Humble Audio — Quad Operator

- Manual PDF

Quad Operator Manual PDF

Using the Humble Audio Quad Operator to Build Full-Length Eurorack Songs

The **Humble Audio Quad Operator** is much more than a 4-op FM voice. In a song-oriented Eurorack system, it can act as:

- a **main melodic voice**
- a **bass voice**
- a **chord / drone generator**
- a bank of **phase-related modulation sources**
- a **self-contained arrangement engine** when paired with VCAs, switches, sequencers, envelopes, mixers, and effects
- a **macro-performance instrument** using the **Algo expander** for algorithm recall and crossfading

The reason this module is especially useful for full-length songs is that it contains **multiple operators with independent outputs**, **lock/free behavior**, **gain-controlled modulation routing**, **audio-rate external FM input**, and optionally **stored/crossfaded algorithms**. Those features make it easier to create **sections, variation, development, contrast, and transitions**—the things that turn a loop into a song.

What the module does well for song building

From the manual, the important song-making features are:

- **4 operators**, each with:
- ratio/free tuning
- detune
- variable waveshape from **sine** → **triangle** → **square** → **saw**
- gain CV
- modulation sends to any operator, including self
- **Independent output per operator**
- **Lock mode** for harmonic FM ratios
- **Free mode** for independent oscillators
- **VCO/LFO mode** for audio or modulation duties
- **AR FM input** with its own gain and modulation sends
- **Reset input** for phase reset
- **Algo expander**:
- saves modulation matrix states
- recalls algorithms
- crossfades between them and/or live knob positions

This means Quad Operator can shift between: - stable harmonic FM tones - noisy/inharmonic percussion - layered oscillator stacks - evolving modulation networks - section changes via algorithm morphing

That's exactly what helps with longer-form composition.

The big song problem in Eurorack

As you said, it's easy to make: - one good beat - one good bassline - one good melody - one good texture

But hard to make: - intro - first statement - variation - breakdown - buildup - chorus / peak - outro

Quad Operator helps because it can provide **internal timbral variation without replacing the pattern**. In other words, even if your sequencer repeats, the **sound architecture** can evolve enough to feel arranged.

Think of it as a module for creating:

1. **sectional contrast**
2. **energy ramps**
3. **voice reallocation**
4. **foreground/background shifts**
5. **controlled harmonic-to-chaotic motion**

Best ways to use Quad Operator in full songs

1. Use it as a “multi-role voice” across sections

Instead of dedicating it to one sound, assign different operators different jobs depending on song section.

Example section plan

- **Intro**: Op 1 and Op 2 in LFO mode modulating effects or filters elsewhere; Op 3 drone only; Op 4 silent
- **Verse**: Op 1 = bass, Op 2 = FM modulator, Op 3 = melody, Op 4 = subtle sub or octave
- **Chorus**: all four operators active in lock state, richer FM algorithm, wider detune, more shape
- **Breakdown**: switch one or more operators to free state for unstable, atmospheric lines
- **Outro**: back to low-modulation sine/triangle tones

Because each operator has an independent output, you can route them to: - separate VCAs - separate filters - separate effect chains - separate mixer channels

That lets you “arrange” the patch from the mixer, mutes, and automation, rather than repatching.

---

2. Build sections by changing FM algorithms, not sequences

The **Algo expander** is one of the strongest song-writing features here.

The manual says the expander can: - save modulation send knob positions - recall A/B/C plus Live - crossfade between two states

That means you can keep: - the **same pitch sequence** - the **same rhythms** - the **same outputs**

but transform the harmonic structure by morphing the modulation matrix.

Practical song use

Store: - **A** = simple, clean, mostly carrier-only tone - **B** = moderate harmonic FM for fuller section - **C** = aggressive/self-modulating bright/noisy peak section

Then structure the song like this: - Intro: Live or A - Verse: A - Pre-chorus: crossfade A → B - Chorus: B - B-section / bridge: crossfade B → C - Breakdown: double-tap Live and manually reduce modulation - Final chorus: B → C crossfade for climax - Outro: return to A

This is hugely effective because you get **arrangement-level change** without changing notes.

---

3. Use lock state for “song harmony” and free state for “song contrast”

The manual makes a clear distinction:

- **Lock state** = harmonic integer frequency ratios relative to master tuning
- **Free state** = each operator becomes its own oscillator

This can be exploited structurally.

Lock state uses

Use lock mode for: - bass - leads - keys - tuned bells - harmonic drones - stable chorus sections

Free state uses

Use free mode for: - bridge textures - intros - transitions - atonal risers - stereo layers - independent counterpoint

Song trick

Keep Ops 1–3 in lock state for musical continuity, but switch Op 4 to free state during transitions. Send Op 4 through: - delay - reverb - resonator - granular processor - wavefolder

This gives you a “new section” feeling without breaking the tonal center too much.

---

4. Use operator outputs as stems for live arrangement

Since there is an **independent output per operator**, treat Quad Operator like a four-stem instrument.

For example: - **Op 1** → lowpass filter → VCA → bass bus - **Op 2** → LPG / VCA → pluck bus - **Op 3** → stereo delay/reverb → lead bus - **Op 4** → wavefolder / HPF → texture bus

Then control song form with: - mute modules - performance mixers - sequential switches - scene-based CV modules - matrix mixers

Why this matters

A lot of Eurorack patches get stuck because one output contains the whole sound. Here, the separate outputs let you do traditional arrangement moves: - drop the bass out - bring the lead in late - leave only atmospheres for breakdown - mute the modulator-derived top layer in verses - add a high layer only in choruses

This is one of the best full-song advantages of the module.

Specific full-song patch strategies

Strategy 1: Quad Operator as complete tonal core of a track

Use the module as the central harmonic source, while external modules provide rhythm and arrangement.

Suggested system companions

- **Sequencer**: Metropolix, Hermod, Rene, Voltage Block + quantizer, NerdSEQ
- **Envelopes**: Quadrax, Zadar, Maths
- **VCAs**: Veils, Quad VCA, Blinds
- **Mixer/performance mixer**: Performance Mixer, Mutamix, STMix, Tex Mix
- **Effects**: Mimeophon, FX Aid, Desmodus Versio, Magneto

- **Filters**: a clean LPF and one character filter
- **Utilities**: clock divider, switches, attenuverters, logic

Patch roles

- **Op 1**: bass carrier
- **Op 2**: internal bass modulator or second melodic layer
- **Op 3**: lead voice
- **Op 4**: pad/drone/texture

Song construction

Intro

- Only Op 4 audible
- Op 4 in lock or free state
- Very low modulation
- Heavy reverb
- Slow shape CV
- Reset synced to bars for stable cycle starts if using LFO mode modulation

Verse

- Bring in Op 1 bass
- Keep algorithm simple
- Low shape complexity
- Moderate envelope control on gain CV for articulation
- Sparse melody on Op 3

Pre-chorus

- Increase modulation sends via CV or Algo crossfade
- Open shape slightly toward triangle/square
- Add subtle detune on one operator
- Bring in delayed Op 3 tail

Chorus

- Enable richer algorithm
- Mix in Op 2 or Op 4 upper layer
- Increase external AR FM contribution slightly
- Add wider stereo effects on higher operators
- Use mixer mute automation to let all layers bloom

Breakdown

- Remove Op 1 bass
- Set one operator to free mode
- Route a slow random or envelope to shape CV
- Crossfade to a more open, unstable algorithm

Final section

- Return to lock mode harmonic relationships
- Add stronger modulator gain
- Add octave doubling with one operator
- Fade back down to sine-heavy tone for outro

Strategy 2: Bass, lead, percussion, and modulation all from one module

Because Quad Operator has four operators and can self-modulate, you can split duties.

Example allocation

- **Op 1** = bassline
- **Op 2** = lead
- **Op 3** = metallic percussion / FM plucks
- **Op 4** = LFO-mode modulation source or drone

Required companion modules

- trigger sequencer
- multiple envelopes
- multiple VCAs
- logic or switches
- percussion companion modules or samplers

How this helps song writing

Instead of thinking “one sound,” think “one cast of characters.” Your song develops by: - changing who is active - changing who modulates whom - changing what gets sequenced - changing what gets enveloped - changing what is dry vs processed

This naturally supports: - intros with only percussion-like FM clicks - verses with bass + sparse lead - chorus with layered tones - bridge with LFO-mode operator modulation - outro with only processed drone/percussion remnants

---

Strategy 3: Use Gain CV for articulation and phrase evolution

The manual notes that **Gain CV affects both output level and modulation intensity**.

This is extremely important.

That means a single envelope or CV can simultaneously: - make an operator louder - make it modulate more strongly

So one event can produce a note that also changes timbre dynamically.

Song use

Patch envelopes from a quad envelope generator to each operator’s gain CV. Now different note patterns can create: - short dull verse notes - bright, expressive chorus notes - decaying metallic bridge tones

Long-form advantage

This helps you avoid static FM. You can create: - phrase accents every 4 or 8 bars - stronger first note of each measure - evolving timbre tied to song rhythm - choruses with more modulation depth than verses

Use: - one envelope shape for verse - another via switched routing for chorus - or vary envelope amplitude with a slow CV

This gives your arrangement macro-dynamics.

Strategy 4: Use external AR FM as a “section injector”

The **AR FM input** is a standout feature. It accepts external audio-rate signals and has its own gain and mod sends.

This means another oscillator, filtered noise, sampler, or even one of Quad Operator’s own outputs can become a modulator source for all operators.

Good sources for AR FM

- analog VCO sine/triangle
- wavetable oscillator
- filtered noise
- drum voice output
- ring mod output
- one Quad Operator output fed back externally
- sampler playing vocal chops or field recordings

Song uses

Verse

External FM gain low or off.

Buildup

Slowly raise AR FM gain and send to one or two operators.

Chorus

Bring in external oscillator tuned to a musically relevant interval.

Bridge

Use noise or percussion into AR FM for dirty, unstable textures.

Outro

Reduce external FM and return to pure internal operator tone.

This is excellent for song development because it adds a whole new “chapter” of timbre without changing sequence data.

Strategy 5: Use the module as a harmonic engine plus separate rhythm system

Many full Eurorack songs become clearer if pitch/timbre and rhythm are separated.

Patch concept

- Quad Operator = all tonal material
- Drum modules/sampler = all rhythm
- One master sequencer = pitch and section CV
- VCAs/mixer = arrangement

Use one sequencer row for: - 1V/oct to all locked operators - another row for transposition - another row for algorithm crossfade or modulation amount - another row for gain/accent envelopes

Then let drums define sections while Quad Operator evolves harmonically.

Why this works

You don’t need Quad Operator to make everything. It can be the “band” while dedicated drums provide song framing. Full songs often need: - kick subtraction/addition - hi-hat openings - fills - drum mutes - rhythmic contrast

Quad Operator then provides the musical identity through evolving FM.

The best modules to pair with it for songwriting

1. Performance mixer

Probably the most important companion.

Use a mixer with: - mutes - aux sends - cue - CV level control if possible

Why: - independent operator outputs become arrangable stems - transitions become easier than repatching - you can create intros/outros by muting layers - send only certain operators to reverb/delay during specific sections

Excellent for turning a patch into a song.

---

2. Sequential switch / matrix mixer

Very useful with Quad Operator.

Use a switch to: - alternate pitch sequences to selected operators - swap modulation destinations by section - reroute one operator’s output to different processors - send different envelopes to gain CVs per song section

This creates form from one patch.

---

3. Multi-channel envelopes

Since gain CV controls both loudness and modulation depth, envelopes are crucial.

Use: - short envelopes for plucks/percussion - long envelopes for pads - section-dependent envelope routing - envelope amplitude modulation for evolving phrasing

A module like Quadrax or Zadar can transform the Quad Operator from static to song-ready.

---

4. Quantized modulation / sequenced CV recorder

Modules like: - Voltage Block - Maestro - Tetrapad/Tete - Planar 2 - Ornament & Crime - Acid Rain Maestro

can sequence or perform: - shape CV - gain CV - ratio CV in free mode - detune-related macro changes externally - Algo crossfade CV

This is where loops become arrangements.

---

5. Effects with CV over mix or feedback

FM sounds change dramatically through effects. Use CV-controllable: - delay - reverb - chorus - resonator - spectral processors

Sectional effect automation is a huge part of song form: - dry verse - wet intro - huge chorus - washed-out breakdown - feedback swell into transition

---

6. Clocked random / probability modules

Use restrained randomness to create “composed variation.”

Patch to: - shape CV - gain CV - AR FM gain - modulation send levels via performance interaction - free-state operator pitch

Use only on selected sections, not constantly.

This gives: - subtle variation across repeated bars - bridge instability - evolving top-end texture - less repetitive phrasing

---

Concrete patch ideas for full songs

Patch 1: FM pop / synthwave song structure

Modules

- Quad Operator + Algo
- 16-step sequencer
- drum machine or sample player
- quad envelope
- performance mixer
- stereo delay/reverb
- lowpass filter

Patch

- Op 1: bass
- Op 2: bass modulator
- Op 3: lead
- Op 4: pad octave

Algorithms

- A: simple bass/lead FM
- B: brighter chorus FM
- C: aggressive peak FM

Structure

- **Intro**: Op 4 only, high reverb, low modulation
- **Verse 1**: Op 1 bass + Op 3 lead, algorithm A
- **Verse 2**: same sequence, but add subtle Op 2 modulation envelope accents
- **Pre**: crossfade A → B over 8 bars
- **Chorus**: B, all layers in, Op 4 widened with effects
- **Break**: mute Op 1, return to Live/manual reduced modulation
- **Final chorus**: B → C with rising AR FM gain
- **Outro**: strip back to Op 4 and delay tails

This is a real song architecture using mostly one voice complex.

Patch 2: Techno track with evolving FM bass and perc layers

Roles

- Op 1: bass stab
- Op 2: self-modulated metallic stab
- Op 3: high percussion tick through LPG
- Op 4: LFO mode modulating filter or delay time elsewhere

External modules

- kick, hats, clap
- trigger sequencer
- Euclidean trigger source
- distortion
- delay
- performance mixer

Song technique

- 16-bar blocks
- same bass sequence for multiple sections

- algorithm changes define form
- mutes remove/reintroduce operators
- AR FM from filtered noise during build
- reset input synced to bars for reliable modulation cycle restarts

Arrangement

- Intro: hats + Op 4 modulation only
- Groove in: Op 1 bass enters
- Tension: Op 2 metallic layer appears every 4 bars
- Build: AR FM gain rises from noise source
- Drop: kick + Op 1 + Op 2, noise FM off
- Breakdown: bass muted, Op 3/4 mod textures and delay
- Final drop: algorithm C, higher modulation depth, full drums

This works well because techno songs often rely on evolving timbre more than chord changes.

Patch 3: Ambient / generative long-form piece

Roles

- All operators partly in lock, one in free
- Very slow CV to shape and gain
- Sparse or no step sequencing
- External AR FM from another drone oscillator or field recording chain

Companions

- slow random voltages
- slew limiter
- quantizer
- long envelopes
- stereo reverb

- granular/delay module
- matrix mixer

Technique

- Keep pitch center stable in lock mode
- Use one free operator for movement
- Slowly crossfade algorithms using Algo
- Bring operators in and out through mixer channels
- Send different operators to different effect depths
- Reset occasionally at long cycle boundaries if modulation coherence matters

Song form

Even in ambient, form still matters: - opening sparse harmonic cloud - middle dense shimmer - high-tension noisy crest - return to purified sine-like resonance

Quad Operator is very good at this because it can move from pure to complex gradually.

Patch 4: Progressive song using operators as “band members”

Assign: - Op 1 = kick-synced bass - Op 2 = countermelody - Op 3 = high arpeggio - Op 4 = drone or chorus double

Then write sections by deciding: - who plays - who is foreground - who modulates whom

Example

A section

- Op 1 and Op 2 only
- moderate FM

- dry mix

B section

- Op 3 enters with delay
- Op 4 doubles tonic or fifth
- more modulation depth

C section

- Op 2 switched to free mode
- AR FM adds unstable texture
- drums stripped down

Return

- all back in lock mode
- algorithm B recalled
- fuller effect sends

This “band member” mindset is one of the best ways to escape loop syndrome in modular.

Ways to create transitions between song sections

Transitions are often the missing link in Eurorack songs. Quad Operator offers several.

1. Algo crossfade sweeps

Fade from simple to complex algorithm over 4–16 bars.

2. Gain CV swells

Since gain also affects modulation intensity, increasing gain can act as both: - volume swell - timbral intensification

3. External FM injection

Bring in AR FM only during transitions.

4. Lock/free contrast

Move one operator from lock to free for a destabilized bridge feel.

5. Shape sweeps

Go from sine toward square/saw to increase brightness and tension.

6. Detune bloom

Small detune for width in choruses; reduce for intimate verses.

7. Reset-controlled phrase alignment

If using LFO mode or modulation duties, use Reset to keep section starts coherent.

How to avoid common pitfalls

Pitfall 1: Everything becomes noisy and dissonant

The manual explicitly warns about this and suggests starting with: - VCO mode - all operators in lock state - detune at 12 o’clock - shape fully CCW for sine - all modulation sends down

That is good advice for songwriting too.

Song-oriented approach

Start with a stable “verse-safe” patch. Then create additional sections by adding: - modulation - overtones - external FM - detune - free-state voices

If you start chaotic, you have nowhere to go.

Pitfall 2: Using all four operators at full complexity all the time

Save density for arrival points.

Think in terms of section energy: - Intro: 1 layer - Verse: 2 layers - Chorus: 3–4 layers - Breakdown: 1–2 layers, but unusual routing - Finale: 4 layers plus external FM or effects

---

Pitfall 3: Sequencing too much instead of arranging

You do not need a new note sequence for every section.

Often better: - same bass sequence, different algorithm - same melody, different shape and effect send - same drone, different gain envelope - same voice, different operator mix

---

Pitfall 4: No macro controls

For songs, create 3–5 macro performance gestures: - Algo crossfade - AR FM gain - operator mute group - effects send amount - modulation depth via gain CV scaling

These are your arrangement levers.

A practical full-song workflow

Here is a very effective way to use Quad Operator for actual composition.

Step 1: Build the most neutral patch

As the manual recommends: - VCO mode - operators locked - sine shapes - zero modulation sends - detune centered

Make sure the sequence itself is musically solid.

Step 2: Define operator roles

For example: - Op 1 = bass foundation - Op 2 = hidden modulator / occasional audible layer - Op 3 = lead - Op 4 = pad/air

Step 3: Create 3 song states

- **State A**: sparse / verse
- **State B**: full / chorus
- **State C**: intense / climax

Save these with Algo if available.

Step 4: Give every operator its own VCA and mixer channel

This is essential for arrangement.

Step 5: Patch envelopes to gain CVs

Now note articulation and timbre become dynamic.

Step 6: Add one external FM source

Keep it muted initially. Use it only for builds, bridges, or final choruses.

Step 7: Decide section duties

Write down: - which operators are audible - what algorithm is active - what effects are on - whether AR FM is present - whether any operator is free state

Step 8: Rehearse transitions

Practice: - crossfade timing - mutes - effect send moves - envelope/scenario changes - filter openings

That’s the difference between a patch and a song performance.

Example complete song blueprint

“Verse/Chorus/Bridge” using Quad Operator

Voice architecture

- Op 1: root bass
- Op 2: modulator for Op 1 and occasional audible fifth
- Op 3: melody
- Op 4: high shimmer texture

Saved algos

- **A** = Op 2 modulates Op 1 lightly, Op 3 mostly clean
- **B** = Op 2 modulates Op 1 and Op 3 more strongly, Op 4 self-modulates slightly
- **C** = self-modulation and cross-modulation for intense brightness

Sections

Intro

- Op 4 only
- long envelope to gain
- heavy reverb
- A
- sparse clock divisions to modulation source elsewhere

Verse 1

- Op 1 + Op 3
- A
- dry-ish
- low shape complexity
- no AR FM

Verse 2

- same as Verse 1, but Op 2 audible quietly
- shape on Op 3 slightly opened toward triangle
- more delay send

Chorus

- B
- all operators except maybe hidden modulator fully or partly audible
- subtle detune on upper operators
- wider FX
- stronger gain CV envelopes

Instrumental break

- mute Op 1
- crossfade toward C
- add AR FM from another oscillator or filtered noise
- Op 4 in foreground

Final chorus

- return Op 1
- B→C during second half
- all drums full
- effects blooming

Outro

- remove drums
- fade to A
- only Op 3 and Op 4 remain
- reduce shape back to sine/triangle
- long reverb tail

That is a full song, not just a loop.

Best musical roles for Quad Operator in different genres

Techno

- evolving bass
- metallic stabs
- percussive FM hits
- tension through AR FM and algorithm crossfade

Ambient

- drones
- harmonic clouds
- slow shape modulation
- lock/free contrast for form

IDM / experimental

- self-modulation
- per-operator processing
- algorithm morphing as composition

Synth pop / melodic electronic

- bass + lead + upper shimmer from same module
- choruses via richer FM states
- verses via cleaner sines/triangles

Electro

- punchy FM bass
- snappy plucks

- robotic lead lines
- section changes with modulation depth

Final thoughts

The Quad Operator is especially well suited to full-length song creation because it combines:

- **multiple voices**
- **multiple modulation relationships**
- **independent outputs**
- **harmonic or free tuning behavior**
- **stored algorithm states**
- **crossfading between timbral architectures**
- **external FM integration**

In practical songwriting terms, that means you can create a track by varying:

- **which operators are heard**
- **which operators only modulate**
- **which algorithm is active**
- **how much gain/modulation each operator has**
- **whether operators are harmonic or independent**
- **how much external FM enters**
- **how each operator is mixed/effected**

That is enough to produce intros, verses, choruses, bridges, breakdowns, drops, and outros from a single coherent patch.

If you want, I can also turn this into: 1. a **section-by-section patch recipe**,
2. a **genre-specific set of patch ideas**, or
3. a **"minimum supporting modules" shopping/patch list** for making full songs with the Quad Operator.

Generated With Eurorack Processor