YY PLUGINS · TECHNOLOGY WHITE PAPER

SOUNDLOCK™

SPECTRUM-ANALYZED LEARNING ALGORITHM

THE SOUND LEADS.

FORTY YEARS OF LISTENING, COMMITTED TO AN ALGORITHM · REV. AUGUST 2026

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PRECISE SOUND IS SCIENCE

1 · WHERE IT COMES FROM

SOUNDLOCK™ was not designed in a laboratory. It was designed across forty years of front-of-house and monitor desks — carried in one engineer's head from festival patch changes to theatre residencies, refined at every console where a risk taken during a show became a rule kept for life.

That lifetime built a specific listening culture: **gain staging before processing, fader balance before equalization, the natural spectrum before any correction.** A drum channel is not a problem to be solved; it is a source to be understood. The engineer's job is to hear what the instrument is already doing — its fundamental, its ring, its attack, the exact structure of everything leaking into its microphone — and to intervene only where the physics demands it, only as much as the physics demands.

Most audio automation is built the other way around. Adaptive processors chase the signal continuously: thresholds ride, filters wander, gain trims breathe. They are control systems — and control is precisely the wrong ambition, because a mixed performance is not a plant to be regulated. It is a living event whose *structure* is fixed the moment soundcheck ends: the microphones do not move, the drum does not change its shell, the bleed geometry is set. What changes is the *performance* — and the performance must never be fought.

> *"I never developed techniques to control the sound. I developed techniques so the sound could lead me."*
> *— Yilmaz Yeniyol*

SOUNDLOCK is that philosophy made executable. It listens the way a working engineer listens — once, with full attention, at soundcheck. It commits the way a working engineer commits — completely. And then it does the hardest thing automation can do: **it stops.**

1.1 THE DOCTRINE IN ONE TABLE

A CHASING PROCESSOR	SOUNDLOCK™
Tracks the signal continuously; decisions drift with the music	Measures once during soundcheck; decisions **lock**
Reacts to the performance — and therefore fights it	Learns the *structure*, then lets the performance drive
Fails loudly: chatter, breathing, pumping artifacts	Fails **safe**: where separation cannot be proven, it does nothing
Hides its state	Displays every decision: branch, band, margin — on the panel
Guesses	Refuses to guess

The lock is not a freeze of convenience; it is an engineering claim: *the measured quantity is a property of the rig, not of the song.* A microphone pair's spacing is a distance. A channel's leakage structure is a geometry. These are facts — and facts, once established, do not track the downbeat.

2 · THE PHILOSOPHY — LISTENING AS A WORLDVIEW

Before SOUNDLOCK is signal processing, it is a position on what mixing *is*. Three tenets, held for forty years, encoded without compromise.

2.1 THE SOUND LEADS

Most processing philosophy descends from control theory: the signal is a plant, the processor a regulator, deviation an error. SOUNDLOCK descends from a listening culture in which the relationship is reversed. The source is the authority. The kick drum knows its fundamental; the room declares its reflections; the leakage geometry is a fact of physics established the moment the microphones are placed. The engineer's craft — and the algorithm's duty — is to **perceive that order and serve it**, not to impose another one on top. This is why SOUNDLOCK's learning phase is pure listening: no intervention, no shaping, not one sample altered until the structure of the channel has been understood. Perception first, action second — and action only where perception found a reason.

2.2 RESTRAINT IS THE HIGHEST INTERVENTION

The culture behind SOUNDLOCK holds a minimalist chain of command: **gain staging before faders, faders before EQ, EQ before dynamics, and nothing at all before necessity.** Balance is not built by adding; it is revealed by removing what obscures it. Every decibel of processing is a small corruption of the source's essence — sometimes a necessary one, never a free one. An algorithm raised on this ethic must therefore be able to conclude that the correct amount of processing is *zero*, and mean it literally: SOUNDLOCK's neutral state is bit-transparent, its marginal cases resolve to transparency, and its proudest output on an unseparable channel is the honest sentence `no separation — staying out`. Restraint, held under pressure, is the discipline that separates balance from decoration.

2.3 EXPERIENCE IS RISK, CRYSTALLIZED

Every rule in this technology was once a risk taken in front of an audience — a gate trusted at a festival with no soundcheck, a polarity flipped on instinct mid-song, a hold time abandoned forever after one bad night. Forty years of such risks, survived and remembered, become something no dataset contains: **judgment.** SOUNDLOCK is that judgment written down — the concert-earned reflexes of one engineer, translated into thresholds, margins and refusals that behave on stage the way he does. It does not simulate expertise statistically; it commits a specific, tested, personally guaranteed practice to code.

> *"Balance is not something I force onto the sound. It is something the sound and I agree on." — Yilmaz Yeniyol*

3 · WHAT THE ALGORITHM ACTUALLY DOES

3.1 POPULATION ANALYSIS, NOT ENVELOPE FOLLOWING

During the learning phase, SOUNDLOCK builds **level-population histograms** of the channel inside an instrument-specific **detection window** (band-limited by key filters chosen from stage practice — e.g. 120–400 Hz for toms, where the shell speaks and neither cymbals nor bass guitar are allowed to vote). Onset-gated capture separates the **hit population** from the **inter-hit population**; percentile anchors (top-decile hit floor, mass-edge percentiles) replace fragile single-peak detection.

Threshold placement then follows a three-branch classifier: a distinct **leak cluster** yields the classic leak-edge-plus-margin rule; a **silent floor** yields a hit-anchored threshold; a **single broad distribution** — the hard case — is resolved against the hit floor with an adaptive margin, and only if a guaranteed safety distance remains. The open/close margin itself adapts to the measured separation (`margin = separation/2` , floored and clamped), with hysteresis sized so that a decaying shell can never re-trigger its own gate.

3.2 SPECTRAL DISCRIMINATION, NOT SPECTRAL ENERGY

Where a key band must be chosen, SOUNDLOCK does not ask "where is this drum loudest?" — it asks **"where is this drum most distinguishable from everything else in the microphone?"** Hit-spectrum and leak-spectrum are accumulated separately; the key band maximizes their contrast. On a bass-heavy stage this lands the floor-tom detector above the bass fundamentals automatically; on a clean channel a robustness branch reverts to the energy optimum. The decision — branch, band, margin in dB — is printed on the face: `leak cluster · key 164 Hz · 30 dB room` . Auditability is part of the design.

3.3 ACCENT-REFERENCED DYNAMICS

The self-learning compressor threshold converges against the **accent population** — the top 6 dB of hits — never against the ghost-note median. "−10 dB of gain reduction" therefore means the backbeat, exactly as an engineer means it. Attack and release stay style-declared; the threshold is the only learned quantity, and it locks.

3.4 ONE-HIT ALIGNMENT

For dual-microphone alignment, SOUNDLOCK performs onset-gated, band-limited (1–4 kHz) **cross-correlation** with sub-sample **parabolic peak interpolation**. A quality gate — peak-to-median ratio of the correlation function, a statistic immune to the instrument's own periodicity — decides whether a single clean hit suffices to lock (`PSR ≥ 27 dB → locked on 1 hit`) or whether a short median accumulation is required. Polarity is taken from the correlation peak's sign and applied with the lock. The result is stored as a **distance in milliseconds** — 2.00 ms at 48 kHz is 2.00 ms at 192 kHz — because what was measured is geometry, not samples.

4 · RULES THAT WERE PAID FOR

Every constraint in SOUNDLOCK was earned on a stage, usually the hard way. They are not preferences; they are the residue of risk.

- **HOLD is always zero.** Hold time on a live gate is a delay on the truth. Release does the musical work; hold only smears it.
- **Never miss a hit.** A gate that eats a tom fill is a firing offence; a late false opening is merely untidy. Every threshold in SOUNDLOCK is clamped a guaranteed distance below the measured hit floor — and where that distance cannot be guaranteed, the gate declines to arm.
- **Steady bleed beats modulated bleed.** The ear forgives a constant leak and never forgives a breathing one. Marginal cases resolve to transparency, not to a pumping compromise.
- **Overheads are never gated.** A gated overhead is a lie about what a drum kit is. The overhead modules carry no gate object at all — the panel shows the high-pass corner instead, in large type, because that is the honest intervention.
- **Zero latency, no oversampling.** Monitor buses are sacred. Alias control is done at the source — band-capped drive and antiderivative anti-aliasing (ADAA) — verified by measurement from 44.1 to 192 kHz, not bought with delay.
- **A measurement is a fact, not a parameter.** Learned state persists as session data, deliberately outside the automation system. Nothing a host can do — transport jumps, sample-rate changes, `prepareToPlay()` storms — may silently discard a measurement taken last week.
- **Show your work.** HARM SOLO plays only what the harmonic engines add. The DIAG line names the branch, the band, the margin. An engineer who can audit a decision can trust it; one who cannot, should not.

> *Balance without corruption: the goal was never a bigger sound. It was the same sound, standing straighter.*

4.1 FAIL-SAFE AS A FIRST-CLASS OUTPUT

SOUNDLOCK treats "do nothing" as a legitimate, reportable result. Until the learning phase can prove separation, the signal path stays **bit-transparent** — not approximately clean, but null-test identical. On channels where the physics offers no safe threshold, the panel says so plainly: `no separation — staying out`. In forty years of mixing, the most expensive mistakes were made by processors that could not say "I don't know."

5 · WHERE SOUNDLOCK LIVES

PRODUCT	WHAT IT LEARNS	WHAT LOCKS
PX-KICK / PX-TOM / PX-FL TOM	Threshold, range, key band from the channel's own histogram; drum fingerprint (F0 · RING · ATK · DECAY)	Gate decision surface, per mic position
PX-SNARE	Compressor threshold against the accent population; gate decision surface in the 200 Hz–1 kHz window	Both — chain GATE → COMP
LM-2	Inter-microphone delay by quality-gated cross-correlation; polarity from the peak sign	Delay as distance (ms), polarity — surviving rate changes and host restarts
TZ-12	Feedback signatures by phase-stability analysis and decimated zoom-FFT (2.9 Hz/bin) in the LF field	Pinned notches on command (TAP-TO-PIN)

5.1 VERIFICATION CULTURE

Every SOUNDLOCK behaviour ships with a measured number attached: alias products ≤ −70 dBc absolute (typically below the −90s); first-sample impulse integrity (`y[0] = +1.0000`) at five sample rates; harmonic amount invariant within 0.3 dB from 44.1 to 192 kHz; alignment error ≤ 0.0002 ms; gate regression matrices replayed against synthetic worst cases *and* real multitrack recordings before any release. Where the test bench and the stage disagreed, the stage won — twice, and the bench was rebuilt both times.

5.2 THE POINT

None of this exists to impress a spec sheet. It exists so that three minutes after the drummer sits down, the console shows a balanced, protected, honest drum sound — and the engineer is free to do the only work that ever mattered: **listening.**

> **SOUNDLOCK™ — Spectrum-Analyzed Learning Algorithm.** Learns your soundcheck. Locks your show. · yilmazyeniyol.com/plugins