On this page

Guide · Beginner

Microtuning with m-suite

How to hear, understand, and make music beyond twelve equal notes. No theory required — this guide starts with sound, not notation.

Beginner · no music theory required 25–35 min + listening Download the PDF ↓

How to use this guide. Microtuning is easier to understand with your ears than with equations. Keep an m-suite instrument open in another tab. Whenever you see a number in cents or a ratio, treat it as a label for a sound — not a test to pass. Use headphones if you can, and keep the volume low when stacking sustained tones.

Chapter 01

What does “in tune” mean?

Most pianos and software instruments split an octave into twelve equal steps. That system is called **twelve-tone equal temperament**, or 12-TET for short. It is so common that its intervals feel neutral — like the default sound of “in tune.”

Microtuning
: Choosing a different map of pitch. Some notes may sit slightly above or below the piano’s notes, an octave may hold more or fewer than twelve steps, or the pattern may repeat at an interval other than an octave. It does not mean “tiny intervals,” “wrong notes,” or difficult mathematics — it means picking a different set of pitch colours.

Another tuning may first sound bent, luminous, hollow, or strangely calm. Those impressions are useful. Microtuning turns “in tune” from a fixed law into a *relationship* among notes, timbre, and musical context.

Try it in m-suite

A first listening experiment

1. Open mdrone and press **HOLD** at a comfortable volume.
2. Choose **Equal (12-TET)** and listen for ten seconds.
3. Switch to **Just 5-limit**, then a meantone table, then a gamelan-style table.
4. Describe each with ordinary words: smooth, restless, hollow, metallic, dark.
5. Return to 12-TET — notice it now has its own character too.

Open mdrone ↗

Chapter 02

The minimum music theory

A repeating vibration is measured in **hertz** (Hz), meaning cycles per second. Faster vibration usually sounds higher. A tone at 440 Hz is the concert A above middle C; a tone at 880 Hz vibrates twice as fast and sounds like the same note one octave higher.

Octave
: A 2:1 frequency relationship. Double the frequency and you reach the same note class, one octave up.

110 Hz A2
220 Hz A3 · ×2
440 Hz A4 · ×2
880 Hz A5 · ×2

Frequency doubles each octave: 110 Hz, 220 Hz, 440 Hz, and 880 Hz are all the note A, one octave apart.

A **tonic** (or root) is the pitch that feels like home. A **drone** — one sustained pitch — is an audible ruler: when another note sounds above it, you can hear whether the relationship locks, beats, floats, or rubs.

Cents
: A ruler for pitch distance. The octave is divided into 1,200 cents; in 12-TET each semitone is exactly 100 cents. Cents measure distance, not absolute pitch — 700 cents above any note is the 12-TET fifth.

Ratio
: Another way to describe an interval, comparing vibration rates. The octave is 2/1, a pure fifth is 3/2, a pure major third is 5/4. Small-number ratios often align their overtones and can sound fused or beatless.

12-TET slightly nudges most ratios so the same keyboard shape works in every key. **Just intonation** does the opposite: it keeps especially clean relationships to a chosen tonic. Neither is universally better; each solves a different problem.

Chapter 03

Hear cents, ratios, octaves, and beating

These are the sounds the rest of the guide relies on. Press a button to play; press it again to stop. Only one demo plays at a time, and the **Stop audio** button appears whenever something is sounding. All tones are built from a warm, filtered waveform at a conservative level.

The octave (2:1)

Two notes an octave apart — the most fused interval there is. They sound like “the same note, higher.”

Play · 220 + 440 Hz

Two major thirds, side by side (A/B)

Both are called a “major third,” but the 12-TET third is wider than the pure 5/4 third. Play each over the same tonic and listen to how much steadier the just third sits.

360¢ 370¢ 380¢ 390¢ 400¢
Play A · 12-TET 400¢ Play B · Just 5/4 (386¢) ≈ 14 cents apart

Two fifths, side by side (A/B)

The 12-TET fifth (700¢) is only a whisker below the pure 3/2 fifth (≈701.96¢) — about two cents. Over a drone, the pure fifth locks almost perfectly still.

694¢ 697¢ 700¢ 703¢ 706¢
Play A · 12-TET 700¢ Play B · Pure 3/2 (702¢) ≈ 2 cents apart

Beating

Two frequencies close together interfere, making a slow rise and fall in loudness called **beating**. Here 220 Hz and 224 Hz beat about four times a second. Slow beating can animate a drone; fast beating adds roughness.

Lamp pulses ≈ 4× per second while playing (|224 – 220| = 4 Hz)
Play · 220 + 224 Hz

A note on consonance. “Consonant” usually means a stable, fused relationship; “dissonant” means tension or complexity. These are perceptions, not rankings of good and bad — tension is a tool, not a mistake.

Chapter 04

Compare common tuning systems

A tuning system is just a rule for turning pitch into a usable set of notes. Here are the families you will meet in m-suite.

Common tuning systems, what to listen for, and a good first use.

System	What to listen for	Good first use
12-TET	Neutral, familiar; every key the same	A reliable reference to compare against
Just 5-limit	Stillness and overtone fusion	A tonic drone with a fifth and third
¼-comma meantone	Sweet thirds; uneven key colour	Slow chord changes
Well temperaments	All keys usable, each a different colour	Transposing one progression around the keys
EDO tables (19, 31…)	Familiar shapes with shifted colour	Reharmonising a simple loop
Custom / Scala	A pitch world you designed	Focused experiments

Maqam, raga, pelog, slendro are not just scales. They are distinct musical practices — each a living tradition with its own repertoire, modal grammar, ornament, and performance context — deliberately left out of the table above so they aren’t read as interchangeable tuning presets. A cents list can approximate some of their intervals, but the tradition lives in how those intervals are approached, hierarchised, and played. Treat any such tuning as a doorway, not a substitute for the practice.

EDO / TET

Equal Divisions of the Octave
: Equal Divisions of the Octave. 19-EDO splits the octave into nineteen equal steps, 31-EDO into thirty-one. m-suite's curated 19- and 31-TET tables are twelve-note selections from those larger grids — the name does not always mean every degree is exposed.

Non-octave scales
: Some systems repeat at something other than 1,200 cents. Bohlen–Pierce, for example, repeats at a 3:1 "tritave." mkeys supports arbitrary scale lengths and non-octave periods through Scala import.

Names deserve care. A preset called "Rast," "Bayati," "Yaman," "Pelog," or "Slendro" is an entry point into pitch relationships — not a complete representation of a musical tradition. Those traditions live in phrasing, ornament, hierarchy, and performance practice as much as in a cents list. Use the names respectfully and listen to expert performers.

Chapter 05

Make a tuned drone with mdrone

mdrone establishes the tonic, the tuning, the drone, and the long-form texture. It is the canonical source of the shared tuning library the rest of the family reads, so it is the natural place to start.

Try it in m-suite

One centre, three colours

1. Open mdrone, choose a tonic and octave, and press **HOLD**.
2. Start with one or two clear voices; keep effects restrained so pitch stays audible.
3. In **ADVANCED**, pick a simple relation — tonic–fifth, or a drone triad.
4. Compare **Equal (12-TET)**, **Just 5-limit**, and a meantone table. Change one thing at a time.
5. Audition each degree; read its cents value, and in just tunings notice the ratio label.

Open mdrone ↗

The fine-detune control isn't only a correction tool. A deviation of two to five cents creates a slow pulse between sustained tones; larger offsets become an expressive bend. Keep at least one stable reference pitch, or the texture loses focus.

Beginner rule. Make one pitch decision at a time. If tuning, voicing, timbre, effects, and motion all change together, you can't learn what caused the result.

Chapter 06

Play a melody with mkeys

mkeys is for direct performance. It supports arbitrary scale lengths, non-octave periods, and Scala `.scl`/`.kbm` import, resolving each note to an exact frequency. It's scale-locked, so it's hard to play a "wrong" note while you explore.

.scl and .kbm files
: A `.scl` file describes the pitch distances in a scale (as cents or ratios) — it answers "what pitches exist?" A `.kbm` file maps keys or MIDI notes onto those degrees — it answers "which key plays which pitch?" A 19-note or non-octave scale doesn't fit a repeating 12-key layout naturally, so the keyboard map makes the relationship explicit.

Try it in m-suite

Turn a tuning into a phrase

1. Choose the same tonic and tuning you used in mdrone — or load a matching Scala file.
2. Play only three degrees: tonic, one contrasting degree, and a stable return note.
3. Repeat a short rhythm until it feels memorable before adding a fourth degree.
4. Change register before changing tuning — the same relationship feels different high and low.

Open mkeys ↗

Chapter 07

Explore harmony with mchord

mchord explores twelve-note microtonal harmony with a built-in microtuned synth. It keeps its familiar chord and voice-leading engine and only adjusts the final frequency of each of the twelve pitch classes — a friendly bridge from conventional harmony into new interval colour.

mchord tuning anchors and when to use each.

Anchor	Meaning	Use it when…
Follow key	The table re-roots so the current key is its tonic	Just intonation, maqam-like scales, frequent key changes
Fixed C	The table stays rooted on C	Exploring historical well temperaments and key colour
Fixed note	The table stays rooted on a chosen pitch	Building around a pedal point or fixed reference

Important limitation. mchord's microtuning applies to its *internal synth* only — its **MIDI output remains 12-TET**. To capture the exact tuning, record mchord's audio. To drive an external synth microtonally, use a pitch-bend/MPE workflow (like mraga) or a synth that loads the same Scala scale directly.

Try it in m-suite

One progression, three temperaments

1. Build a slow four-chord progression in 12-TET with smooth voice leading.
2. Switch to Just 5-limit with **Follow key** and listen to the held thirds and fifths.
3. Switch to a well temperament with **Fixed C** and move the progression through several keys.
4. Keep the version whose tension supports the music — not simply the most exotic tuning.

Open mchord ↗

Chapter 08

Generate a tuned line with mraga

mraga generates a melodic line from an mdrone scene's tonic and tuning. You paste an mdrone link; mraga reads the exact tonic, scale cents, and repeat period, then improvises a struck line you steer with seven controls.

mdronetonic + tuning → copy LINKscene URL → mragapaste + conduct

Workflow: build a scene in mdrone, copy its link, then paste the link into mraga to import the tuning and conduct a generative line.

Two limitations to keep in mind. mraga imports the tuning once from the pasted link — **live changes in mdrone do not automatically update mraga**; after changing the tuning, copy and paste a fresh mdrone link. And while mraga can send microtonal MIDI using pitch bend or MPE, the receiving synth must be set up for it (see the next chapter).

Try it in m-suite

Drone and conducted line

1. Build and save a sparse drone in mdrone, then press **LINK** to copy its scene URL.
2. Open mraga and paste the link — it reads the exact tonic and tuning.
3. Start with low **density**, generous **silence**, and calm **restlessness**.
4. Choose a register and voice that sit above the drone without masking it.

Open mraga ↗ Open mdrone ↗
A named raga adds grammar beyond the tuning, but — like any tradition named by a preset — it still deserves contextual listening and study, not just a scale selection.

Chapter 09

Four composition recipes

A — Still just-intonation ambient

mdrone in Just 5-limit, tonic–fifth or a drone triad, slow movement. In mkeys, a three-degree motif with long notes and wide rests. Introduce one degree every 30–60 seconds; remove material before adding effects.

B — Meantone chord study

mchord in ¼-comma meantone, a slow progression, smooth voicing. Compare **Follow key** against **Fixed C**, and let one chord ring long enough to hear its beating. Record the internal audio to preserve the tuning.

C — Drone and conducted raga line

mdrone with a suitable tuning and a sparse texture; copy the scene link. In mraga, paste it and start with low density and high silence. Open with free timing, then bring in a pulse later.

D — Non-octave miniature

mkeys with a non-octave `.scl` and its `.kbm` map. Use only four degrees and a repeated rhythmic cell. Think in contour, register, and colour rather than conventional chord labels.

Chapter 10

Scala files, MIDI, and MPE

Different goals call for different transports. Pick the one that keeps what matters for your piece.

Choosing a transport for tuning, sharing, and MIDI.

Goal	Recommended method
Preserve the exact sound	Record / export audio from the instrument
Reopen a scene in m-suite	Use the app's self-contained share link
Move a tuning between compatible tools	Use `.scl`; add `.kbm` when key mapping matters
Drive an MPE synth from mraga	MPE MIDI, with the receiver's pitch-bend range matched
Send mchord to ordinary MIDI gear	Expect 12-TET MIDI; record internal audio for its microtuning

MPE
: MIDI Polyphonic Expression. Standard MIDI notes name piano-key pitches, and a pitch bend supplies the offset. In single-channel mode one bend affects every note on that channel, so overlapping notes can retune each other. MPE spreads notes across separate channels so each can bend independently.

Match the pitch-bend range. Microtonal MIDI only lands correctly if the sending and receiving pitch-bend ranges agree (and MPE is enabled on both ends where used). If an external synth ignores the tuning, that mismatch is the usual cause — check it in the instrument's MIDI settings before assuming anything is broken.

Download this guide as a PDF to keep the checklists and tables offline.

Chapter 11

Troubleshooting

Common symptoms, likely causes, and what to try.

Symptom	Likely cause	Try this
Everything sounds "wrong"	Too many variables changed at once	Return to a tonic drone; use three degrees; remove effects
Chords sound muddy	Dense voicing, low register, or fast beating	Raise the voicing, remove a note, simplify the timbre
mraga no longer matches mdrone	mdrone's tuning changed after the link was pasted	Copy and paste a fresh mdrone link
External synth ignores the tuning	Ordinary MIDI, or a mismatched bend range	Use MPE / pitch bend and match the pitch-bend range on both ends
Overlapping MIDI notes bend together	Single-channel pitch-bend limitation	Use MPE, or avoid overlapping releases
A Scala scale feels scrambled	Keyboard map missing or unsuitable	Load or create a matching `.kbm` map

Chapter 12

Glossary

Glossary of microtuning terms.

Term	Meaning
12-TET	The octave divided into twelve equal 100-cent steps.
Cent	1/1,200 of an octave; a unit of pitch distance.
EDO	Equal divisions of the octave.
Frequency	Vibration rate measured in hertz (Hz).
Interval	The distance between two pitches.

Term	Meaning
Just intonation	Tuning based on selected whole-number frequency ratios.
Microtuning	Any deliberate pitch organisation beyond the assumed standard tuning.
MPE	MIDI mode giving notes separate expressive channels, including pitch bend.
Period	The interval after which a scale pattern repeats.
Ratio	A comparison of two frequencies, such as 3/2.
Scala .scl	Text format describing a scale's pitch distances.
Scala .kbm	Text format mapping keys / MIDI notes to scale degrees.
Tonic	The pitch perceived as home or reference.

Quick formulas (you don't need them to compose): frequency from cents is `tonic × 2^(cents ÷ 1200)`; cents from a ratio is `1200 × log₂(ratio)`; one octave up is `× 2`.

← All guides Start with mdrone ↗

■ Stop audio

m-suite

m-suite is a collection of local-first browser instruments and music tools. No accounts or uploads.

Built in the open by gdamdam ↗