

Height Speaker Cheat Sheet

Why height content disappears in a mix, and the levels, delays and choices that make it read as height.

Why heights hide

We place sounds vertically mostly from high-frequency cues shaped by the outer ear. Without them, the brain has little reason to put a sound overhead.

Heights tend to vanish when the content is:

- **Dark.** Little energy in the upper range, so no elevation cues.
- **Low in level** next to a full front pair that masks it.
- **Identical to the front pair.** Correlated copies fuse toward the louder or earlier speaker.

The soloed vs. in-context gap

A height pair can sound carefully designed when soloed and disappear once the front pair plays. Always check both.

How to make heights read

- **Give them something unique.** An element, reverb or texture the front pair does not carry.
- **Keep some top end.** Air, transients and upper harmonics carry the elevation cue.
- **Decorrelate.** A different reverb, a short delay or a slightly different EQ keeps heights from collapsing into the front.
- **Set level on purpose.** Decide whether heights should support or be heard, then check it in context.
- **Use time carefully.** Small offsets add space; larger ones turn into echoes (see the delay table).

Common height choices

OFTEN WORKS	USE WITH CARE
Reverb and room returns	Kick, bass and sub content
Vocal ambience and pre-delayed effects	Dry lead vocal
Pads, strings, choir, shakers	Exact copies of the front mix

Level ratios in decibels

WHAT YOU HEAR	AMPLITUDE	DB
Equal	1.0	0
About three quarters	0.75	-2.5
About half	0.5	-6.0
About a quarter	0.25	-12.0
About a tenth	0.1	-20.0

dB = $20 \times \log_{10}(\text{amplitude ratio})$. Ears judge loudness, not amplitude, so treat estimates as rough.

Delay between speakers

DELAY	USUALLY HEARD AS
Under about 1 ms	The image shifts toward the earlier speaker
About 1 to 30 ms	One fused sound at the first arrival (precedence effect), with added width or color
About 30 to 50 ms	The edge zone; depends on the material
Over about 50 ms	A separate echo

Thresholds vary with the signal. Sharp transients reveal echoes sooner than pads or vocals.

Height checklist

- ☐ Solo each height pair, then listen in context
- ☐ Top fronts vs. top rears: same content, different time or level?
- ☐ Is anything in the heights that is not in the front?
- ☐ Is there enough top end for the content to read as height?
- ☐ Check the binaural render on headphones
- ☐ Check smaller layouts and the stereo fold-down
- ☐ Note playback level so you can compare later

Questions to ask every mix

- What does the height layer add that the floor does not?
- Can you hear the heights with everything playing?
- Does the height content change between sections?
- Would the song lose anything if the heights were muted?

Go deeper

The full Atmos Mix Analysis Workbook walks through all seven speaker pairs with a complete worked example. Free at hinotesound.com.