **B** (distance from speakers to side wall) greater than 24 inches / 60 cm
- **C** (distance from speakers to side wall) greater than 20 inches / 50 cm

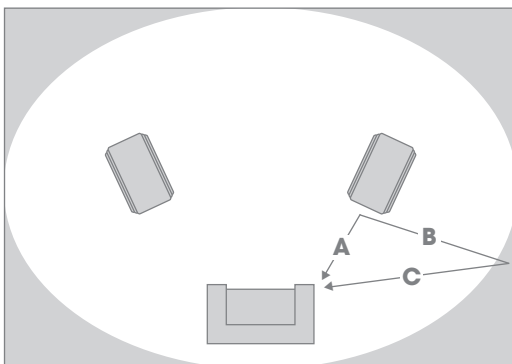
USHER

III. Long Wall Placement

Yet another set-up strategy places the speakers at the two center points of an ellipse that “touches” the four walls in a rectangular room. This calls for a listening position 1’ to 3’ from the wall behind the listening position. The direct sound from the speakers reaches the listener well before confusing side-wall reflections.

In a long wall setup the distance from the speaker directly to the ear (A) should be at least 5’ less than the sum of the distance from the speaker to any reflective surface (B) plus the distance of the reflective surface to the ear (C). The secondary reflected energy arrives at least 5 milliseconds after the primary direct-arriving sound. In Figure 2 below, the speaker to ear distance (A) is 6’. The speaker-to-wall distance (B) is 5’, and the wall-to-ear distance (C) is 8’, totaling 13’. 13’ (B+C) minus 6’ (A) equals 7’. In this case, distance (A) is 7’ less than the sum of (B) and (C), so this is an optimum setup.

In figure 2, note the close proximity of the listener's head to the rear wall. Room boundary modes are suppressed as sound pressure is high but the velocity low. So sitting in that maximum pressure area yields the deepest bass. And since the reflections there are shorter than the circumference of the listener's head, you won't sense the time delay. If your brain can't localize reflections it ignores them.



◀ FIGURE 2: Long Wall Setup

- Distance **A** must be at least 5 feet less than the sum of Distance **B** + Distance **C**

USHER

Light Room Treatment

There's no need to cover your walls with tuning panels! Using light acoustic treatments to absorb or refract first reflections points will fine tune the sound even further. Have a friend hold a flat mirror up against both side walls around tweeter height. Sit in the listening position and ask your friend to move the mirror back and forth until you see the tweeter of the near speaker reflected there. Mark that position and, for even better results, ask your assistant to move back until you can see the tweeter of the other speaker in the mirror. Mark that point too. Do the same for the other channel.

There are many commercial products in the market, some of them quite discreet, that you can use to tamp down these first reflection points. You'll be amazed at how minimizing these first and second reflections cleans up and liberates the sound at the listening position. Then you'll hear even more dramatic results from moving the speakers back and forth, closer and farther apart.

USHER

Tips and Tricks

- Generally speaking, the farther away from the wall behind the speakers you are, the more depth you'll hear in the soundstage.
- Nearfield (close to speaker) listening in highly reflective environments lowers muddling room acoustic interference. Minimizing room reflections optimizes first-arrival sounds at the listening position.
- Toe the speakers in towards the listener's ears and experiment with widening the angle to find the best compromise between center-fill, image focus, the overall size of the soundstage, and high frequencies that are open, fast, and detailed, but not bright or edgy. As you fine tune, the sense of bass articulation and detail begin to emerge from the pressure zones you've soothed. Experiment by moving the listening chair back and forth while changing toe-in.
- Movements of only a few inches of toe-in or speaker/listening chair distance can make the difference between average and superb sound. In asymmetric rooms, adjust the speakers one at a time to achieve the same balance.
- When the sound locks in, and you'll know it when you hear it, install the spikes. Avoid damaging your hardwood or tile floor with spike protectors. Adjust each spike so the speaker is level and stable. The spikes contribute towards tighter bass with more solid and dynamic sound, plus they reduce high-frequency modulation regardless of the flooring material or construction.
- When setting up bookshelf speakers use a speaker stand that places the tweeter at the average height of a seated listener's ears without spikes.
- Avoid placing objects near the speakers which may cause unwanted reflections.

USHER

Tips and Tricks

- When possible avoid placing any large objects between the speakers and the listening position, i.e., glass-topped coffee tables. They'll degrade the tonal balance and imaging while producing unnaturally harsh upper frequencies in most cases.
- Best acoustics are achieved with a listening room as close to acoustically neutral as possible; not too bright from too much "slap echo" off hard surfaces, and not too dead sounding because of an over-damped room.
- If your room is square rather than rectangular and its numbers aren't good for avoiding frequency peaks and nulls, rotate the system by 45 degrees and point your speakers diagonally into the room!
- If damping an acoustic hot spot on the left side wall requires that you place absorbent material there, position the opposite wall's absorbent material a few inches off for a more broadband overall effect.
- Since resonant modes are nondirectional (existing at both listening and speaker positions), you can station a single speaker in your listening position and walk around the room making a grid showing bass-rich and bass-shy areas.

Enjoy your new Usher speakers!