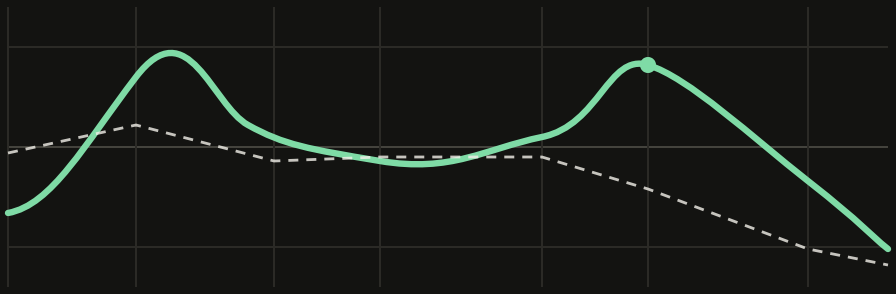
BY KUMQUAT AUDIO

INSTRUCTION MANUAL



Room

Tune a room by ear
and by eye.

SOUND SYSTEM
MEASUREMENT & TUNING

MACOS 13 VENTURA
AND LATER

CONTENTS

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HOW TO USE THIS BOOKLET

Skim section B once so you know what things are called. After that, go to the section for whatever you are trying to do. Numbers in black circles (1) point from the text to a numbered part in the drawing beside it.

A READ THIS FIRST

Before you begin

Room listens through a measurement mic and shows you what your sound system is doing. It suggests changes. You decide what to do with them.

What you need

- A Mac running macOS 13 Ventura or later.
- An audio interface, or the Mac's own microphone for a quick try.
- A measurement microphone, ideally an omnidirectional one, on a stand.
- For the timing views, a copy of your mix coming back into the interface (the master left and right from the console, or from Dante).

Where to put the mic

Stand it at ear height in the seating area, pointing up or at the stage. Avoid standing next to a wall or under a speaker. Measure in two or three places and look at the average.

CAUTION

Test noise is loud. Tune mode plays pink noise and sweeps through your system. Start with the system low, warn anyone in the room, and never run it with someone standing close to a speaker. Room raises its own level slowly and stops at a safe ceiling, but your amps and speakers decide how loud that ends up.

NOTE

Room shows **dBFS** (level against the interface's maximum) until you calibrate it. After calibration, the level readout is real **dB SPL**. Everything else works the same either way.

The two modes

MODE	USE IT TO	PLAYS SOUND
Tune	Set up a room or check a rig, one step at a time	Yes
Live	Keep open while the band plays or you mix	Only if you pick Room's noise as reference

B NOMENCLATURE

Names of the parts

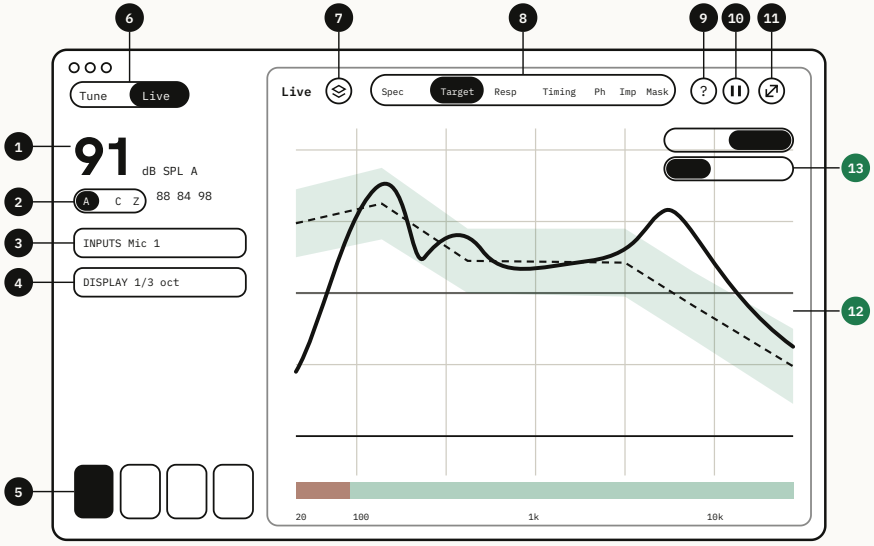


FIG. B-1 LIVE MODE, TARGET TAB

1 Level readout
Big number: how loud it is, in dB.

2 Weighting and stats
A / C / Z, then Slow, Leq and Max.

3 Inputs
Interface, mics, reference.

4 Display
Smoothing, averaging, peaks, scale, target.

5 Tool buttons
Store trace, Reset Leq, Calibrate, On top.

6 Tune | Live
Switches the mode.

7 Profile
Save or load all your settings.

8 View tabs
The row under the header: Spectrum and Target.

9 Explain (?)
Labels your own chart in plain words.

10 Pause
Freezes every view. Space bar does the same.

11 Focus
Hides the controls so the chart fills the window.

12 Chart
Hover to read exact values.

13 View switches
Distance | Curves, range, source (Target tab).

C QUICK START

Tune mode, four steps

Connect, Level, Measure, Fix. Do them in order. Room only lets you move on when each one is ready.

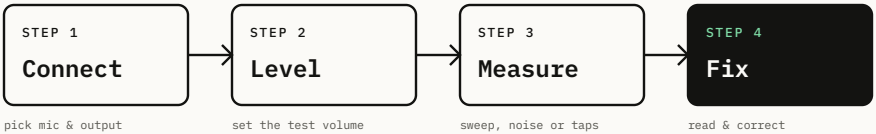


FIG. C-1 THE TUNE PATH

1 Connect

- **Listen:** choose the interface the mic is plugged into.
- **Mics & sources:** each row is a mic on an input. Add more, name them, colour them, hide them with the eye.
- **Play:** choose where the test sound comes out. If the interface has several outputs you can send it to just one.
- Tap the mic or clap. The **Mic signal** bar should move. If not, you picked the wrong input.

2 Level

Room brings the test noise up slowly until the mic hears it clearly without being too loud. Keep the room quiet. If it cannot get a good level it tells you; raise the system a little.

3 Measure

Pick a test signal, then press the button.

SIGNAL	WHAT IT IS	CHOOSE IT WHEN
Sweep	6 second rising tone	The room is quiet and still. Cleanest and fastest. Default.
Noise	About 10 seconds of pink noise	People are moving about.
Tap test	Six clicks	You want each speaker's arrival time and polarity.

C QUICK START, CONTINUED

Step 4: Fix

Room shows the measurement and a short list of plain-language moves, such as *“cut a little around 200 Hz.”*

The Fix views

TAB	IT ANSWERS
Response	Which pitches are too loud or too quiet?
Timing	Do all pitches arrive together?
Phase	The same question in degrees, for specialists.
Impulse	How big are the reflections, and how late?

Mics in the Fix screen

All your mics are recorded in the same run. The Fix screen starts on the **average** of the mics, which is usually what you tune to. A row of chips above the chart lets you look at any single mic.

The advice list

- **Cut** is preferred to boost, because a boost uses headroom.
- A **narrow dip** is flagged as a likely room null. Boosting it will not fill it.
- **Leave it** means you are within a few dB of your target.

TIP

Press ? next to the tabs at any time. Room draws numbered notes on your own chart and explains them: loud and quiet spots, which pitches arrive late, where reflections come from.

Choosing what “good” means

The advice measures against your **Target**. Built-in targets are Flat, Room, Live PA and Speech. Open **Edit curves…** to draw your own: drag points, click to add one, type exact values, or paste a list of `frequency dB` pairs, one per line.

Targets are about **shape, not level**. Room lines the target up with the average of 200 Hz to 4 kHz in your measurement, so only the tilt and bumps count.

D LIVE MODE

A screen to leave open

Switch Tune → Live and keep it up while the band plays. Room keeps the Mac awake.

The level readout 1 2

WEIGHTING	USE
A	Follows the ear. The usual choice for volume limits.
C	Nearly flat. Suits loud music and bass.
Z	Unweighted, raw.

Slow is a smoothed level. **Leq** is the average since you last pressed Reset Leq. **Max** is the loudest moment. Room runs A, C and Z together, so switching never loses history.

The tabs 8

Spectrum and Target. Each is explained in its own section: Spectrum below, and Target in F. Response, Timing, Phase and Impulse are for tuning a system, so they are in **Tune** mode, in the Fix step (section G).

Spectrum settings 4

SETTING	WHAT IT DOES
Smoothing	Blurs the curve across pitch. 1/12 octave is detailed, 1 octave is broad. Start at 1/3.
Averaging	Fast to Steady. Slower is calmer.
Long average	Off, 3, 5 or 10 s. Draws a steady average in bold over a faint live curve, so you can see what is slowly building up (a boom, a buildup in the mud). Reset restarts it.
Peaks	A thin line that remembers the loudest moments. Falling, or Hold for 2 s up to forever.
Scale	Fixed holds still. Auto glides in 10 dB steps.

D LIVE MODE, CONTINUED

Handy extras

The status line

Small chips under the header say what the chart is based on (mic, reference, target, average). Amber chips warn you: clipping, a very low signal, a missing device, no reference lock, mismatched sample rates, over the limit, or paused.

Level limit

Under the level readout, **Set a level limit**. Use – and + to set it in dB of the chosen weighting. The big number turns amber within 3 dB of it and red when over. A chart shows the last 10 minutes, 1 hour or 4 hours, with your Leq, peak and time over the limit.

Snapshots, before and after

Open **Snapshots** on the left and **Save a snapshot** before you change the EQ, and another after. Name them. **Compare** shows one as a dashed line behind the live curve (**Overlay**) or switches to **Change**: live minus snapshot around a zero line, red where it got louder and blue where it got quieter, with the biggest change called out.

Glance

Choose **Glance** from the ⋯ menu (or press G) to fill the window with the level in big numbers you can read across the room, a smaller verdict (**ON TARGET**, **CLOSE** or **OFF TARGET**, and how many dB from the target), a picture of how far the mix is from the target, a coloured strip, and the first thing to fix. Esc leaves it.

Signal

Under **Signal** on the left, play **Pink noise** or a repeating **Sweep** on its own while you watch the spectrum. It starts quiet: raise the **Level** slowly, and choose where it plays under **Play through**. A “Playing” chip reminds you while it runs. It stops when you choose **Off** or switch to Tune.

D LIVE MODE, CONTINUED

Report

Save report… in the ⋯ menu saves a PDF. **This moment** is one page. **Last 30 minutes**, **Last hour** and **Last 2, 3 or 4 hours** are two or three pages that tell what happened: how much of the time you were on target, close or off, with a bar for each stretch so you can see when; how far each part of the sound sat above or below the target, and how often it was outside the forgiveness range; which things kept coming up, as a share of the time; the level over time with the Leq, peak and quietest; and when you were over your limit. Room keeps the last four hours while Live is open.

Keyboard

KEY	DOES
Space	Pause or resume
1 – 2	Spectrum, Target
A	Cycle the long average: Off, 3 s, 5 s, 10 s
F · G · Esc	Focus (hide controls) · Glance · leave Glance

D LIVE MODE, CONTINUED

Watch on a phone or iPad

A read-only copy of the Glance view, in a web page, so you can watch from the mixing position or the back of the room.

Start it

1. On the Mac, open the ··· menu and choose **Watch on a phone or iPad…**, then **Start sharing**.
2. On the phone, scan the code with the camera, or type the address shown. The phone must be on the same Wi-Fi or network as the Mac.
3. The first time, macOS may ask whether Room can accept incoming connections. Choose **Allow**.

What you see

The verdict and how many dB from the target, the level with your limit colours, the status chips, a coloured strip by pitch, the distance curve, and the “What to do” notes. It follows the phone's light or dark setting.

Safe by design

- **Read only.** The page can look but cannot change anything.
- The link has a private code. **Stop sharing** ends it, and the next link gets a new code.
- Anyone on the same network who has the link can view it, so share it only with people you trust.

If it will not connect

PROBLEM	TRY
The page never loads	Check both devices are on the same network. Guest Wi-Fi often blocks devices from seeing each other.
It says the link is invalid	Sharing was stopped and restarted. Scan the new code.
“Lost connection” shows	Room closed or sharing stopped, or the Wi-Fi dropped. It reconnects on its own.

E FREQUENCY CHARTS

Reading a frequency chart

Low pitches are on the left and high pitches on the right.
Up means louder.

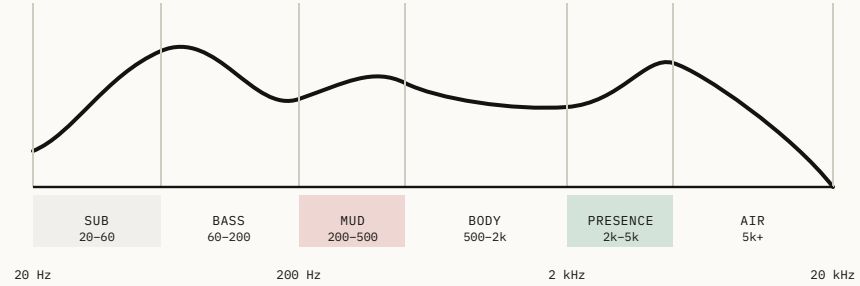


FIG. E-1 REGIONS OF THE SPECTRUM, LOGARITHMIC AXIS

REGION	YOU HEAR	TYPICAL TROUBLE
Sub 20–60 Hz	Rumble you feel	Boom, stage rumble, long ring
Bass 60–200 Hz	Weight of kick and bass	Too much makes it thick
Mud 200–500 Hz	Boxiness	The most common problem area
Body 500 Hz–2 kHz	Voices, guitars, keys	Honky or hollow
Presence 2–5 kHz	Clarity and bite	Harsh, tiring
Air 5 kHz up	Sparkle	Hiss, sizzle, or dull

RULE

A **narrow dip** is usually the room. Do not boost into it. A **broad bump or sag** is something EQ can fix, gently. Cut before you boost, and measure again after every change.

F THE TARGET VIEW

How far from where you want to be

Pick a target in Display. The Target tab shows how close the room is to it, pitch by pitch.

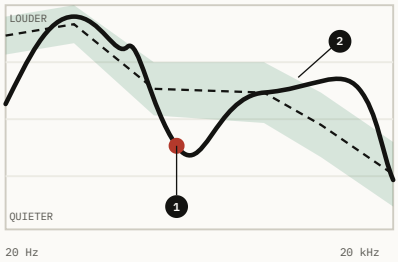


FIG. F-1 CURVES (DEFAULT)

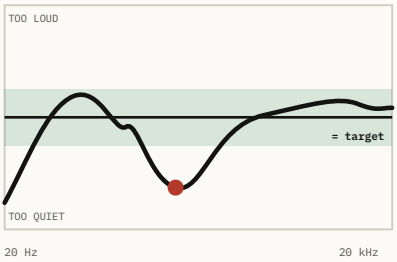


FIG. F-2 DISTANCE

1 **Outside the band**
The mic is more than 3 dB away from the target here. Too quiet if below the band, too loud if above.

2 **The green band**
3 dB either side of the target. Stay inside and you are on target.

Curves or Distance?

Curves draws the target as a dashed line, with the green band around it, and your mics on the same scale. **Distance** subtracts the target, so the target becomes the flat middle line. That is why a target looks flat there. Both show the same thing.

The strip and the number

The coloured strip under the chart is green where you are close, amber when you are a bit off and red when far off. The label gives one overall figure, such as `±2.4 dB from Live PA`. Under about 3 dB is good.

F THE TARGET VIEW, CONTINUED

Choices on the right of the chart

SWITCH	OPTIONS	WHAT IT DOES
View	Distance, Curves	See the target's shape, or the distance from it.
Range	Auto, ±12, ±24, ±48	How tall the chart is. Auto picks the smallest step that holds everything, widens at once, narrows only with lots of spare room, and glides so the grid never jumps.
Forgiveness	±1.5, ±3, ±4.5, ±6 dB	How far off still counts as on target. Sets the width of the green band and the strip colours (green inside it, amber up to twice that, red beyond). Use ±1.5 for a careful tune and ±6 for a rough check or a noisy room. Default ±3.
Source	Spectrum, Response	Appears when you have a reference. See below.

Spectrum or Response?

Spectrum compares what the mic hears with the target. The music's own shape counts, so a bass-heavy song shows up as a bass-heavy room.

Response compares the mic with your reference signal. The music cancels out, so what is left is the system and the room. **Use Response to judge the system.**

The “What to do” card

At the top left of the chart, Room lists the worst three places outside your forgiveness range in plain words, with a numbered pin on the chart for each: how far off, wide or narrow, and what to try (a cut, a gentle boost, or “this is probably the room, move the mic”). The arrow folds the card away and the lock holds it still. **Quick, Calm or Slow** at the bottom sets how long notes stay put; the same switch is in the ? window. With several mics it also compares them.

Getting a good result

1. Pick the target in **Display** and set a reference so you can use **Response**.
2. Pause (space bar) when the music is typical and read the strip.
3. Fix **broad** stretches outside the band first. Make a small change, wait a few seconds, look again.

G TIMING, PHASE, IMPULSE

Are the speakers lined up?

These views are in **Tune** mode, in the Fix step after a measurement. They compare the mic with a **reference**: a signal Room can hold the mic up against. (Live keeps only Spectrum and Target.)

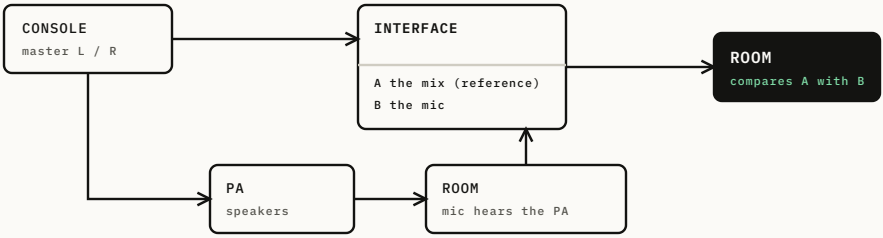


FIG. G-1 THE REFERENCE, AND WHAT THE MIC HEARS

Choose a reference 3

REFERENCE	YOU GET
Room's pink noise	No wiring. Room plays quiet noise while you look. Shows reflections and relative arrival times.
An input with your mix	True delay, and it works with music playing. Pick the console's master **Left**, then optionally **Right**.

With two reference inputs, **Sum to mono** gives one result, like a listener hearing both sides. **Left & right** gives a result for each side, so you can time each speaker separately.

Timing

Milliseconds early or late against the mids. A flat line means everything arrives together. A slope means some pitches, often the lows, arrive late. Late lows make a kick feel detached from the mains.

Phase

The same thing in degrees. Flat is good. Check it when joining a sub to mains.

G TIMING, PHASE, IMPULSE, CONTINUED

Impulse, coherence and the tap test

Impulse

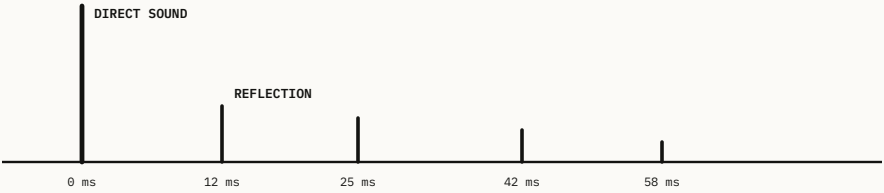


FIG. G-2 DIRECT SOUND AND REFLECTIONS (ILLUSTRATION)

The **tall first spike** is the sound coming straight from the speaker. Smaller spikes later are **reflections**, with their delay shown. A reflection of 12 ms is about 4 m of extra path. A big spike more than about 30 ms late is an echo you will hear.

Coherence

Many views show how far to trust a reading. Where the coherence line fades, the measurement is noisy or the room is confusing it. Trust the parts that stay solid.

Tap test

Plays six clicks and reports each speaker's **arrival time** and **polarity**. It tells you which speaker to delay and by how much, and flags one that looks backwards (wired out of phase), which can cancel the bass.

CAUTION

Arrival times include your interface's own delay. Compare speakers measured through the **same output**.

J MICS, SOURCES, PROFILES

Set up once, reuse every time

Several mics

- Add mics in **Connect** or the Live **Inputs** panel. Give each a **name** and a **colour**.
- The **dot** beside a mic shows or hides its trace. Its **name** makes the other views follow that mic.
- After a Measure, Fix starts on the **average**. Chips let you look at one mic.
- **Name inputs…** labels every input of the interface, so menus show real names.
- **Add nickname…** (under the interface pickers) gives a device your own name, such as “Sanctuary rack”. Handy when two aggregate devices look alike. The real name stays beside it in the list.

Sources

Add a source puts any other input on the spectrum for watching only, such as the master left and right. Sources are never measured and never change the Fix result.

Aggregate devices

To use a mic interface and a Dante Virtual Soundcard together, combine them in **Audio MIDI Setup** on the Mac. Tick **Drift Correction** on every device except the clock master, or they slowly slide apart. Room then sees all channels as one device.

Profiles 7

A profile saves everything you have dialled in: interface and outputs, mic list with names, colours and what is hidden, reference, display settings, weighting, target, calibration, test signal.

ACTION	RESULT
Save / Update	Stores the current settings under a name.
Load	Applies a profile. It never starts test noise by itself.
Export / Import	Moves a profile to another Mac as a file.

The profile you used last loads itself the next time Room starts. Devices are matched by name, so a profile still works if the interface moves to another port. **Make one profile per room.**

K A ROUTINE

Rehearsal and service checklist

The same steps every time keep you fast and keep the room consistent.

SETUP, TEN MINUTES BEFORE

- [ ] Mic on its stand, ear height, in the seating area.
- [ ] Open Room, switch to **Live**, load the room's **profile**.
- [ ] Set the reference to the master mix input (Left, and Right if you have it).
- [ ] Optional: run a **Tune** pass (Sweep, then Fix) to check the system and room are behaving.

DURING SOUNDCHECK AND THE BAND

- [ ] Watch **Spectrum** for the general feel.
- [ ] On **Target**, pick **Live PA**, on **Curves**. Stay mostly inside the green band. Chase broad problems, not single spikes.
- [ ] If the kick feels detached from the mains, look at **Timing**.
- [ ] **Pause** to read a moment. **Store trace** to compare before and after.

AFTERWARDS

- [ ] Update the room's profile if you changed anything you want to keep.
- [ ] Note what you changed on the console, and why.

TIP

Focus hides the controls so the chart fills the window, and **On top** keeps Room above other windows. Room keeps the Mac awake in Live mode.

L TROUBLESHOOTING

If something goes wrong

PROBLEM	TRY THIS
The mic bar does not move	Check the input number in Connect. Check phantom power. Check macOS System Settings → Privacy & Security → Microphone.
Response is wild at low pitches	Low pitches are noisy in a quiet room. Look at coherence and raise the system a bit.
Target view looks cramped	Set Range to ±24 or ±48, or leave it on Auto.
Target curve looks flat	Are you on Distance? The target is the flat line there. Switch to Curves.
Only the first device appears in an aggregate	Check all devices are in the aggregate in Audio MIDI Setup, with Drift Correction ticked.
Level reads in dBFS	Normal until you Calibrate.
The mic went silent after changing devices	Pick the interface again in Connect. Room restarts its engines when the device changes.

IF ROOM WILL NOT OPEN

After an update, a saved profile can occasionally stop the app from starting. Open Terminal and run:

```
defaults delete com.joshhoover.dial activeProfile
```

Then open Room again.

M GLOSSARY

Words you will see

dB	Decibel, a unit of loudness difference. About 3 dB is a just-noticeable change. About 10 dB sounds twice as loud.
Hz, kHz	Pitch. Low numbers are bass, high numbers treble.
Octave	A doubling of pitch, such as 100 Hz to 200 Hz.
Pink noise	A hiss that sounds balanced to the ear. The standard test sound.
Reference	The known-good signal Room compares the mic against.
Coherence	How much to trust a reading at each pitch, 0 to 100 %.
Polarity	Whether a speaker pushes out when it should. Wrong polarity can cancel the bass.
Leq	The average level since you last reset it.
Weighting	A: tilted to match the ear. C: nearly flat. Z: raw.
Target	The shape you want the system to have.
SPL	Sound pressure level, loudness in the room.

M SPECIFICATIONS

Specifications

PLATFORM	macOS 13 Ventura or later. Universal: Apple silicon and Intel.
INSTALL	Signed and notarized installer package.
ANALYSER	8192-point FFT, Hann window, 75 % overlap.
DISPLAY GRID	1/12 octave points, 20 Hz to about 19 kHz, smoothed to 1/12, 1/6, 1/3 or 1 octave.
LEVEL WEIGHTINGS	A, C and Z, each with fast, slow, Leq and max.
AVERAGING	Fast, Medium (about 0.18 s), Slow, Steady.
TEST SIGNALS	Pink noise, 6 s log sweep (impulse by deconvolution), six-click tap test.
DELAY FINDING	GCC-PHAT with sub-sample refinement. Re-checked about once a second in Live.
TRANSFER FUNCTION	Magnitude, delay-compensated phase, coherence, impulse and energy-time curve, group delay.
INPUTS	Any number of input channels on the chosen device. Aggregate devices supported.
TARGETS	Flat, Room, Live PA, Speech, plus your own. Shape only, anchored to the 200 Hz to 4 kHz average.
RANGE (TARGET VIEW)	Auto, ±12, ±24, ±48 dB.
FORGIVENESS (TARGET VIEW)	±1.5, ±3, ±4.5, ±6 dB.
PROFILES	Stored per Mac. Export and import as files.
LEVEL UNITS	dBFS until calibrated, then dB SPL.

NOTE

Room is a measurement and tuning aid. It does not replace listening in the room.



Room

Tune a room by ear and by eye.

ROOM BY KUMQUAT AUDIO

INSTRUCTION MANUAL
WRITTEN FOR VERSION 1.X