PI BY SAHARTY

PI IMMERSIVE LIVE

Object-based immersive sound for live shows



USER MANUAL

Version 2.0.2 · macOS & Windows

www.pi-ware.com · support@pi-ware.com

Precision is a constant.

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WELCOME

Pi Immersive Live is an object-based spatial audio engine for concerts, theatre, installations and studios. Every input becomes an *object* with a position, a size and a distance, and Pi Immersive renders it in real time to the loudspeaker system you actually have, from a 7.1.4 studio to a large venue with line arrays, delays, surrounds and overheads. You can also render to headphones (binaural) or to Higher-Order Ambisonics.

Pi Immersive Live is a standalone application for macOS and Windows. In the app's title bar and menus it is shown as **Pi Immersive By Saharty**.



Figure 1. Pi Immersive Live by Saharty

Who it is for

- **Live sound engineers** who want to place and move sources over an immersive or source-oriented PA system.
- **Theatre sound designers** who need voices to localise to the performers (Stage delay matrix) and cues that recall with timed morphs.
- **Installation and dome designers** working with large speaker counts, Ambisonics or multichannel network audio.
- **Studio engineers** monitoring immersive mixes on a speaker bed or on headphones.

What you get in version 2.0.2

This manual describes version 2.0.2, which includes:

- An object engine with eight panning laws, plus spread, directivity, distance laws, Doppler and air absorption per source.

- A **room model** (shape, 22 surface materials, audience, RT60 per octave band) where each property can be switched off.
- A **room engine** with geometric early reflections, a 16-line late reverb and two send effect buses (algorithmic or convolution).
- A **Stage delay matrix** for source-oriented reinforcement, alone or in parallel with the object engine.
- **Yamaha console control** over RCP, with one aux per loudspeaker.
- **Show control**: MIDI learn, LTC automation, OSC / ADM-OSC and snapshots with timed morphing.
- Up to **256 x 256** audio channels, including Dante, AVB and MADI interfaces.

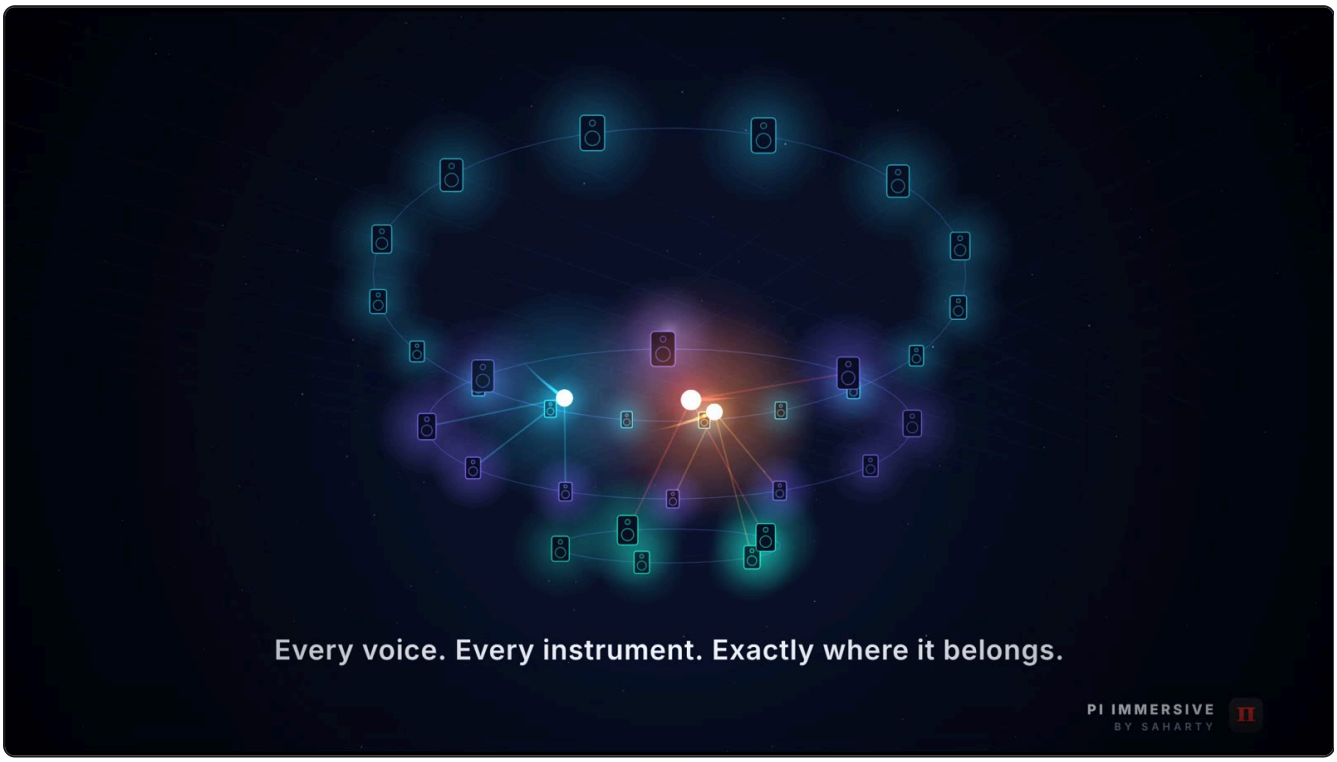


Figure 2. Objects placed and moved around the loudspeaker system ▶ **Animated in the online manual**

QUICK START

1. **Install** Pi Immersive Live from the `.dmg` (macOS) or `.exe` (Windows) installer and open it.
2. **Activate or start a trial.** The licence window opens on the first launch. Enter your licence key and click **Activate**, or click **Start 15-day free trial**.
3. **Choose your audio device.** Open the **I/O Setup** page (Cmd/Ctrl+1). Choose the driver type and device, then enable the input and output channels you need.
4. **Choose the output format.** Under **Output format**, set **RENDERING** to **Loudspeakers**, **Binaural (headphones)** or **Ambisonics (HOA, ACN/SN3D)**.
5. **Describe the room.** On **Room Setup** (Cmd/Ctrl+2), in the **Room** tab, set **ROOM SHAPE**, **WIDTH**, **LENGTH**, **HEIGHT** and the mix position.
6. **Set up the loudspeakers.** In the **Loudspeakers** tab, pick a format under **START FROM A FORMAT**, or use the **Format advisor** tab and click **Apply this system**. Check that the **Out** column matches your physical outputs.
7. **Check each speaker.** Select a speaker and click **Test selected**, or click **Cycle test** to step through all of them with pink noise.
8. **Set up your sources.** On **Sources** (Cmd/Ctrl+4), select a source, set its **INPUT CHANNEL**, then drag it around the plan.
9. **Make sure the engine is on.** The **ENGINE** button in the header should read **ON**.
10. **Save your project** with Cmd/Ctrl+S. Projects are saved as `.piimm` files.

> **Tip:** A new project already contains eight sources on inputs 1 to 8, spread in a circle at 3 m. You can hear something straight away once your device is set up.

INSTALLATION

macOS

1. Open the downloaded `.dmg` file.
2. Drag **Pi Immersive By Saharty** to your **Applications** folder.
3. Open it from **Applications**. The app is a universal build that runs natively on Apple silicon and Intel Macs, and needs macOS 11 Big Sur or later.
4. On the first launch macOS asks whether Pi Immersive can use the microphone. Click **Allow**. The app needs this permission to receive audio inputs for spatialisation and for LTC timecode. If you click **Don't Allow**, you can change it later in **System Settings > Privacy & Security > Microphone**.

Windows

1. Run the downloaded `.exe` installer and follow the steps.
2. Open **Pi Immersive By Saharty** from the Start menu.
3. For the lowest latency and the most channels, use your interface's ASIO driver. WASAPI and DirectSound are also available.

First launch

- If Pi Immersive has never been activated on this computer, the licence window opens automatically (see *Activation & licensing*).
- If the last-used audio device can't be opened, you are asked to choose one on the I/O page.
- Only one copy of the app runs at a time; double-clicking a `.piimm` project opens it in the running copy.

> **Note:** Pi Immersive Live is a standalone application, not a plug-in. It doesn't need Python, extra runtimes or other dependencies.

ACTIVATION & LICENSING

Pi Immersive Live uses the Pi by Saharty licensing system. One licence covers one computer, and you can move it to another computer at any time.

Buying and receiving your key

Buy Pi Immersive Live at **pi-ware.com/products/pi-immersive-live** (or use **Help > Buy Pi Immersive Live...**). Your licence key arrives by email after purchase. It looks like `XXXXX-XXXXX-XXXXX-XXXXX`.

Online activation

1. Open **Help > Licence...**, or click the licence banner at the top of the window.
2. Type or paste your key into **Licence key**.
3. Click **Activate**.

When activation succeeds, the window says **Activated** and shows the owner name. It also shows **This computer:** with the name of this computer.

If your key is already active on another computer, Pi Immersive asks whether you want to **Move it here**. If you agree, the other computer gets a 24-hour notice and then switches to limited features. The dialog also shows how many moves you have left this year.

Free trial

Click **Start 15-day free trial** in the licence window. You don't need to enter payment details. Every feature works during the trial.

Offline activation

Use offline activation when the show computer has no internet access:

1. Enter your licence key in the licence window.
2. Click **Offline activation**. A request code appears.
3. Click **Copy code** and take the code to any device with internet access.
4. Paste it at **pi-ware.com/activate**. You receive a licence file.
5. Back on the show computer, click **Load licence file...** and choose that file (`.pilic`).

Moving your licence to a new computer

- **From the old computer:** open the licence window and click **Deactivate this computer**. This frees the licence so you can activate it on the new computer.
- **If the old computer isn't available:** sign in to your account at **pi-ware.com/account**, where you can deactivate or reset your computers. Or simply activate on the new computer and confirm **Move it here**.

How licence checks work

- Pi Immersive checks the licence whenever it finds an internet connection: at launch, then every 60 minutes. While offline, it tries again every 2 minutes.
- **It keeps working offline with no time limit.**
- **The 24-hour rule:** features are never limited without at least 24 hours of notice on that computer, whatever the reason (licence moved, trial ended, deactivated from the account). During the notice every feature still works, and a banner at the top of the window shows the message and a countdown.

Limited mode

When Pi Immersive Live isn't activated, or the notice period is over:

- Projects still open, can be edited and can be saved.
- The engine can't be started. Spatial processing and all outputs are bypassed. Input meters and LTC still work.
- **A show that is already running keeps running** until you stop it with the **ENGINE** button. If you try to stop it, a dialog warns you that the engine can't be started again until the app is activated.
- Starting and stopping the engine always fades over about 50 ms. Nothing is ever cut hard.

Licence file location

System	Path
macOS	`~/Library/Application Support/Pi by Saharty/Licences/pi-immersive-live.pilic`
Windows	`%APPDATA%\Pi by Saharty\Licences\pi-immersive-live.pilic`

INTERFACE TOUR

The main window has four areas: the **header** at the top, the **navigation bar** on the left, the **page area** in the centre and the **status bar** at the bottom. On Windows the menu bar is inside the window. On macOS it is in the system menu bar.

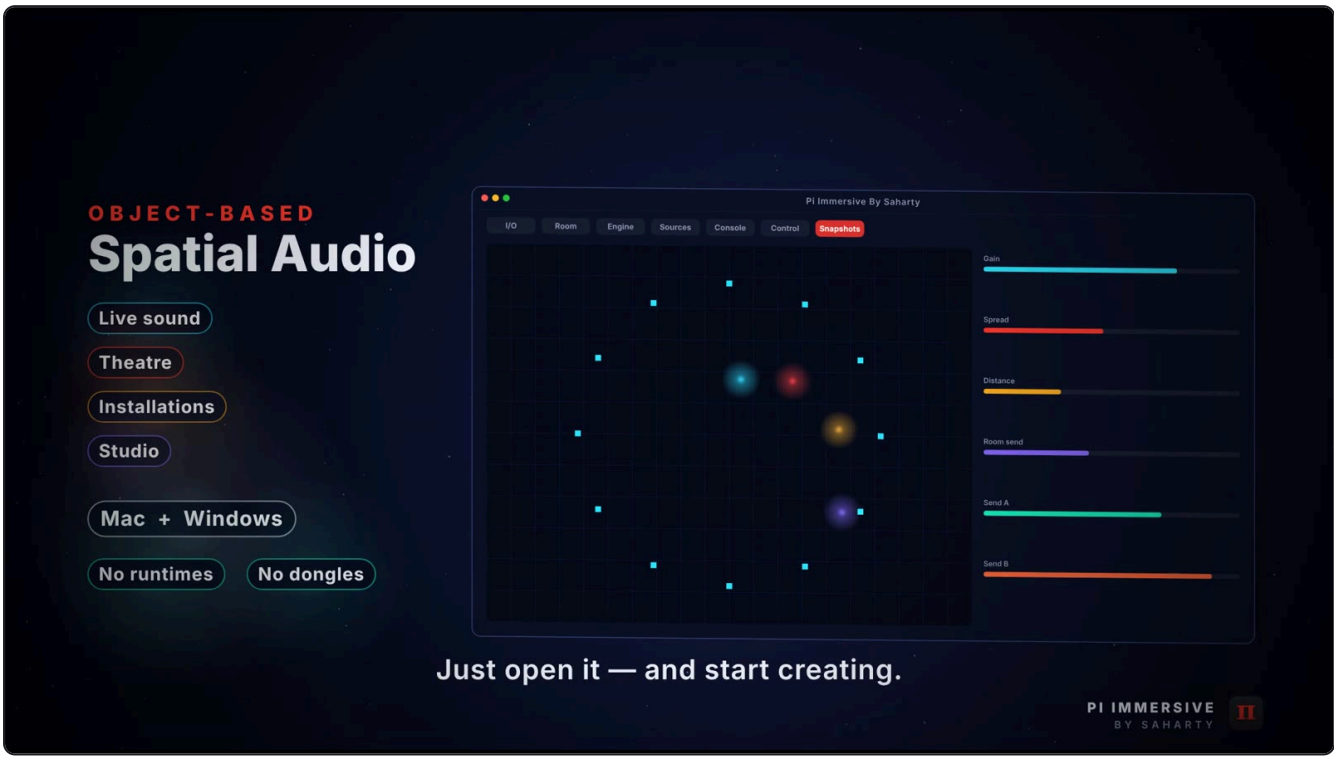


Figure 3. The main window: page navigation, the spatial view and output meters

Header

Control	What it does	Range / default
Project name	Shows the project name. A `*` means there are unsaved changes.	"Untitled project"
ENGINE mode menu	Chooses the processing mode: **Object-based spatialisation**, **Stage delay matrix** or **Both (parallel)**.	Object-based spatialisation
ENGINE ON / OFF button	Starts or stops all processing and outputs, with a ~50 ms fade.	ON when licensed
MASTER slider	Master output level. Double-click to reset to 0 dB.	-60 to +12 dB / 0 dB
Master mute	Mutes all outputs (smoothly).	Off
Add source button	Adds a new source at 3 m and selects it.	—
Clock	Timecode display (hh:mm:ss:ff). Below it: **LTC** or **INTERNAL**, plus **REC** or **PLAY** while automation runs. Red while recording.	—

Control	What it does	Range / default
CONSOLE LED	Lights when the Yamaha console is connected.	—
LTC LED	Lights when LTC is locked.	—
CPU readout	CPU load, sample rate and buffer size.	—
Output meters	One meter per output, labelled with the speaker names (or channel numbers for binaural / HOA).	—

Navigation bar

The seven pages follow the order you work in. You can also jump to them with Cmd/Ctrl+1 to Cmd/Ctrl+7 or from the **Pages** menu.

#	Page	Purpose
1	**I/O Setup**	Audio interface, network audio and output format
2	**Room Setup**	Room shape, surfaces, loudspeaker system and immersive format
3	**Room Engine**	Geometric reflections, late reverb, send effects and listener
4	**Sources**	Objects, input assignment, panning, levels and sends; Stage delay matrix
5	**Console**	Yamaha console control over RCP
6	**Control**	MIDI mapping, timecode automation and OSC
7	**Snapshots**	Cues with timed morphing

The version number is shown at the bottom of the navigation bar.

Status bar

The status bar shows the device, latency, engine state, source and output counts, output format, room size, OSC port and open MIDI inputs.

Menus

Menu	Items
File	**New project**, **Open...**, **Save**, **Save As...**, **Audio settings...**, **Quit**
Sources	**Add source**, **Duplicate selected**, **Remove selected**, **Unmute all**, **Clear all solos**, **Arrange sources in a circle**, **Reset all positions to front**
Pages	The seven pages, numbered 1 to 7
Snapshots	**Store snapshot**, **Recall next (space)**, **Recall previous**
Automation	**Record**, **Play / chase timecode**, **Stop**

Menu	Items
Help	**OSC / MIDI reference**, **Licence…**, **Buy Pi Immersive Live…**, **About Pi Immersive**

> **Note: Arrange sources in a circle** and **Reset all positions to front** leave locked sources where they are.

The spatial view

The spatial view appears on the Room Setup, Room Engine and Sources pages. It shows the room, the loudspeakers, the mix position and the sources. Use the **Top**, **Front**, **Side** and **3D** buttons above it to change the view.

Use the wheel over an empty area to zoom; in 3D, drag to orbit. The footer shows the selected source's position and panning law. All mouse and keyboard actions are listed in *Keyboard shortcuts / remote control*.

SETTING UP AUDIO I/O

The **I/O Setup** page has four cards: **Audio interface**, **Output format**, **Network audio devices** and **Signal**.

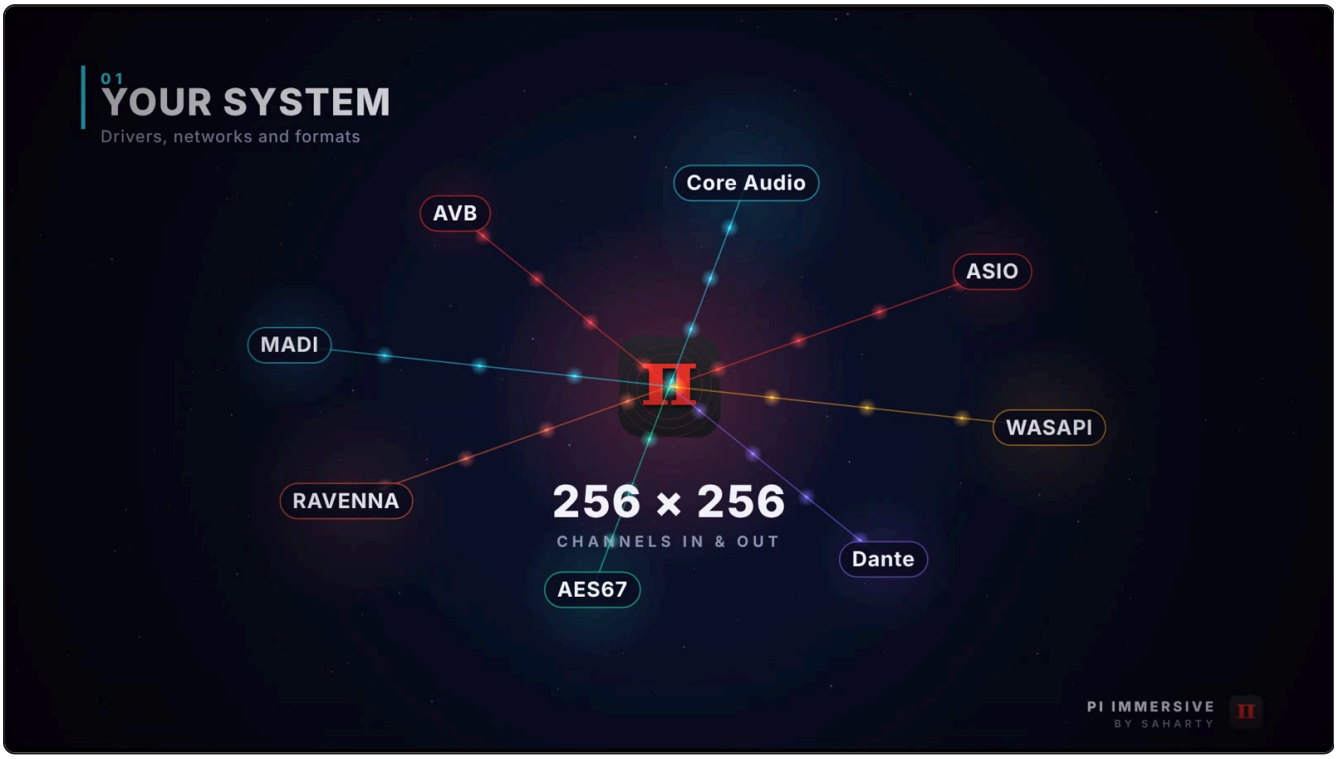


Figure 4. Core Audio, ASIO, WASAPI, Dante, AES67, RAVENNA, MADI and AVB I/O ▶ Animated in the online manual

How to choose your audio device

1. Open **I/O Setup** (Cmd/Ctrl+1, or **File > Audio settings...**).
2. In **Audio interface**, choose the driver type (Core Audio on macOS; ASIO, WASAPI or DirectSound on Windows) and the device.
3. Enable the input and output channels you need, then set the sample rate and buffer size.
4. Check the status line above the device list. It shows the driver, device, sample rate, buffer size, latency and the number of active inputs and outputs. It turns amber when no device is open.
5. If the device stops responding, click the reset button at the top right of the card to restart it.

Pi Immersive supports up to 256 inputs and 256 outputs.

For **Dante**, select Dante Virtual Soundcard or Dante Via and route channels in Dante Controller. **AVB** is set up in macOS Audio MIDI Setup. For **MADI**, select your interface's driver.

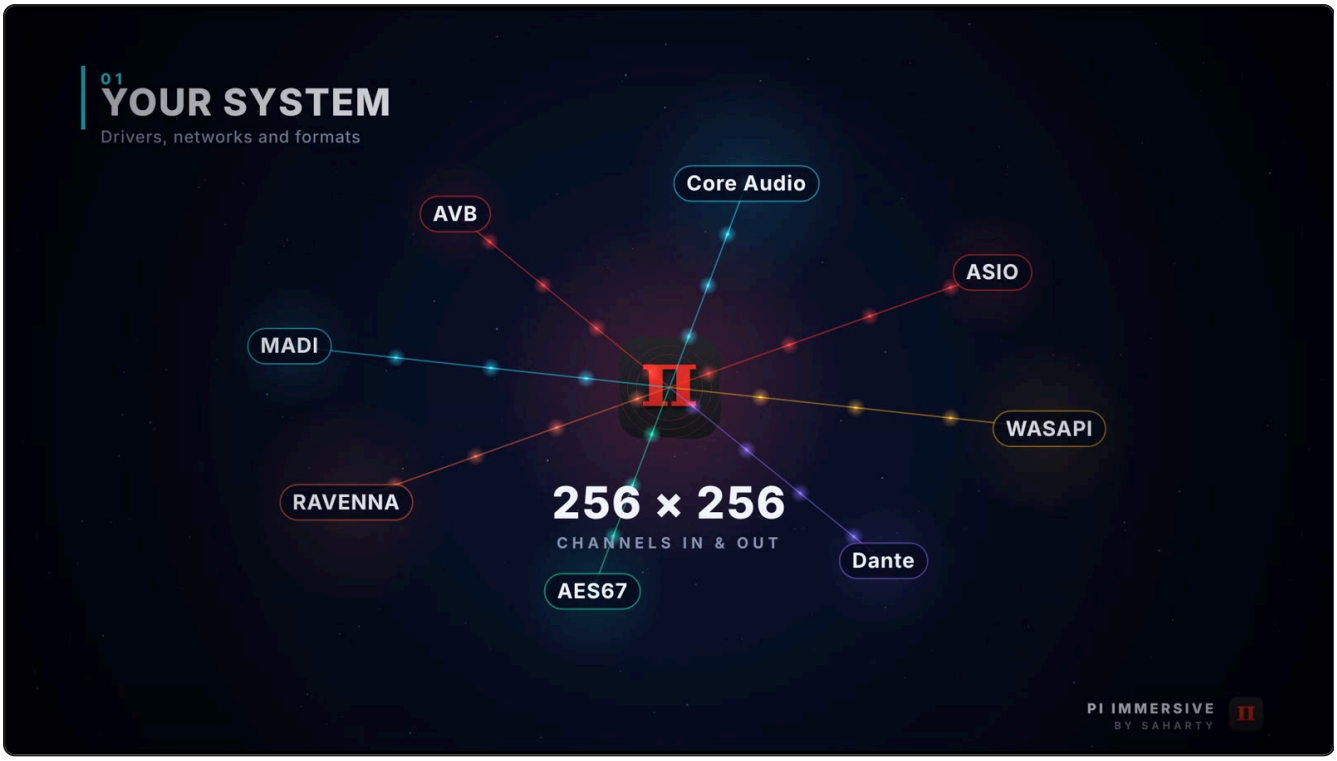


Figure 5. Up to 256 x 256 channels in and out

Network audio devices

The **Network audio devices** card lists the Dante, AES67 and RAVENNA devices found on your network, with their IP addresses. Click **Rescan** to search again.

> **Note:** The device list is for information only. Routing is still done in your network audio software, such as Dante Controller.

Signal meters

The **Signal** card meters the device's active **INPUTS** and **OUTPUTS** (up to 64 of each).

How to choose the output format

Control	What it does	Range / default
RENDERING	**Loudspeakers**, **Binaural (headphones)** or **Ambisonics (HOA, ACN/SN3D)**.	Loudspeakers
HEADPHONE OUTPUTS	Output pair for binaural rendering (enabled for binaural only).	Out 1 / 2
AMBISONIC ORDER	1st to 7th order. The channel count is shown (for example 3rd order = 16 ch, 7th order = 64 ch). Enabled for Ambisonics only.	3rd order
HOA FIRST OUTPUT	The first output of the Ambisonic channel block.	Out 1

Control	What it does	Range / default
LFE CROSSOVER	Crossover frequency for the LFE / subwoofer feed.	40 to 300 Hz / 120 Hz
MOTION SMOOTHING	How smoothly positions glide when they change. Higher values give softer moves but more lag.	1 to 1000 ms / 30 ms

- **Loudspeakers:** the speakers, their types and their output patching are set on Room Setup.
- **Binaural:** an HRTF headphone render, with the room and the sends folded to stereo.
- **Ambisonics:** ACN channel order with SN3D normalisation, for an external decoder or recorder.

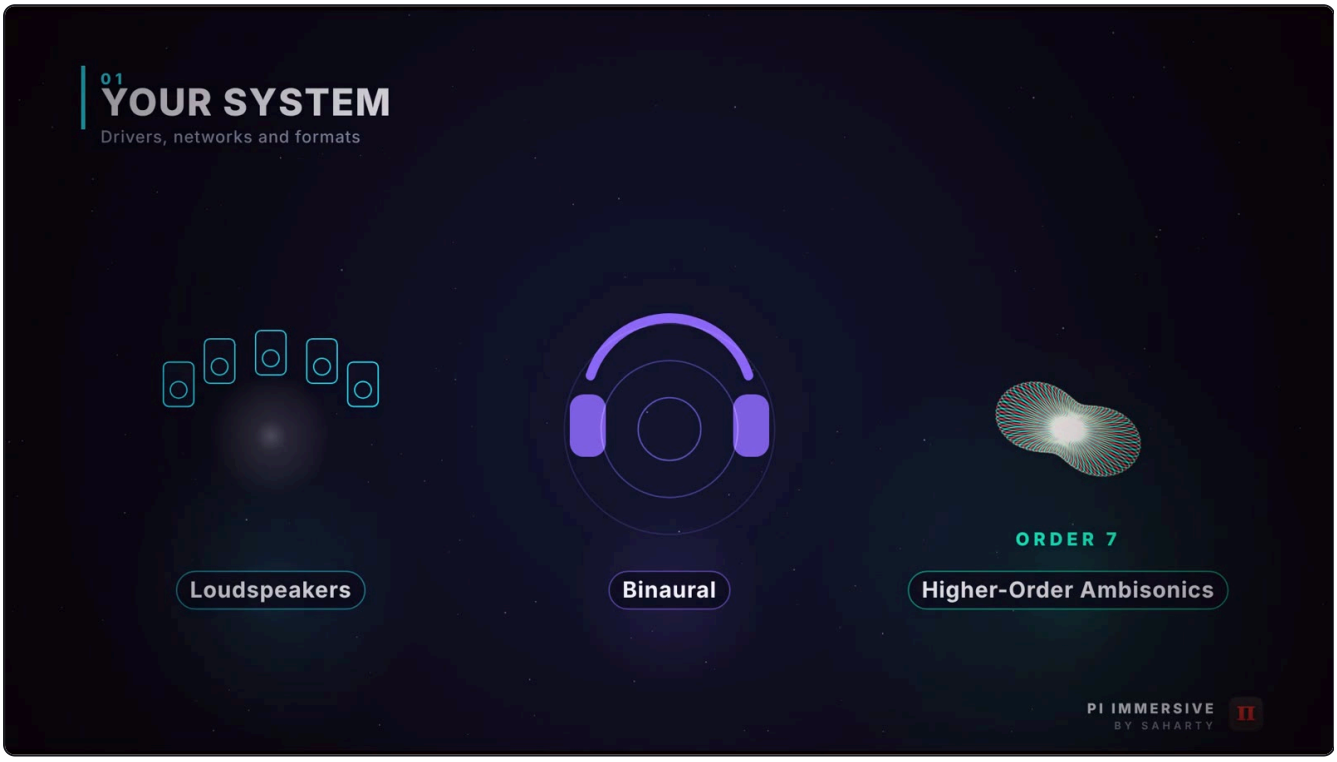


Figure 6. Three output formats: loudspeakers, binaural and Higher-Order Ambisonics

MODELLING THE ROOM

Room Setup has the spatial view on the left and four tabs on the right: **Room**, **Surfaces & acoustics**, **Loudspeakers** and **Format advisor**. The view buttons **Top**, **Front**, **Side** and **3D** and the toggles **Coverage**, **Names** and **Sources** are above the plan.

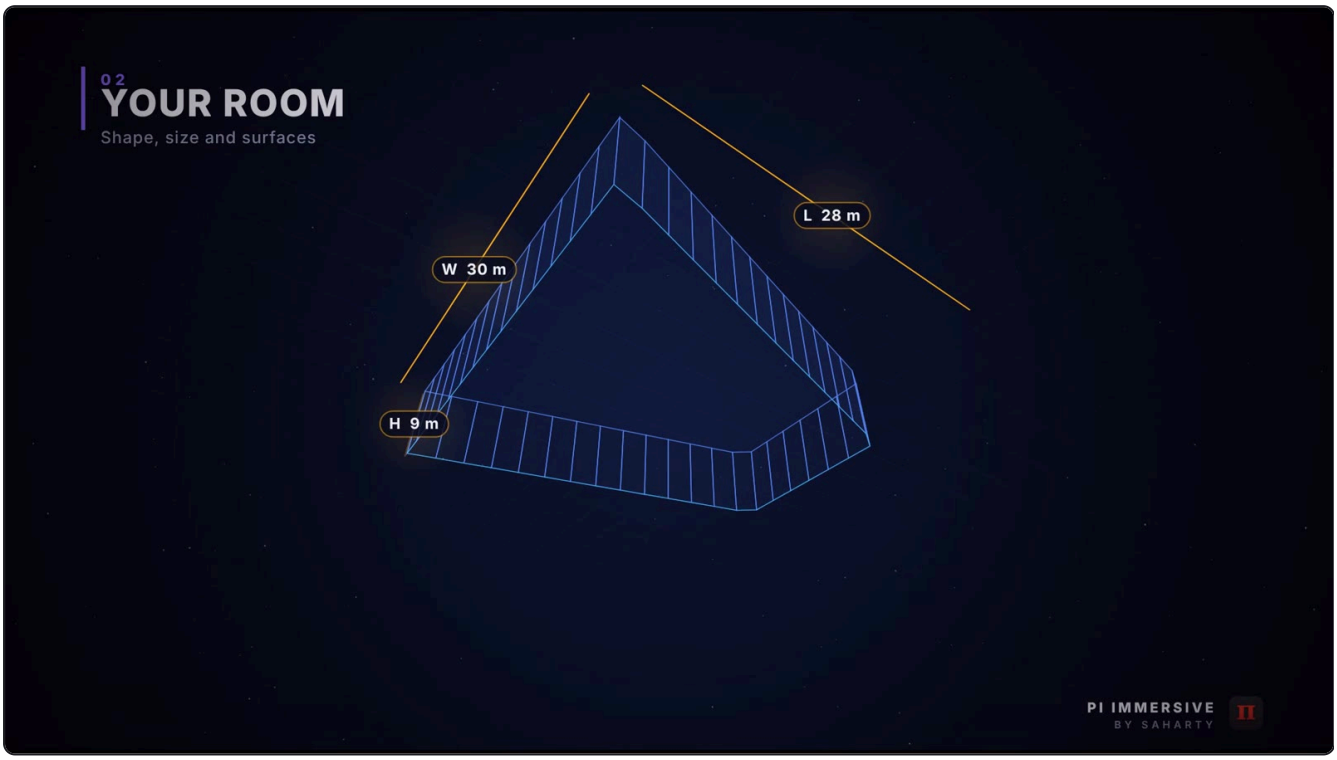


Figure 7. Room shapes: rectangle, fan, oval and more ▶ Animated in the online manual

How to describe the room

1. Open **Room Setup** and select the **Room** tab.
2. Choose a **ROOM SHAPE**: **Rectangle (shoebox)**, **L-shape**, **Fan / trapezoid**, **Hexagon**, **Octagon**, **Oval / round** or **Custom polygon**.
3. Set the dimensions and the mix position with the controls below.
4. Read the summary: volume, floor area, total surface, RT60 (mid), mean free path, critical distance, Schroeder frequency and a description of the room's character.

Control	What it does	Range / default
WIDTH	Room width	2 to 200 m / 16 m
LENGTH	Room length	2 to 300 m / 24 m
HEIGHT	Ceiling height	2 to 60 m / 8 m
SHAPE A, **SHAPE B**	Proportions of the non-rectangular shapes (for example the narrowing of a fan or the cut-out of an L)	0.1 to 0.9 / 0.5 and 0.4

Control	What it does	Range / default
STAGE DEPTH	Depth of the stage area at the front	0 to 40 m / 5 m
MIX X, **MIX Y**	Position of the mix (reference) point in the room	X -100 to 100 m / 0; Y -150 to 150 m / -2 m
EAR HEIGHT	Listening height at the mix position	0.5 to 20 m / 1.2 m
AUDIENCE	How full the room is. Adds audience absorption to the floor.	0 to 100 % / 60 %
REFLECTION ORDER	**1st order (6 paths)** or **2nd order (up to 20 paths)**	2nd order
Fit speakers to room	Moves the loudspeakers so they fit the room.	—

The character text ranges from "very dry (studio / outdoor)" through "dry - good for amplified music and speech", "medium - theatre / multi-purpose" and "live - concert hall" to "very live - consider absorption or more direct sound coverage".

Switching room properties on and off

Under **PROCESSING - EACH ROOM PROPERTY CAN BE SWITCHED OFF** you'll find six switches. All are on by default.

Switch	Effect when on
Room model active	The room model feeds the processing. When off, the engine uses the manual reverb settings and no geometric reflections.
Geometric early reflections	Early reflections are calculated per source from the walls, floor and ceiling.
Surface materials	The reflections and reverb time use each surface's material.
Reverb time from room	The late reverb's decay, size and pre-delay come from the room model.
Air absorption	High frequencies drop with distance, as they do in air.
Speaker time / level alignment	Each loudspeaker is automatically delayed and level-matched to the mix position.

How to assign surface materials

1. Select the **Surfaces & acoustics** tab.
2. Each surface (**Floor**, **Ceiling**, **Wall 1**, **Wall 2**, ...) is listed with its area in m^2 and a material menu. Choose a material for each one.
3. To set every wall at once, choose a material from **ALL WALLS**.
4. Check the **ESTIMATED REVERBERATION TIME (EYRING, OCCUPIED)** chart on the **Room** tab. It shows RT60 at 125, 250, 500, 1k, 2k and 4k Hz.

The library has 22 materials, each with octave-band absorption from 125 Hz to 4 kHz: Concrete (painted), Concrete (rough block), Brick (unglazed), Plaster on masonry, Gypsum board on studs, Wood panelling, Wood floor, Stage (wood on air space), Glass (large pane), Marble / ceramic tile, Metal panel, Carpet on concrete, Heavy curtain (draped), Acoustic ceiling tile, Acoustic foam 50 mm, Mineral wool panel 100 mm, QRD diffuser, Upholstered seats (empty), Audience (seated), Audience (standing), Grass / soil (outdoor) and Open (no surface).

> **Tip:** Outdoors, set the ceiling to **Open (no surface)** and the floor to **Grass / soil (outdoor)**.

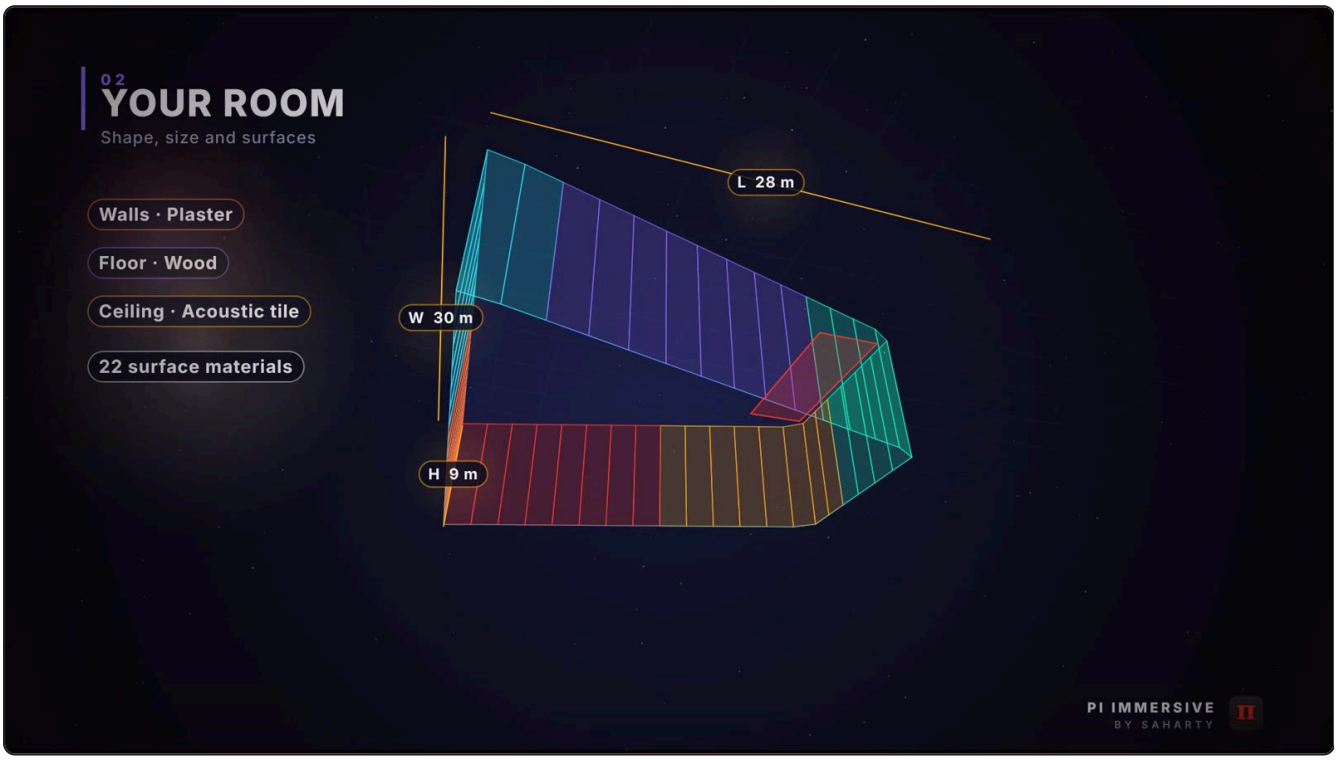


Figure 8. Surface materials for the walls, floor and ceiling

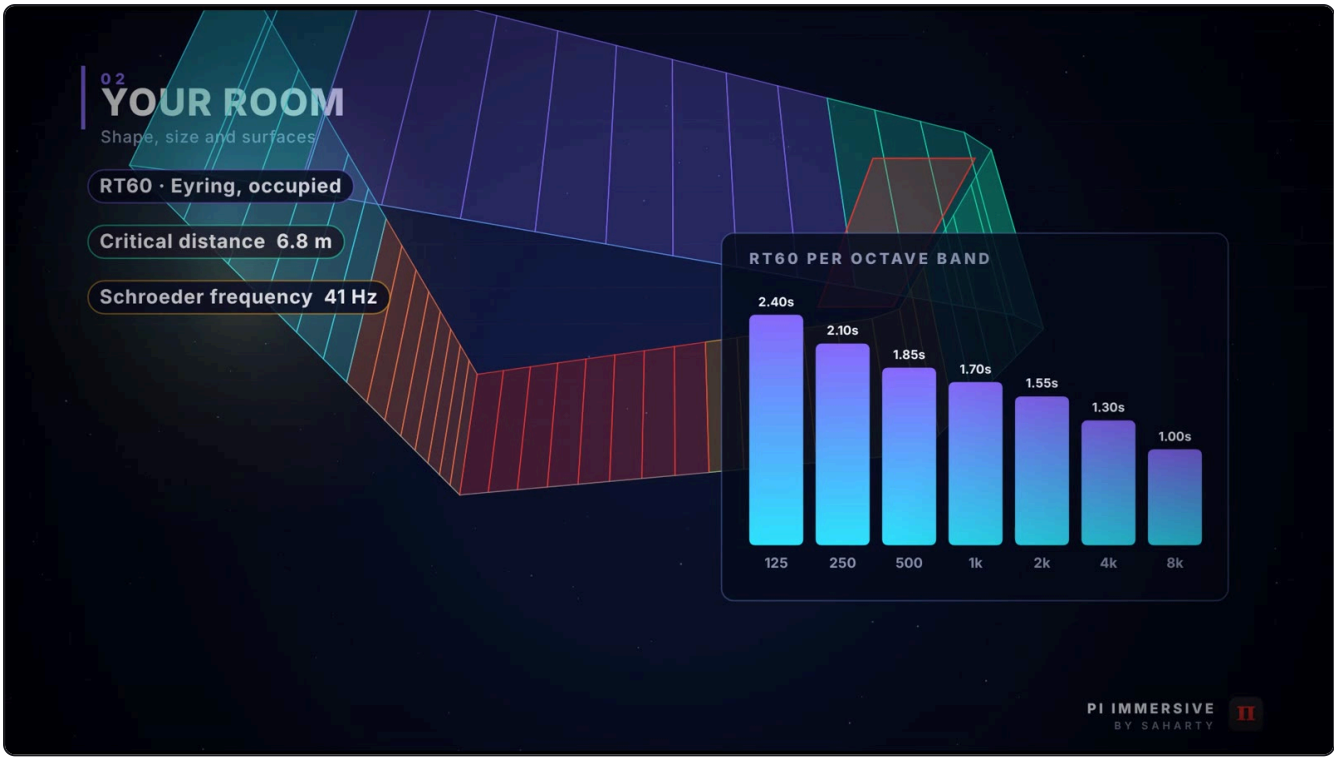


Figure 9. Estimated RT60 per octave band, critical distance and Schroeder frequency

SETTING UP THE LOUDSPEAKER SYSTEM

How to build a layout

1. Open **Room Setup > Loudspeakers**.
2. Choose a starting point from **START FROM A FORMAT**: Mono, Stereo, LCR, Quad, 5.0, 5.1, 7.0, 7.1, 5.1.2, 7.1.4, 9.1.6, 9.1 (height layer), 11.1 (height + top), 13.1 (height + top), Hexagon, Octagon, Dome 16, Dome 24, Dome 32 or 22.2 (ITU-R System H).
3. Edit the table to match your real system: name, type, model, number of elements, positions, trim and output.
4. Drag the speakers on the plan to adjust their positions. In this page you can also drag the **MIX** marker to move the mix position; the speakers stay where they physically are.
5. Click **Number outputs** to number the physical outputs 1 to n in layout order, or type each output in the **Out** column.

The line above the table summarises the system: the number of outputs, boxes, arrays, height speakers and sub outputs, and the layout name. If you edit a preset, the layout name changes to **Custom**.

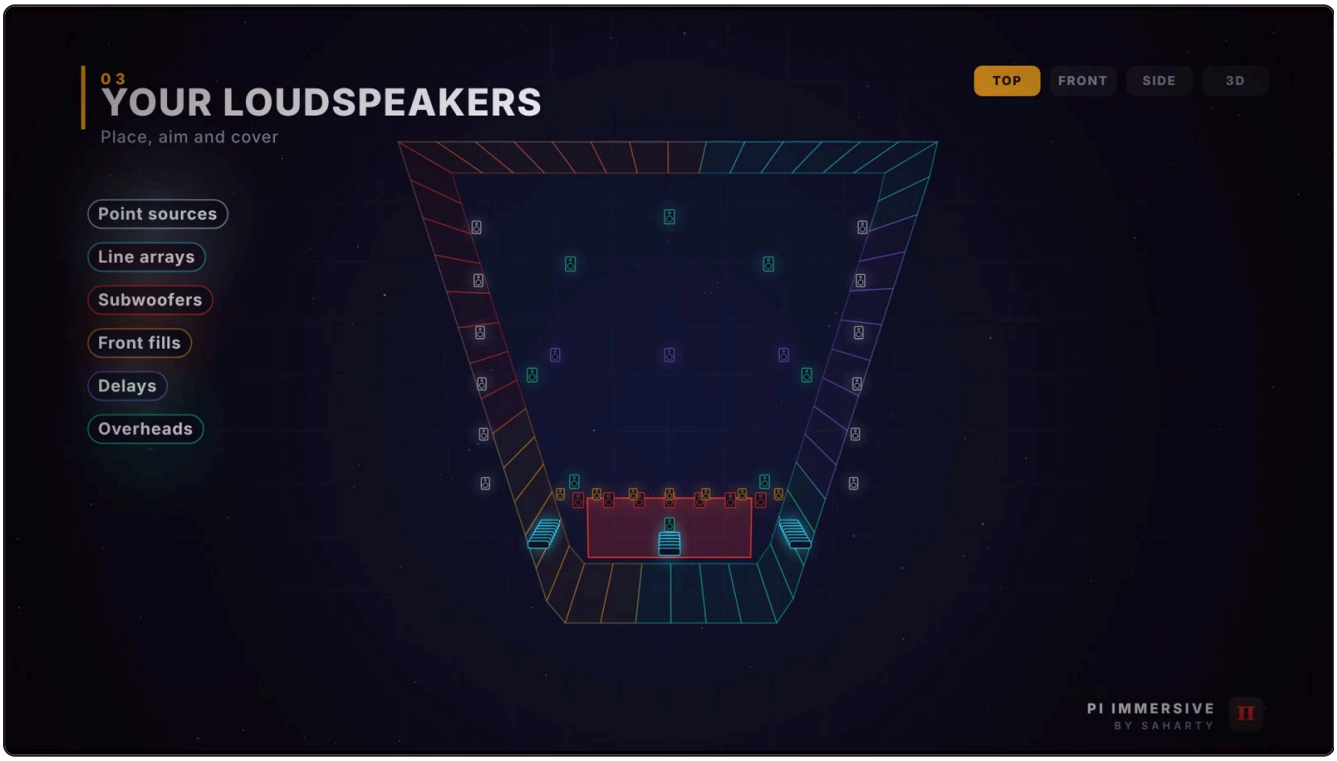


Figure 10. Point sources, line arrays, subwoofers, fills, delays and overheads placed in the room ▶ Animated in the online manual

Loudspeaker table columns

Column	Meaning
#	Speaker number

Column	Meaning
Name	Speaker name (also used for the output meters)
Type	Point source, Line array, Column array, Subwoofer, Front fill, Delay, Overhead / ceiling or Surround
Model	Free text, for your reference
Elem	Number of boxes in a line array or column
Qty	Number of identical boxes fed from this output (for example a sub cluster)
X m, **Y m**, **Height**	Position in the room, in metres
Dist	Distance from the mix position
Trim	Your level trim (dB)
Delay	Your delay (ms), added to the automatic alignment
Align	The automatic alignment delay and level for this speaker, or "off"
Out	Physical output number
Aux	Console mix / aux that feeds this speaker (used on the Console page)
LFE	Marks the output as an LFE / subwoofer feed
Mute	Mutes this speaker

Why the type matters: level alignment uses each type's loss over distance: about 3 dB per doubling for line arrays (4.5 dB under four elements), 4 dB for columns and 6 dB for the rest.

Table buttons

Button	What it does
Add	Adds a loudspeaker.
Duplicate / mirror	Copies the selected speaker, mirrored left / right.
Remove	Removes the selected speaker.
Number outputs	Numbers the physical outputs 1 to n in layout order.
Assign console auxes	Assigns console mix / aux buses to every speaker in order, starting at the first mix set on the Console page.
Fit to room	Moves the speakers to fit the room.
Test selected	Plays pink noise at -20 dB through the selected speaker. Click again to stop.
Cycle test	Plays pink noise at -20 dB through each speaker in turn, about every 1.2 seconds. Click again to stop.
Import… / Export…	Loads or saves a speaker layout file (`.pispk`; import also accepts `.xml`).

> **Warning:** Turn your amplifiers down before you run **Cycle test** on a large system for the first time.

Speaker right-click menu

Right-click a speaker on the plan to set its **Type**, toggle **Aim at mix position**, **Mute** or **LFE**, **Duplicate (mirror L/R)** it or **Delete** it.

The **Coverage**, **Names** and **Sources** toggles above the plan show or hide speaker coverage, names and sources.

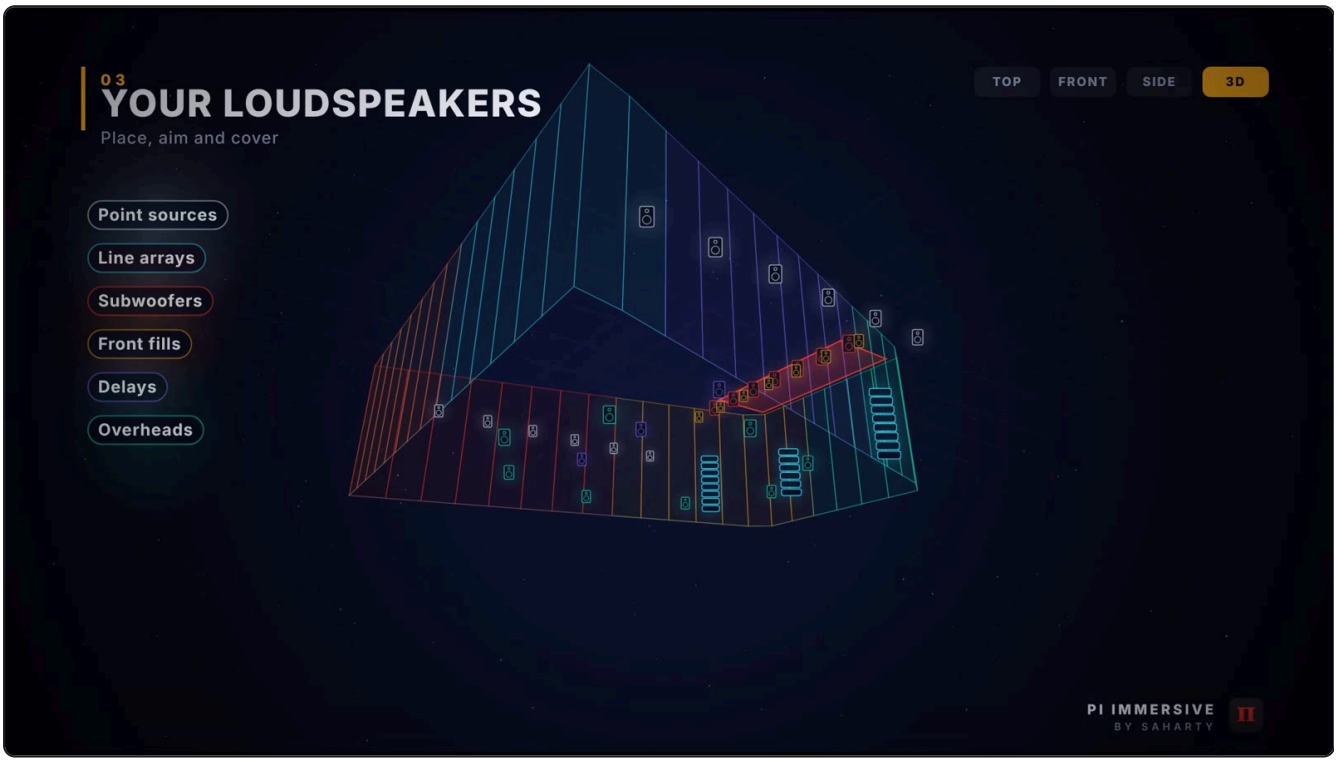


Figure 11. Top, front, side and 3D views of the loudspeaker system

How to use the format advisor

The **Format advisor** suggests immersive loudspeaker systems for your room and explains why.

1. Describe the room first on the **Room** tab. The advisor uses the size, shape, height, stage depth and mix position.
2. Open the **Format advisor** tab.
3. Choose **VENUE / USE**: **Concert / arena**, **Theatre / opera**, **Club / small venue**, **Studio / control room** or **Installation / dome**.
4. Choose **OUTPUTS AVAILABLE** (8 to 128).
5. Click **Analyse room** (it also updates when you change either menu).
6. Select a suggestion. The best match is marked **BEST FIT**. The detail panel shows a summary, the reasons, the zones and every box with its position and coverage.
7. Click **Apply this system** and confirm. This replaces your current speakers. Then fine-tune the positions on the plan.

Suggestions range from frontal hangs with surrounds and overheads, or a source-oriented theatre system, to 7.1.4 / 9.1.6 / 5.1.4 studio layouts and Ambisonic domes.

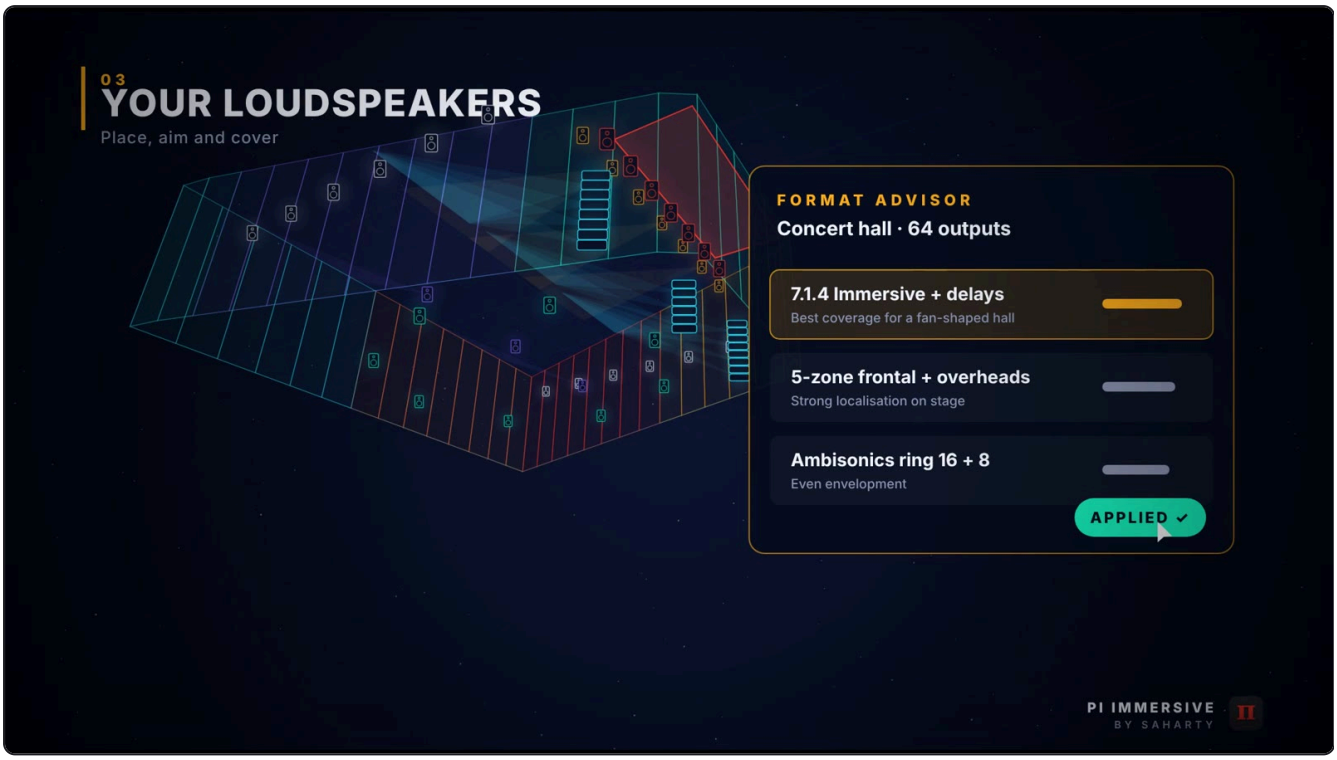


Figure 12. The format advisor ranks systems and applies the one you choose ▶ Animated in the online manual

WORKING WITH SOURCES

The **Sources** page has the spatial view on the left and the source panel on the right. Use **Object sources** and **Stage matrix** at the top to switch between the object engine and the Stage delay matrix editor.

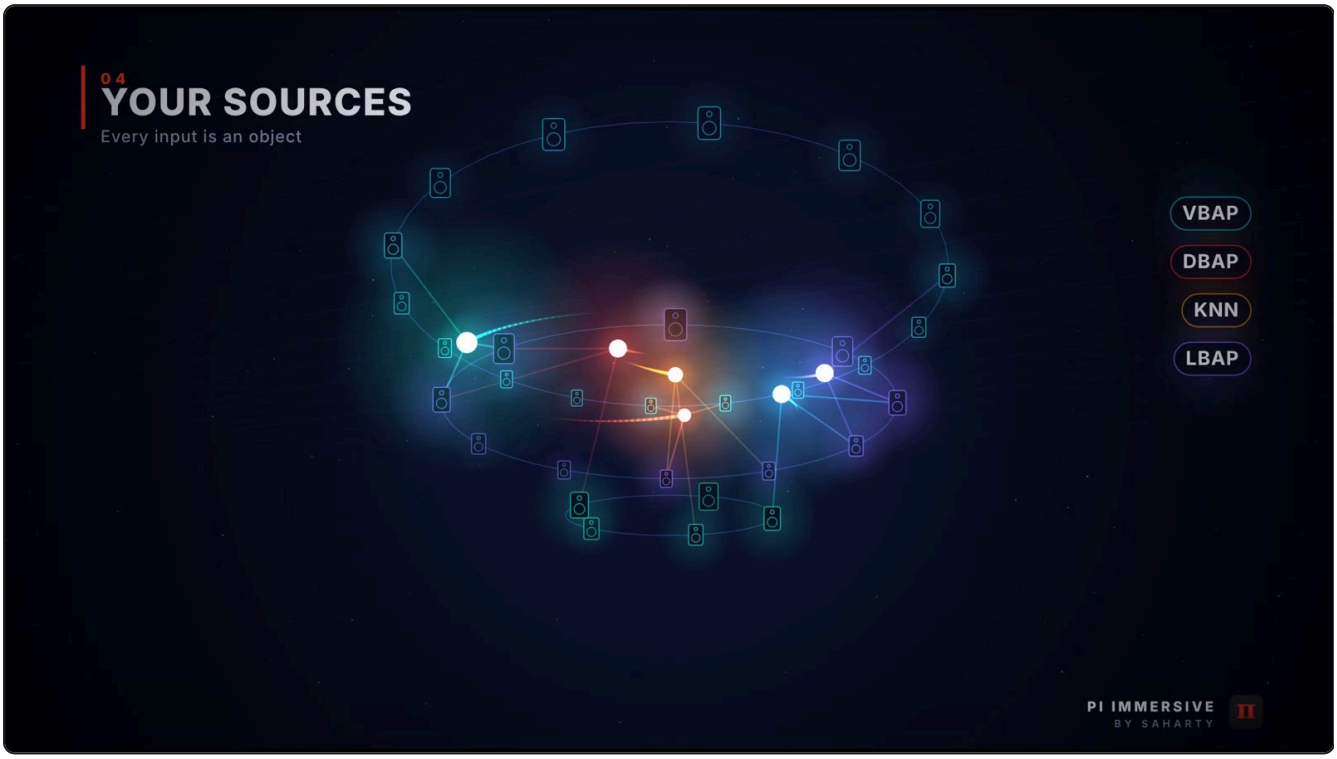


Figure 13. Sources moving through the room with different panning laws ▶ Animated in the online manual

How to add and organise sources

- Click **+ Add** in the source panel, use the header's add button, or choose **Sources > Add source**. New sources start at 3 m.
- Double-click an empty spot on the plan (not in 3D view) to add a source exactly there.
- Double-click a source in the list to rename it, or type in the **NAME** field.
- Click **Colour** to choose the source's colour.
- Click **Remove** to delete the selected source.
- Right-click a source in the list for **Mute**, **Solo**, **Unmute all** and **Clear all solos**.

List tags: **M** muted, **S** solo, **L** locked, **ST** stereo pair. ### How to position a source

- **Drag** a source on the plan to move it.
- **Alt-drag** to change only its distance and keep its direction.
- **Mouse wheel over a source:** changes elevation in the Top view, or distance in the other views.
- **Shift + mouse wheel over a source:** changes its spread.
- **Arrow keys and Page Up / Page Down** move the selected source when the plan has keyboard focus (see *Keyboard shortcuts*).

- Or type values in the **Position & panning** tab.

If a source belongs to a group, dragging it moves the other unlocked sources of the same group with it.

Source right-click menu

Right-click a source on the plan for: **Mute**, **Solo**, **Lock position**, **Stereo pair input**, **Panning law** (submenu), **Group** (**No group** or **Group 1** to **Group 8**), **Send to front centre**, **Duplicate** and **Delete**.

Position & panning tab

Control	What it does	Range / default
INPUT CHANNEL	The physical input that feeds this source	In 1 to In 256
PANNING LAW	How the source is spread over the speakers (see below)	VBAP
AZIMUTH	Direction around the listener (0° = front, positive = left)	-180° to 180° / 0°
ELEVATION	Height angle	-90° to 90° / 0°
DISTANCE	Distance from the listener	0.05 to 100 m / 2 m
SPREAD	Size of the source: 0° is a point, 360° is fully diffuse	0° to 360° / 0°
YAW	Which way the source faces	-180° to 180° / 0°
DIRECTIVITY	0 is omnidirectional, 1 is close to cardioid	0 to 1 / 0
STEREO WIDTH	Width of a stereo pair (enabled when **Stereo pair** is on)	0° to 180° / 60°
KNN K / DBAP ROLLOFF	Number of nearest speakers for KNN, or rolloff for DBAP	K 1 to 8 / 3; rolloff 0 to 12 dB / 6 dB
Stereo pair	Uses the input channel and the next one as a stereo source	Off
Lock position	Protects the position from mouse, MIDI, OSC and the arrange commands	Off

Panning laws

Law	Best for
VBAP	Precise point sources on regular layouts, using the nearest pair or triangle of speakers.
DBAP	Irregular layouts and installations where there is no single sweet spot. Uses the DBAP rolloff.
KNN	Feeds the K nearest speakers. Smooth and even.
Nearest Speaker	Snaps the source to a single speaker. Useful for "real" point sources.
Ambisonics (HOA)	Encodes the source to Ambisonics and decodes it to the layout. Smooth movement on domes.
Angular Spread	Continuous spread panning for wide, enveloping sources.

Law	Best for
LBAP	Layer-based panning: VBAP per ring with an elevation crossfade, for layouts with distinct height layers.
Stereo Pan	Classic constant-power pan for 2-channel output.

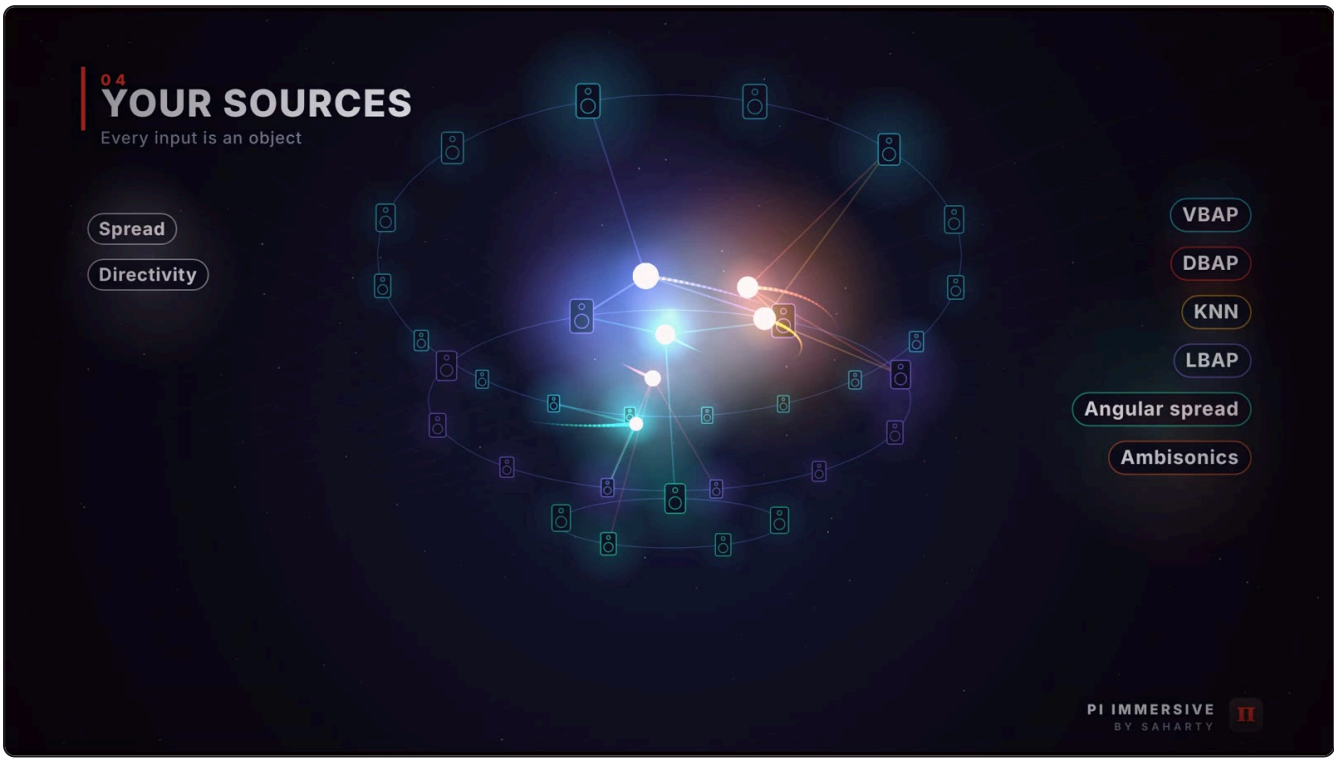


Figure 14. Panning laws, spread, directivity, distance, Doppler and air absorption

Level & sends tab

Control	What it does	Range / default
GAIN	Source level	-60 to +12 dB / 0 dB
LFE SEND	Level sent to the LFE / subwoofer outputs	off (-60) to +6 dB / off
ROOM SEND	Level into the room engine	off to +6 dB / -12 dB
SEND A, **SEND B**	Levels to effect buses A and B	off to +6 dB / off
Mute, **Solo**	Mute or solo the source	Off
Sends post fader	When on, the sends follow the source gain and mute	On

Distance & room tab

Control	What it does	Range / default
DISTANCE LAW	**None**, **1/d (-6 dB per doubling)**, **1/d^2 (-12 dB per doubling)** or **Custom**	1/d

Control	What it does	Range / default
REF. DISTANCE	Distance at which the source plays at 0 dB	0.1 to 20 m / 1 m
ROLLOFF	Level drop per doubling of distance (Custom law only)	0 to 12 dB/2x / 6
EARLY, **CLUSTER**, **TAIL**	This source's level into early reflections, the reflection cluster and the reverb tail	-60 to +6 dB / 0 dB
Doppler	Pitch shift when the source moves towards or away from you	Off
Air absorption	High-frequency loss with distance	On
Room engine	Sends this source to the room engine	On

How to check a source

Select the source and click **Pink noise**. Pink noise plays through that source at its current position. Click again to stop.

View options

The **Speaker gains** toggle shows how much each speaker receives from the selected source. **Names** shows the source and speaker names.

USING THE STAGE DELAY MATRIX

The **Stage delay matrix** is for source-oriented reinforcement, mainly in theatre. Each matrix input is a performer or instrument (input *n* is physical input *n*). Each input-to-output cell has a level and a delay. Pi Immersive can calculate these from a stage plan so that the real voice reaches every seat first, and the loudspeakers support it without pulling the image away from the stage.

To use it, set the header **ENGINE** menu to **Stage delay matrix**, or to **Both (parallel)** to run it alongside the object engine. Then click **Stage matrix** on the Sources page.

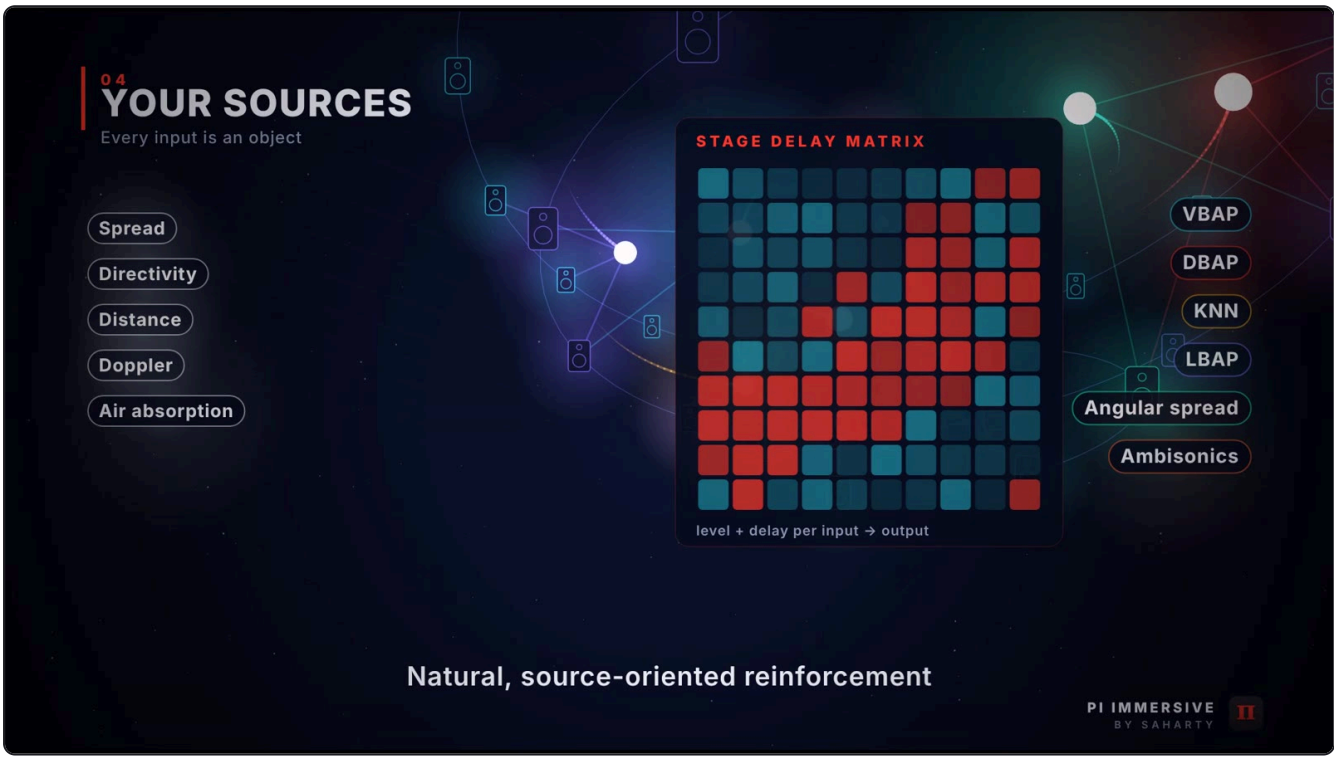


Figure 15. The Stage delay matrix: a level and a delay for every input and output

How to set up the stage plan

1. Choose the number of **Inputs** and **Outputs** (up to 64 each).
2. Set **Layout radius** and click **Speakers from layout** to take the speaker positions from your loudspeaker layout.
3. Drag the performers on the stage plan. Shift-drag to move speakers. Use the wheel to zoom.
4. Adjust the stage plan rules (table below), then click **Recompute all from stage plan**.

Control	What it does	Range / default
Crossfade	Time to move between positions or images	0.01 to 10 s / 0.5 s
Precedence offset	Extra delay so the real source arrives first	0 to 40 ms / 8 ms
Level rolloff	Level drop per doubling of distance	0 to 12 dB/2x / 6

Control	What it does	Range / default
Max level, **Min level**	Limits for the calculated cell levels	-20 to +10 dB / 0 dB; -60 to 0 dB / -40 dB
Reference dist.	Distance for 0 dB	0.5 to 20 m / 3 m
Layout radius	Radius used by **Speakers from layout**	2 to 40 m / 8 m
Distance attenuation	Reduces the level of distant speakers	On
Glide delay (pitch) instead of crossfade	Moves delays smoothly (with a pitch glide) instead of crossfading	Off

Subwoofer and LFE outputs are never fed by the localisation matrix.

How to edit cells by hand

Click a cell, then:

- **Drag** to change its level.
- **Shift-drag** to change its delay (up to 500 ms).
- **Double-click** to switch it on or off.

Each cell shows its level in dB and its delay in ms. For the selected input you can set **Input gain**, **Mute input**, or **Clear input**.

How to store and recall images

An *image definition* stores the full set of cells for one input, such as "actor at the left door".

1. Select an input and set up its position or cells.
2. Click **Store image**.
3. Later, select the image in the list and click **Recall**. The matrix crossfades to it over the **Crossfade** time.
4. Use **Update** to overwrite the selected image with the current cells, or **Delete** to remove it.

ROOM ENGINE: REFLECTIONS, REVERB AND EFFECTS

The **Room Engine** page creates a realistic sense of space. It has three tabs: **Room reverb**, **Send effects** and **Listener**. The spatial view on the left can show the **Reflection paths** from each source.

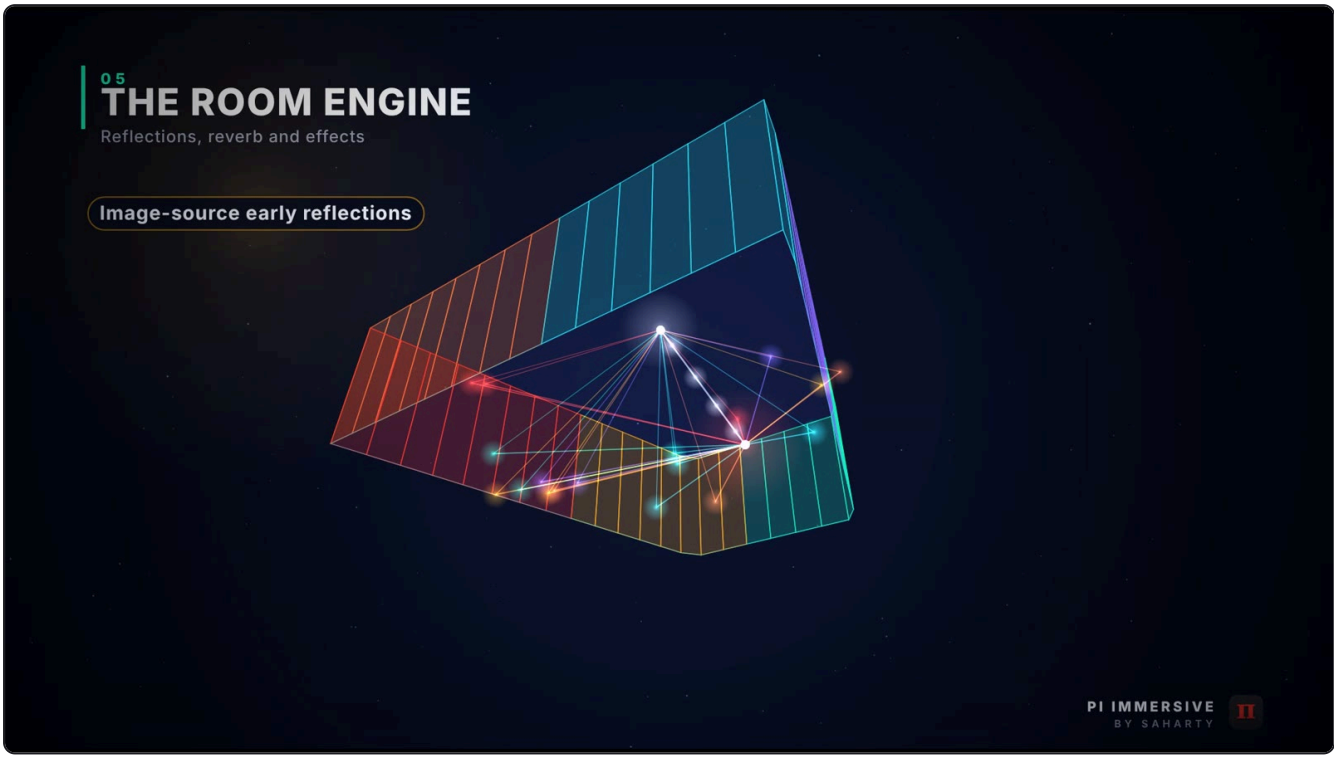


Figure 16. Image-source early reflections calculated from the actual room ▶ Animated in the online manual

Room reverb tab

At the top are three switches:

- **Room engine on**: switches the whole room engine on or off.
- **Derive from room**: when on, reverb time, size and pre-delay follow the room model (volume, materials and audience). Switch it off to set them by hand.
- **Geometric reflections**: early reflections are calculated per source from the walls, floor and ceiling, and filtered by each surface's material.

Choose a **SPACE PRESET** to start from a typical space: Small room, Studio live room, Chamber, Concert hall, Cathedral, Arena, Plate, Ambience or Outdoor slap.

LATE REVERBERATION

Control	What it does	Range / default
SIZE	Size of the virtual space	1 to 100 m / 12 m
RT60	Mid-frequency decay time	0.1 to 20 s / 1.6 s
LOW RT	Low-frequency decay as a multiple of RT60	0.2 to 3x / 1.2x

Control	What it does	Range / default
HIGH RT	High-frequency decay as a multiple of RT60	0.1 to 1.5x / 0.6x
PRE-DELAY	Gap before the reverb starts	0 to 200 ms / 10 ms
LOW X-OVER	Crossover between the low and mid bands	50 to 1000 Hz / 250 Hz
HIGH X-OVER	Crossover between the mid and high bands	1000 to 12000 Hz / 4000 Hz
DIFFUSION	Density of the reverb	0 to 1 / 0.7
MODULATION	Slow movement in the tail, which reduces ringing	0 to 1 / 0.3
WIDTH	Spread of the reverb over the speakers	0 to 1 / 1
HIGH CUT	Low-pass filter on the reverb	1000 to 20000 Hz / 12000 Hz
LOW CUT	High-pass filter on the reverb	10 to 500 Hz / 60 Hz

LEVELS AND EARLY REFLECTIONS

Control	What it does	Range / default
EARLY	Level of the early reflections	-60 to +6 dB / -6 dB
CLUSTER	Level of the dense reflection cluster	-60 to +6 dB / -8 dB
TAIL	Level of the late reverb tail	-60 to +6 dB / -6 dB
EARLY SPREAD	Angular spread of the early reflections	5° to 120° / 40°

> **Note:** When **Derive from room** is on, the size, RT60 and pre-delay you see come from the room model. Change the room or its materials to change them.

Send effects tab

There are two effect buses, **SEND A** and **SEND B**. Each source sends to them with its **SEND A** and **SEND B** levels on the Sources page (pre or post fader). The returns are spread with decorrelation over the speaker zone you choose.

Control	What it does	Range / default
Active, **Mute**	Switch the bus on, or mute its return	Active on
TYPE	**Algorithmic space** or **Convolution (impulse response)**	Algorithmic space
SPACE	Algorithmic preset (same list as the room reverb)	Concert hall
Load impulse response...	Loads a WAV or AIFF impulse response (mono or stereo) for convolution	—
RETURN TO	**All speakers**, **Frontal**, **Surround**, **Height / overhead** or **Ear level (no heights)**	All speakers

Control	What it does	Range / default
RETURN	Return level	-60 to +12 dB / -6 dB
PRE-DELAY	Delay before the effect	0 to 250 ms / 15 ms
LOW CUT, **HIGH CUT**	Filters on the send	20 to 1000 Hz / 120 Hz; 1000 to 20000 Hz / 12000 Hz
WIDTH	Spread of the return	0 to 1 / 1
DECAY, **SIZE**, **DIFFUSION**	Algorithmic space settings	0.1 to 20 s / 2 s; 1 to 100 m / 20 m; 0 to 1 / 0.8

A **RETURN** meter shows each bus's output level. The name of the loaded impulse response is shown, or "No impulse response loaded".

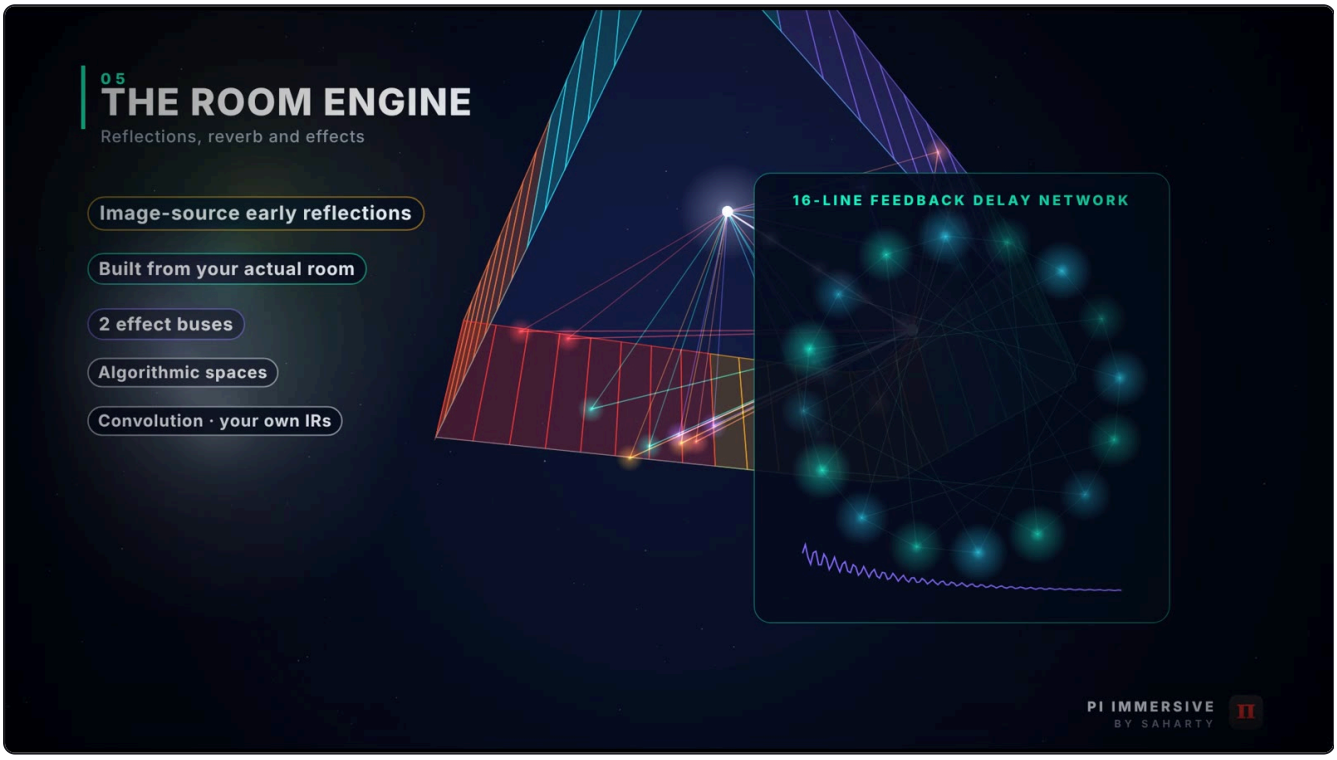


Figure 17. Late reverb network, two effect buses, algorithmic spaces and convolution

Listener tab

The **LISTENER / PERSPECTIVE (RELATIVE TO THE MIX POSITION)** controls move or turn the virtual listener. This changes every source's direction and distance, the early reflections and the binaural rendering.

Control	Range / default
YAW	-180° to 180° / 0°
PITCH	-90° to 90° / 0°
ROLL	-90° to 90° / 0°
OFFSET X, **OFFSET Y**	-50 to 50 m / 0 m

Control	Range / default
OFFSET Z	-20 to 20 m / 0 m
HEAD RADIUS	0.06 to 0.11 m / 0.0875 m (used for binaural)
MASTER	-60 to +12 dB / 0 dB

> **Tip:** For headphone monitoring, send listener yaw from a head tracker over OSC (`/listener/ypr`).

CONTROLLING A YAMAHA CONSOLE

The **Console** page connects Pi Immersive to a Yamaha CL, QL, TF, DM3, DM7 or RIVAGE PM console over RCP (TCP port 49280). In this mode the console does the mixing: each loudspeaker is fed by one console mix (aux) bus, and Pi Immersive writes each source channel's send levels to those auxes from the panning law. This is updated 20 times a second.

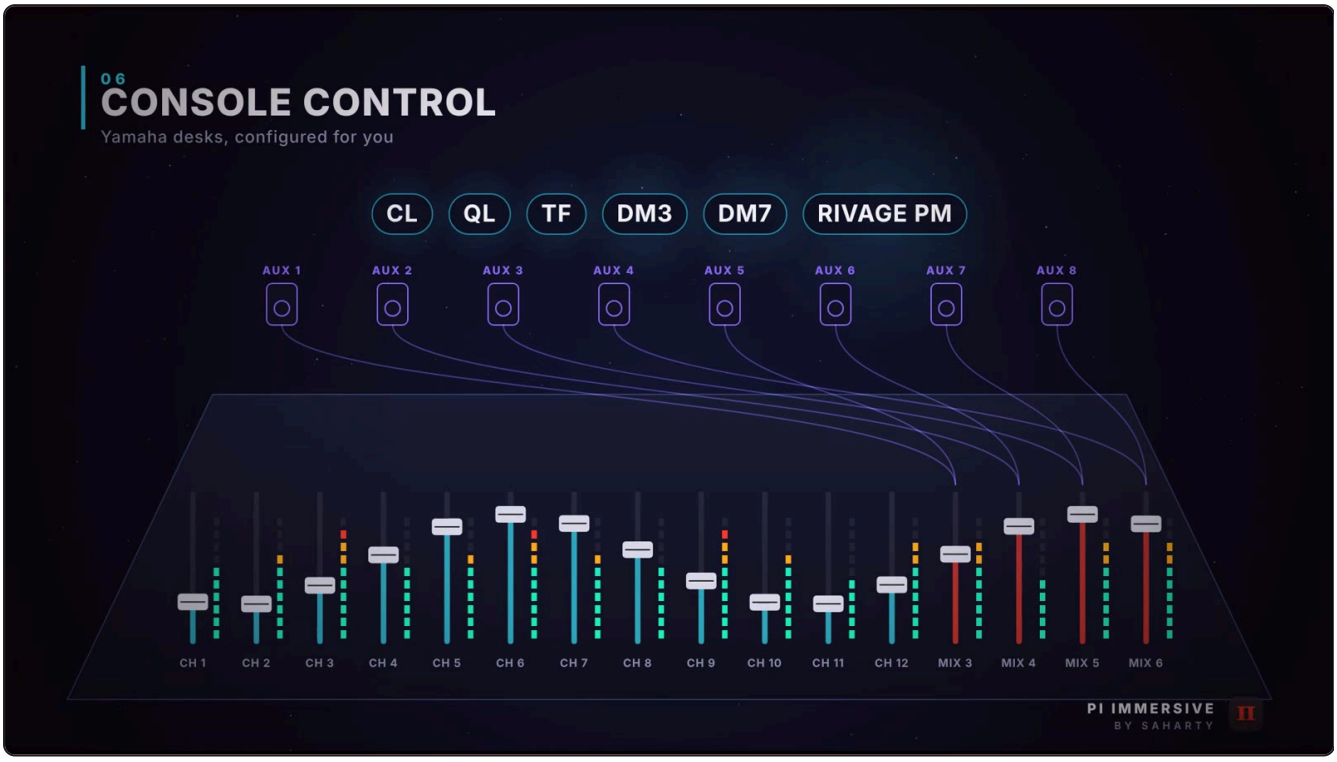


Figure 18. Each loudspeaker fed from its own console aux ▶ **Animated in the online manual**

How to connect

1. Connect the computer to the console's network and give it a fixed IP address in the console's range.
2. Open the **Console** page and turn on **Control the console**.
3. Enter the **CONSOLE IP** (default `192.168.0.128`) and **PORT** (default `49280`).
4. Under **NETWORK ADAPTER**, choose the wired adapter, or **Automatic (let the system choose)**. Click **Refresh** to update the list.
5. Click **Apply / reconnect**. The status shows **Connected to ...** with the console model and the local address, and the header **CONSOLE** LED lights.

If several adapters (for example Wi-Fi and Ethernet) are on the console's subnet, or none is, the page shows a warning and tells you what to do.

How to assign auxes to loudspeakers

1. In the **Loudspeaker -> console aux** table, choose a **Console aux** (**Mix 1** to **Mix 72**, or **None**) for each loudspeaker. You can also use the **Aux** column on Room Setup.

2. Or click **Assign auxes in order** to assign consecutive mixes.
3. The **Status** column shows **live** or **offline** for each assigned speaker, or "not fed".

If no speaker has an aux assigned, Pi Immersive falls back to consecutive mixes starting at **FIRST AUX (FALLBACK)**, for **AUX COUNT (FALLBACK)** mixes.

Settings

Control	What it does	Range / default
CHANNEL OFFSET	Console channel = source input channel + offset	0
FIRST AUX (FALLBACK)	First mix used when no aux is assigned	Mix 1 to Mix 72 / Mix 1
AUX COUNT (FALLBACK)	Number of mixes in the fallback	1 to 72 / 8
MAX SEND LEVEL	Highest send level written	-40 to +10 dB / 0 dB
MIN SEND (BELOW = -INF)	Sends below this are set to -inf	-90 to -10 dB / -60 dB
Follow source gain on channel faders	Writes source gain to the channel faders	Off
Follow source mutes	Writes source mutes to the channel on/off	Off
Stereo pan follows azimuth	Sets each channel's stereo pan from its azimuth	Off
Auto-configure the console	Configures the console on connect and whenever sources or aux assignments change	On

Auto-configuration

When **Auto-configure the console** is on, Pi Immersive:

- sets every source channel's sends to the speaker auxes to **POST fader** and switches them **on**,
- removes the source channels from the stereo and mono buses,
- removes the speaker auxes from the stereo bus.

Click **Configure console now** to do this immediately. On connect, Pi Immersive first checks which commands your console supports and lists the result for each step: **OK**, **no reply** (template used as is), or **NOT available over RCP on this console** with what to do by hand.



Figure 19. Auto-configure: sends post fader, channels off the stereo bus

Command templates

If your console firmware uses different parameter paths, edit the templates under **Command templates**: **SOURCE SENDS -> POST FADER (PrePost 0 = POST)**, **SOURCE SENDS ON**, **SOURCE CHANNELS OFF STEREO BUS**, **SOURCE CHANNELS OFF MONO BUS** and **SPEAKER AUXES OFF STEREO BUS**. Use `{ch}` and `{mix}` for 0-based numbers, or `{ch1}` and `{mix1}` for 1-based numbers. Leave a template empty to skip that step. Click **Defaults** to restore them.

Other tools

- **Send channel names** writes the source names (up to 8 characters) to the console.
- **RAW RCP COMMAND** sends any RCP line when you click **Send**.
- The **Log** shows connections, checks, errors and replies. **Clear** empties it.

> **Warning:** Auto-configure changes your console's routing. Save a console scene before you connect for the first time.

SHOW CONTROL: MIDI, TIMECODE AND OSC

The **Control** page has three tabs: **MIDI mapping**, **Timecode & automation** and **OSC**.

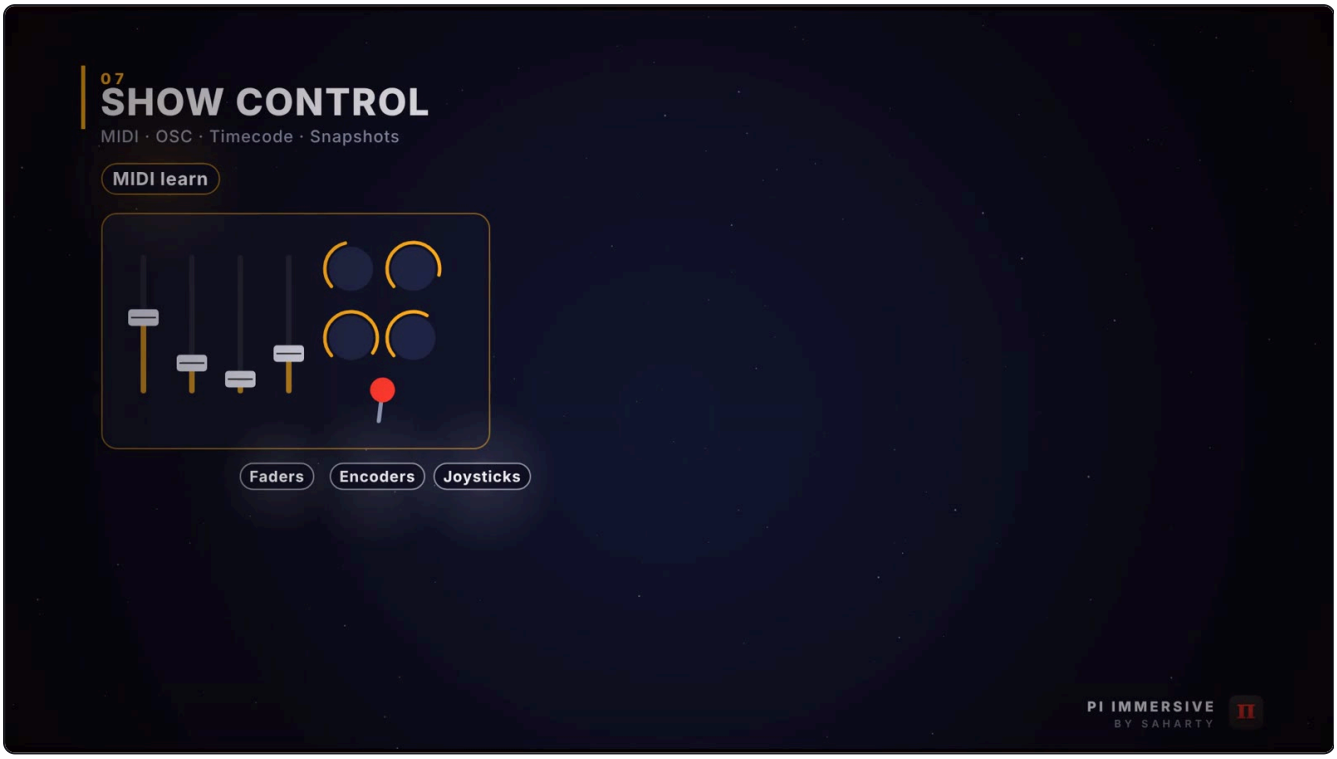


Figure 20. MIDI learn for faders, encoders and joysticks

MIDI mapping

Turn on **MIDI input** to open all MIDI inputs. The inputs found are listed, and the last received message is shown. Click **Rescan** after connecting a new controller.

How to map a control with learn

1. Click **Add + learn**, or click **Learn** on an existing row.
2. Move the control on your MIDI controller. The page shows "LEARNING - move a control..." until a message arrives. The device, channel, message type and number are filled in.
3. Choose the **Function**, **Target**, **Min**, **Max** and **Mode**.

How to map a joystick: click **Add joystick X/Y**. Pi Immersive adds an X / Y pair and learns both axes in turn.

Column	Meaning
On	Enables the mapping
Name	Your name for it
Device	A specific MIDI input, or **Any device**
Ch	MIDI channel 1 to 16, or **Any**

Column	Meaning
Message	**CC**, **CC 14-bit**, **Note**, **Pitch bend** or **Program change**
No.	CC or note number
Function	What it controls (see below)
Target	**sel** (0) = the selected source or Stage Matrix input; *n* = source, Stage Matrix input or snapshot *n*
Min, **Max**	Range in the function's units (degrees, metres, dB…)
Mode	**Absolute**, **Relative (encoder)**, **Toggle**, **Momentary** or **Trigger**
Inv	Inverts the direction

Functions: Source X (joystick), Source Y (joystick), Source Z / height, Azimuth, Elevation, Distance, Spread, Gain, Room send, Send A, Send B, Mute, Solo, Select source #, Select next source, Select previous source, Master gain, Recall snapshot #, Next snapshot, Previous snapshot, Automation: record, Automation: play, Automation: stop, Listener yaw, Stage Matrix performer X and Stage Matrix performer Y.

Defaults restores the default mappings: CC 16 azimuth, CC 17 elevation, CC 18 distance, CC 19 spread and CC 7 gain, all on the selected source, plus Program change to recall a snapshot.

> **Tip:** Use **Relative (encoder)** for endless encoders so the value never jumps.

Timecode & automation

Pi Immersive can record source movements and levels against LTC timecode and play them back, chasing the code.



Figure 21. Moves recorded and played back against timecode ▶ Animated in the online manual

How to set up timecode

1. Set **CLOCK SOURCE** to **LTC timecode from audio input** or **Internal clock**.
2. For LTC, choose the **LTC AUDIO INPUT** (Input 1 to 256). The frame rate (24, 25, 29.97 or 30 fps) is detected automatically.
3. Check the display: "LTC locked" with the frame rate, and the LTC level in dBFS.
4. Set **SHOW START (TIMECODE OFFSET)** by typing a timecode, or click **Set to current LTC**. Show time is the incoming LTC minus this offset.

How to record automation

1. In **ARMED FOR RECORDING (CLICK TO ARM)**, click the sources (and Stage Matrix inputs) you want to record. Use **Arm all** or **Disarm** for all sources.
2. Turn on **Global** to also record master gain, listener yaw and snapshot recalls.
3. Click **Record**, then roll timecode and move the armed sources.
4. Click **Stop**.

Recording writes the armed sources' position, gain, mute and sends. Re-recording replaces only the time range you pass over; everything else keeps playing back.

How to play back: click **Play**. Playback follows the timecode, including jumps. With the internal clock, **Rewind** returns to zero.

The lane display shows azimuth, elevation, distance and gain for the selected source (±8 seconds around the current time). **Clear sel.** deletes the selected source's moves. **Clear all moves** deletes everything, after you confirm.

OSC

Control	What it does	Default
OSC input	Listens for OSC messages	On
RECEIVE PORT	UDP port Pi Immersive listens on	8000
FEEDBACK HOST, **FEEDBACK PORT**	Where feedback is sent	127.0.0.1, 9000
Send feedback to controller	Sends source changes back	On
Accept ADM-OSC (/adm/obj/...)	Accepts ADM-OSC object messages	On

Click **Apply** after changing ports. Click **Send full state** to send every source's state to your controller. The status line shows "Listening on UDP ...", the message count and the last message.



Figure 22. Scenes recalled from show control

SNAPSHOTS AND CUES

Snapshots store the sources, the room and the listener, plus the master level. When you recall one, positions, gains, spreads, room and effect sends, source yaw, room size, RT60, early, cluster and tail levels and the master level all morph smoothly over the snapshot's recall time.

How to build a cue list

1. Open **Snapshots** (Cmd/Ctrl+7).
2. Set **Recall time for new snapshots** (0 to 60 s, default 0.5 s).
3. Set up the scene, then click **Store new** (or **Snapshots > Store snapshot**). It is named **Cue 1**, **Cue 2** and so on.
4. Click **Rename** to name it, and **Up** / **Down** to reorder.
5. Click **Update** to save the current scene into the selected snapshot, or **Delete** to remove it.

How to run cues

- Double-click a snapshot, or select it and click **Recall**.
- Press **Space**, or click **Next >**, to recall the next cue. Click **< Prev** for the previous one.
- Recall from MIDI (Program change by default), or from OSC with `/snapshot/recall n`.

Each row shows its morph time.

SETTINGS & PREFERENCES

Pi Immersive saves most settings inside the project, so each show keeps its own setup.

Saved in the project (`.piimm`): everything about the show: sources, speakers, room, room engine, output format, Stage Matrix, MIDI mappings, timecode and automation, console and OSC settings, and snapshots.

Saved on the computer: the audio device setup, in the settings file (macOS: `~/Library/Application Support/Saharty/Pi Immersive/`; Windows: the `Saharty\Pi Immersive` folder inside `%APPDATA%`).

Project commands:

- **New project** starts with a default room, eight sources and the default MIDI mappings.
- **Open...** and **Save As...** use your Documents folder by default.
- If you have unsaved changes, Pi Immersive asks you to **Save**, **Don't save** or **Cancel** before closing or opening another project.

KEYBOARD SHORTCUTS / REMOTE CONTROL

Global keyboard shortcuts

Keys	Action
Cmd/Ctrl+N	New project
Cmd/Ctrl+O	Open project
Cmd/Ctrl+S	Save
Shift+Cmd/Ctrl+S	Save As
Cmd/Ctrl+1 to Cmd/Ctrl+7	Go to page 1 to 7
Space	Recall the next snapshot

Spatial view (click the view first to give it focus)

Keys / mouse	Action
1 / 2 / 3 / 4	Top / Front / Side / 3D view
0	Reset the view
Left / Right arrow	Azimuth of the selected source, 1° (Shift: 10°)
Up / Down arrow	Elevation of the selected source, 1° (Shift: 10°)
Page Up / Page Down	Distance of the selected source, 0.1 m (Shift: 1 m)
M / S / L	Mute / Solo / Lock the selected source
Delete or Backspace	Remove the selected source
Drag	Move a source (on Room Setup: move a speaker or the mix position)
Alt+drag	Change distance only
Shift+drag on a speaker	Move a speaker (Sources page)
Wheel over a source	Elevation (Top view) or distance (other views)
Shift+wheel over a source	Spread
Wheel elsewhere	Zoom
Double-click empty space	Add a source there
Drag / double-click in 3D	Orbit / reset the view
Right-click	Source or speaker menu

OSC address reference

The same list is shown on the **OSC** tab (**Help > OSC / MIDI reference**). *n* is the 1-based source index.

Group	Addresses
Source position	`/source/n/aed` az el dist, `/source/n/xyz` x y z (m), or one value with `/az`, `/el`, `/dist`, `/x`, `/y`, `/z`
Source level and shape	`/gain` dB, `/mute` 0/1, `/solo` 0/1, `/spread` deg, `/yaw` deg, `/directivity` 0..1, `/lfe` dB
Source room	`/source/n/room/send`, `/early`, `/cluster`, `/tail` dB, `/room/on` 0/1
Source other	`/law` 0..7 (menu order), `/doppler` 0/1, `/name` string
ADM-OSC	`/adm/obj/n/azim`, `elev`, `dist`, `aed`, `xyz`, `x`, `y`, `z` (normalised: 1.0 = 10 m), `gain` (linear), `w` (spread), `mute`
Room	`/room/size` m, `/room/rt60` s, `/room/early`, `/cluster`, `/tail` dB, `/room/predelay` ms, `/room/on` 0/1
Listener	`/listener/ypr` yaw pitch roll, `/listener/xyz` x y z
Master	`/master/gain` dB, `/master/mute` 0/1
Snapshots	`/snapshot/recall` n
Stage Matrix (input n)	`/matrix/n/xyz` x y z, `/matrix/n/image` i, `/matrix/n/cell` out dB ms, `/matrix/n/gain` dB, `/matrix/n/mute` 0/1

Feedback: when a source moves, Pi Immersive sends `/source/n/aed`, `/xyz`, `/gain`, `/mute` and `/spread` to the feedback host. With ADM-OSC on, it also sends `/adm/obj/n/aed` and `/xyz` with normalised values. Locked sources ignore position messages.

TIPS FOR LIVE/STUDIO USE

- **Start from the room.** Describe the room and materials before you place speakers. The format advisor, the alignment and the room engine all depend on it.
- **Leave alignment on. Speaker time / level alignment** delays nearer speakers to arrive with the farthest one and matches levels at the mix position, taking line-array behaviour into account. Use the **Trim** and **Delay** columns only for fine adjustments on top.
- **Keep motion smoothing reasonable.** About 30 ms avoids zipper noise on fast moves. Raise it if a MIDI controller or OSC sender produces stepped movement; lower it if moves feel late.
- **Use Lock position for fixed sources.** Locked sources ignore the mouse, MIDI, OSC and the arrange commands, so a stray move can't shift the lead vocal.
- **Theatre:** use **Stage delay matrix** so voices localise to the performers, with a few milliseconds of **Precedence offset**.
- **Console mode:** use a wired network adapter. If Wi-Fi and Ethernet are both on the console's subnet, traffic may leave through Wi-Fi. Select the wired adapter or turn Wi-Fi off.
- **Pre-show check:** run **Cycle test** on the loudspeakers, then **Pink noise** on a source, before doors open.

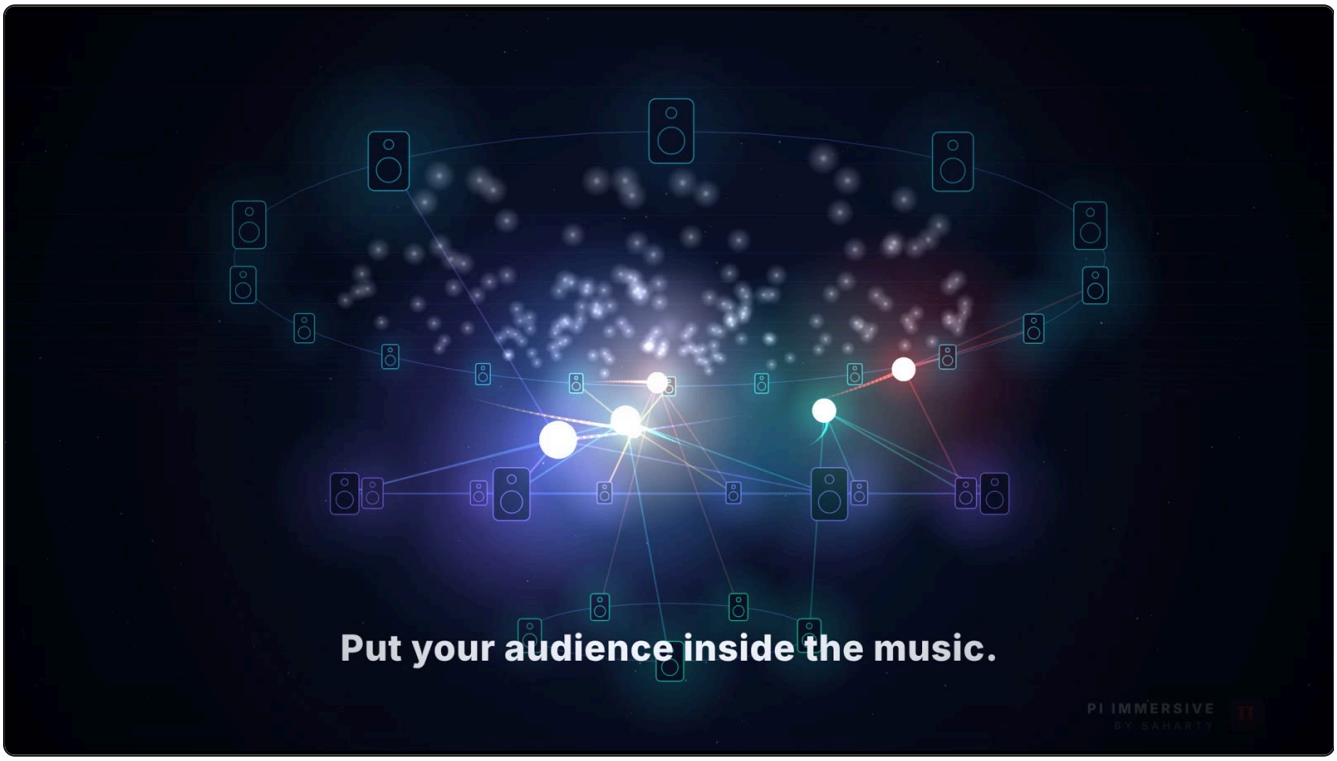


Figure 23. Put your audience inside the music

TROUBLESHOOTING

Symptom	Cause	Fix
No sound, and the status bar says "ENGINE STOPPED - activate Pi Immersive Live to start it"	The app isn't activated, or the notice period is over	Open **Help > Licence...** and activate, or start the free trial. The engine then starts by itself.
No sound, and the **ENGINE** button reads **OFF**	The engine was stopped	Click **ENGINE** to start it.
"The audio device could not be opened" at launch	The last device is disconnected or in use	Choose a device on **I/O Setup**.
Input meters don't move	Wrong channels enabled, or (macOS) microphone permission refused	Enable the inputs on **I/O Setup**. On macOS, allow Pi Immersive in **Privacy & Security > Microphone**.
A source is silent	Wrong **INPUT CHANNEL**, source muted, another source soloed, or gain at -60 dB	Check the input, **Mute** / **Solo**, and **Sources > Clear all solos**.
Moves sound stepped	Motion smoothing too short for the controller rate	Raise **MOTION SMOOTHING** on **I/O Setup**.
Convolution bus is silent	No impulse response loaded, or bus muted / inactive	Click **Load impulse response...**; check **Active** and **Mute**.
Console: "no answer within ... (wrong IP, cable, or adapter?)"	Wrong IP, cable or adapter	Check the IP, cabling and **NETWORK ADAPTER**. Give the computer a fixed IP in the console's range.
Console: "Several adapters ... are on the console's subnet"	Wi-Fi and Ethernet on the same subnet	Pick the wired adapter or turn Wi-Fi off.
OSC messages are ignored	OSC input off, wrong port, or a firewall	Turn on **OSC input**, check **RECEIVE PORT**, click **Apply**, allow the app through the firewall.
MIDI controller does nothing	MIDI off, device not found, or mapping disabled	Turn on **MIDI input**, click **Rescan**, check the **On** column.
Licence "active on another computer"	The key is used elsewhere	Choose **Move it here**, or deactivate the other computer from your account.

SPECIFICATIONS & SYSTEM REQUIREMENTS

Specifications

Item	Value
Version	2.0.2
Type	Standalone application (macOS and Windows)
Engine	Object-based spatialisation, Stage delay matrix, or both in parallel
Audio I/O	Up to 256 x 256 channels
Sources	Up to 64
Loudspeaker outputs	Up to 64
Panning laws	8
Output formats	Loudspeakers, binaural (HRTF), Ambisonics 1st to 7th order (ACN / SN3D)
Room model	7 shapes, 22 materials, early reflections up to 2nd order, RT60 estimate
Reverb and effects	16-line late reverb, 2 effect buses
Stage delay matrix	Up to 64 x 64, delays up to 500 ms
Control	Yamaha RCP, MIDI, LTC (24 / 25 / 29.97 / 30 fps), OSC, ADM-OSC, snapshots
Project file	`.piimm`

System requirements

	macOS minimum	macOS recommended	Windows minimum	Windows recommended
OS	macOS 11 Big Sur	Latest macOS	Windows 10 64-bit	Windows 11 64-bit
Processor	Apple silicon or Intel (Universal)	Apple M1 Pro or better	Intel Core i5 / AMD Ryzen 5, 4 cores	Intel Core i7 / AMD Ryzen 7, 8 cores
Memory	8 GB	16 GB	8 GB	16 GB
Disk	100 MB	100 MB	100 MB	100 MB
Audio	Core Audio interface	Multichannel MADI / network audio interface	ASIO driver	Multichannel MADI / network audio interface
Control	—	OSC / MIDI controller, LTC source	—	OSC / MIDI controller, LTC source

SUPPORT

- **Email:** support@pi-ware.com
- **Website:** www.pi-ware.com
- **Video tutorials:** youtube.com/@pibysaharty
- **Your account and licences:** pi-ware.com/account

Please include your version (**Help > About Pi Immersive**), operating system and audio interface.

Pi Immersive Live is made by Pi by Saharty.

PI BY SAHARTY

www.pi-ware.com · support@pi-ware.com

Video tutorials: youtube.com/@pibysaharty

Online manual with animations: https://www.pi-ware.com/manuals/pi-immersive-live/

Precision is a constant.

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