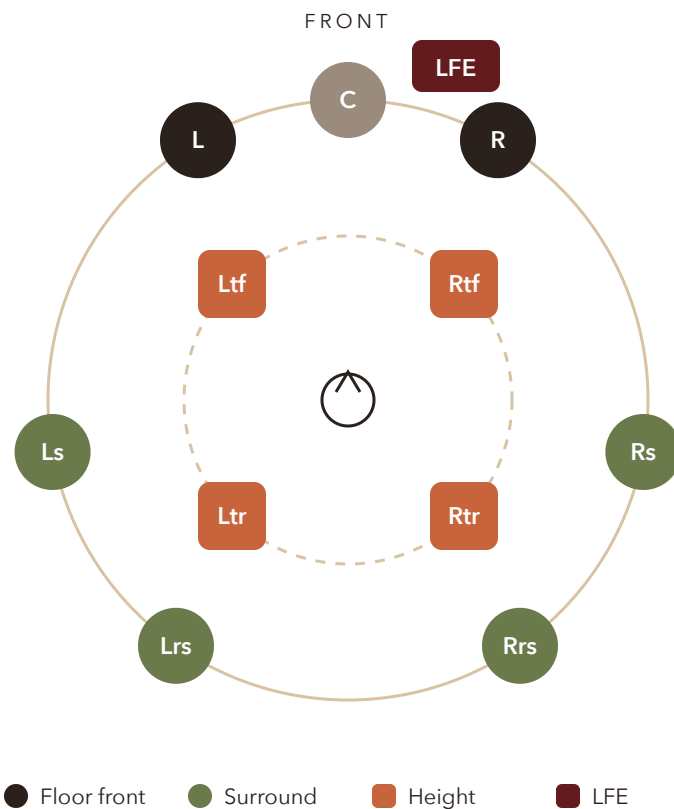


Atmos Mix Analysis Workbook

A speaker-pair method for taking apart any Atmos release, understanding the engineer's choices, and bringing those choices into your own mixes.



Why analyze by speaker pair

Most Atmos mixes are built pair by pair, even when the engineer is working with objects. Listening one pair at a time turns a wall of sound into a set of decisions you can name: what went where, how loud, how delayed, and why.

This method came out of graduate work analyzing commercial Atmos releases on a 7.2.4 system. It works just as well on 7.1.4 and on smaller rooms.

The process

1. **Fill in the session sheet.** Song, release, format, and the room you heard it in.
2. **Listen to the whole mix twice** before soloing anything. Write first impressions.
3. **Work through the seven pair worksheets.** Solo each pair, then listen to it in context.
4. **Map the stems** on the stem matrix and the section timeline.
5. **A/B against the stereo release** and note what Atmos adds.
6. **Score and interpret.** Rate cohesion, immersion, and translation, then write what you think the engineer was going for.

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Tip

Print the pair worksheets once per song. Keep the reference card at your desk.

No Atmos room?

You can still use most of this workbook on headphones with a binaural render, but levels and heights will read differently. Note your playback system on the session sheet every time.

The room

- ☐ Speakers calibrated to the same level at the listening position
- ☐ Bass management and LFE level confirmed
- ☐ You can solo and mute individual speakers or pairs
- ☐ Seated at the reference position, ears at floor speaker height
- ☐ Room noise low enough to hear quiet pairs

The source

- ☐ Lossless Atmos source, not a binaural stream, when possible
- ☐ The stereo release ready for the A/B
- ☐ Playback level noted so you can return to it
- ☐ Timestamps for each section written down

Your ears

- ☐ Rested, not after a long session
- ☐ Listen at a moderate level; quiet pairs get louder in your head when you are tired
- ☐ Take a break between soloing pairs and listening in context

A note on soloing

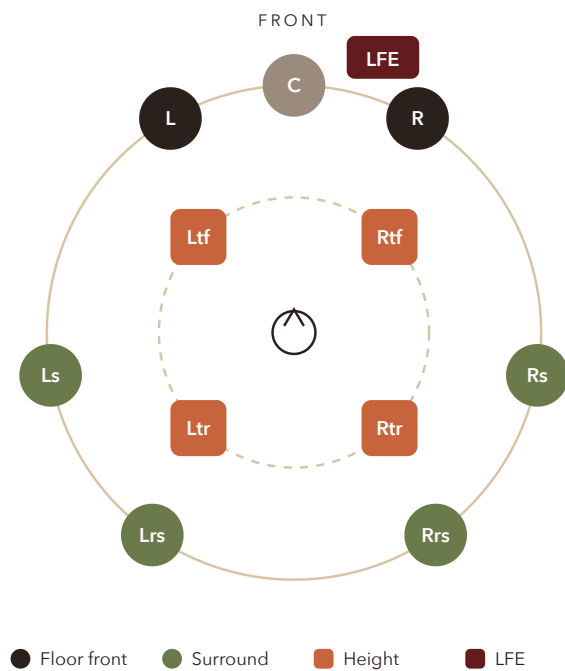
Soloing tells you what is in a pair. Context tells you what the listener actually hears. Both answers matter, and the gap between them is often the most interesting finding in the whole analysis. A height pair can be carefully designed and still disappear once the front pair is playing.

About the LFE

Different rooms handle bass very differently. Listen to the LFE soloed and with the full system, and note whether low end shows up anywhere else.

The 7.1.4 room at a glance

SEVEN PAIRS TO LISTEN THROUGH



PAIR	SPEAKERS	LISTEN FOR
FRONT	L, R	The stereo anchor and the low end split
CENTER	C	Used, vacant, or one driving element
LFE	LFE	Cutoff, and what is sent
SIDES	Ls, Rs	Instrumental variations, featured stems
REARS	Lrs, Rrs	Secondary anchor, ambience, movement
TOP FRONT	Ltf, Rtf	Vocal treatment, delay, level vs. front
TOP REAR	Ltr, Rtr	Delay and level vs. top fronts

Circles are floor speakers. Squares are height speakers. On a 7.2.4 system, treat the two LFE outputs as one pair.

Session sheet

ONE PER SONG

SONG	FORMAT HEARD
ARTIST	ROOM / SYSTEM
ALBUM / RELEASE	SOURCE
MIX ENGINEER	PLAYBACK LEVEL
RELEASE YEAR	DATE(S)

Sections and timestamps

SECTION	START	WHAT CHANGES IN ATMOS HERE

First impressions (two full listens, nothing soloed)

Approach

☐ Stereo first, expanded

☐ Balanced

☐ Fully reimagined

The anchor of most mixes. Start here so every other pair can be judged against it.

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

Soloed, this pair sounds like:

With every speaker playing, it:

☐ Disappears

☐ Barely there

☐ Supports

☐ Clearly heard

☐ Leads

Level

Compared with the front pair

☐ Masked

☐ About ¼ (−12 dB)

☐ About ½ (−6 dB)

☐ About ¾ (−2.5 dB)

☐ Equal

☐ Louder

TIME BASED

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

IS THIS THE FULL STEREO MIX, OR A VERSION WITH ELEMENTS REMOVED? _____

IS IT HIGH PASSED? WHERE DOES THE LOW END GO INSTEAD? _____

What the engineer was going for here

Notes and timestamps

Used, vacant, or reserved for one driving element. A vacant center is a choice worth explaining.

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

Soloed, this pair sounds like:

With every speaker playing, it:

☐ Disappears☐ Barely there☐ Supports☐ Clearly heard☐ Leads**Level**

Compared with the front pair

☐ Masked☐ About $\frac{1}{4}$ (-12 dB)☐ About $\frac{1}{2}$ (-6 dB)☐ About $\frac{3}{4}$ (-2.5 dB)☐ Equal☐ Louder**TIME BASED**

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

WHAT HOLDS THE LEAD VOCAL IN PLACE IF THE CENTER IS EMPTY? _____

DOES ANYTHING EVER MOVE INTO OR OUT OF THE CENTER? _____

What the engineer was going for here

Notes and timestamps

Listen for what is sent here and whether it is musical, atmospheric, or both.

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FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

ESTIMATED CROSSOVER OR CUTOFF (HZ):

DOES LOW END ALSO APPEAR IN ANY OTHER PAIR? WHEN?

What the engineer was going for here

Notes and timestamps

Often an instrumental variation of the front pair, or a home for one featured element.

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

Soloed, this pair sounds like:

With every speaker playing, it:

☐ Disappears☐ Barely there☐ Supports☐ Clearly heard☐ Leads**Level**

Compared with the front pair

☐ Masked☐ About $\frac{1}{4}$ (-12 dB)☐ About $\frac{1}{2}$ (-6 dB)☐ About $\frac{3}{4}$ (-2.5 dB)☐ Equal☐ Louder**TIME BASED**

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

WHICH ELEMENTS ARE MISSING COMPARED WITH L / R? _____

IS THERE A FEATURED STEM THAT IS LOUDER HERE THAN ANYWHERE ELSE? _____

What the engineer was going for here

Notes and timestamps

Secondary anchor, ambience, or movement. Check how much survives with everything playing.

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

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☐ Equal

☐ Louder

TIME BASED

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

DOES THIS PAIR MIRROR THE FRONT, OR CARRY ITS OWN CONTENT? _____

CAN YOU STILL HEAR IT WITH ALL SPEAKERS ACTIVE? _____

What the engineer was going for here

Notes and timestamps

Heights reveal the engineer's intent fastest when soloed, and hide fastest in context.

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

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 ☐ Equal
 ☐ Louder

TIME BASED

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

IS THERE PRE-DELAY OR A SEPARATE DELAY TIME ON VOCALS OR EFFECTS? _____

LEVEL COMPARED WITH L / R (ESTIMATE): _____

What the engineer was going for here

Notes and timestamps

Compare directly with the top fronts: same content, different time, different level?

STEMS AND ELEMENTS HEARD

SOLOED VS. IN CONTEXT

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☐ Equal

☐ Louder

TIME BASED

Pre-delay, delay, reverb, ms estimates

FREQUENCY

High pass, low pass, tone vs. front

MOVEMENT

Panning, automation, section changes

Questions for this pair

DELAY COMPARED WITH THE TOP FRONTS (MS ESTIMATE):

LEVEL COMPARED WITH THE TOP FRONTS (ESTIMATE):

What the engineer was going for here

Notes and timestamps

Stem matrix

WHAT LIVES IN EACH PAIR

List the stems you hear in each pair and mark the level against the front pair. Color code with the tags if you like; it makes patterns jump out when you compare songs.

PAIR	STEMS AND ELEMENTS	LEVEL VS. L / R	TIME / TONE NOTES
L / R			
C			
LFE			
LS / RS			
LRS / RRS			
LTF / RTF			
LTR / RTR			

Patterns I notice

Section timeline

WHEN EACH PAIR IS ACTIVE

Shade each cell by how present the pair is in that section: empty for silent, light for barely there, dark for clearly heard. This is where arrangement choices show up, like an intro that is almost stereo and a chorus that opens the room.

PAIR	INTRO	VERSE 1	PRE	CHORUS 1	VERSE 2	CHORUS 2	BRIDGE	FINAL	OUTRO
L / R									
C									
LFE									
LS / RS									
LRS / RRS									
LTF / RTF									
LTR / RTR									

Moments worth noting

TIME	WHAT HAPPENS AND IN WHICH PAIR

Level match the two versions by ear before you compare. A louder version almost always sounds better, which hides the real differences.

QUALITY	STEREO RELEASE	ATMOS RELEASE
Width and wrap		
Height and air		
Vocal focus		
Low end weight		
Punch and impact		
Ambience and depth		
Movement		

How different does the Atmos version feel overall?

- ☐ Almost identical
- ☐ Slightly wider
- ☐ Clearly surround
- ☐ A different record

Where the difference is biggest (section and pair)

Anything the stereo version does better?

Scoring rubric

THREE SCORES, OUT OF 10

Score the mix against its own goal, not against your taste. A conservative mix can earn a 10 for translation and a 6 for immersion and still be a great Atmos mix.

SCORE	1 TO 3	4 TO 7	8 TO 10
Cohesion Does it feel like one record?	Pairs feel disconnected. Elements jump between speakers without reason.	Mostly unified, with a few moments that pull attention to a speaker.	Every pair supports the same idea. You hear a song, not a speaker system.
Immersion Are you inside it?	Sounds like stereo coming from more boxes.	Noticeable wrap and height in some sections.	The room disappears. Sound surrounds and moves with purpose.
Translation Does it keep the song's identity?	The Atmos version loses what made the stereo mix work.	Identity holds, with some balance changes that feel off.	Unmistakably the same record, expanded.

COHESION

___ / 10

IMMERSION

___ / 10

TRANSLATION

___ / 10

What was the engineer going for?

Write a hypothesis, then list the evidence from your worksheets that supports it.

Evidence

PAIR	CHOICE I HEARD	HOW IT SUPPORTS THE HYPOTHESIS

Did it work?

What I am taking into my own mixes

Worked example: “Yukon” by Justin Bieber

PART 1 OF 2

A condensed version of an analysis of the 2025 Dolby Atmos release of “Yukon” from the album *Swag*, mixed by Josh Gudwin and released in 7.2.4. It was heard on a 7.2.4 Kali system over several weeks. Gudwin's approach across the album was to preserve the stereo mix and push ambience outward, which makes it a clear example of the stereo-first style.

PAIR	WHAT WAS HEARD	LEVEL AND TIME
L / R	Full stereo mix, high passed around 150 Hz. Low end moved to the LFE. The primary anchor all song.	Reference level. Carries most of the energy.
C	Vacant for the whole song. The lead vocal held through a strong phantom center from L / R.	None.
LFE	Kick, sub kick, bass, synth bass, and low guitar content below roughly 125 to 200 Hz. Musical and atmospheric.	No phase issues heard with the mains.
LS / RS	Instrumental without the second electric guitar and lead vocal. That guitar returns from its own stem, louder. Lead vocal wet effects only.	Less than half the level of L / R.
LRS / RRS	Percussion, guitar, bass presence, and a filtered vocal that sounded side chained. Bass duplicated here in the chorus.	Very low. Mostly masked by the front pair.
LTF / RTF	Instrumental stem mixed warmer, plus the lead vocal with pre-delay and a vocal effects stem on a separate delay.	Masked by L / R in context.
LTR / RTR	Same instrumental content plus vocal wet signal only.	About $\frac{3}{4}$ the level of the top fronts (about -2.5 dB), delayed 30 to 40 ms from them.

Key finding

Soloed, the heights were clearly designed with care: pre-delay on the vocal created front to back depth through diffusion rather than rhythmic echo. In context, they were nearly inaudible. The gap between soloed and in context listening is the story of this mix.

A/B with the stereo release

Very little difference outside the side speakers and the rear bass presence near the end. The intro is almost stereo in Atmos except for vocal ambience in the sides and heights, which helps the lead vocal and its ad libs stand apart. The room opens at the first chorus when more pairs come in.

Even with quiet pairs, the many small contributions added up. It is just enough to feel like surround rather than stereo.

Interpretation

The likely goal was to keep the stereo experience nearly identical and expand it across more speakers. The evidence: the full stereo mix on L / R with a high pass, the other pairs built as variations of the instrumental using time and level changes, and the LFE carrying the foundation so the spatial image stayed intact everywhere else.

Scores

COHESION	IMMERSION	TRANSLATION
10	7	10

Conservative but not lazy. It translated the stereo mix more efficiently than many Atmos mixes chasing the same goal.

Lessons for your own mixes

- A vacant center can work when the front pair holds a strong phantom vocal.
- Heights built from the full instrumental at low level tend to vanish behind L / R. If you want them heard, give them something the front pair does not have.
- A 30 to 40 ms offset between top fronts and top rears sits near the edge where delay starts to read as an echo. Use it on purpose.
- Moving all low end to the LFE keeps the image clean, but check headphone renders and smaller systems, where LFE handling varies.

This analysis is independent commentary based on listening to the commercial release. Not affiliated with or endorsed by Justin Bieber, Josh Gudwin, or their labels. No audio, lyrics, or artwork is included.

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

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

Delay and what you perceive

DELAY BETWEEN SPEAKERS	USUALLY HEARD AS
Under about 1 ms	The image shifts toward the earlier speaker
About 1 to 30 ms	One fused sound, located 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.

Questions to ask every mix

- Is the front pair the full stereo mix?
- Where does the low end live?
- Is the center used? If not, what holds the vocal?
- What is in the heights that is not in the front?
- Can you hear each pair with everything playing?
- What changes between sections?
- How close is it to the stereo release?

Why heights hide

We locate sounds vertically mostly from high frequency cues shaped by the outer ear. Height content that is dark, low in level, or identical to the front pair gives the ear little reason to place it overhead. Brighter content, unique elements, and some decorrelation all help heights read as heights.

Notes
