Humble Audio — Quad Operator Algo Extension

- Manual PDF

Quad Operator Manual PDF

Humble Audio Quad Operator: using it to build full-length songs in Eurorack

The **Humble Audio Quad Operator** is much more than “a 4-op FM voice.” Read as a songwriter’s module, it is really a **small network of 4 oscillators plus one external FM bus**, with:

- global pitch control
- per-operator ratio/free tuning
- per-operator timbre shaping
- per-operator gain VCAs
- a full FM modulation matrix
- independent outputs for each operator
- optional **Algo expander** for saving/crossfading FM routings

That combination makes it unusually strong for the exact problem you described: getting beyond a nice loop and into **sectional development**, **arrangement**, and **long-form variation**.

The key mindset shift: don’t treat it as one patch, treat it as a song engine

A lot of Eurorack patches stall because the sound is amazing but too static structurally. The Quad Operator helps because it can be treated as:

1. **One playable macro voice** for lead/bass/chords
2. **A bank of four related oscillators** for layered arrangement
3. **A modulation source** in LFO mode
4. **A scene morphing timbre system** via gains, matrix changes, and Algo crossfades
5. **A “song continuity” source** where multiple parts share a harmonic DNA

That last one matters. Full songs often need contrast, but they also need coherence. Quad Operator gives you both.

What the manual suggests musically

From the manual, the most song-relevant features are:

- **4 operators with independent outputs**
- **Lock mode** for harmonic integer-ratio FM
- **Free mode** for independent oscillators
- **Shape crossfade** from sine → triangle → square → saw
- **Gain CV per operator**, which affects both:
- output volume
- how strongly that operator modulates others
- **Mod 1–4 sends per source**
- **External AR FM input** with its own gain and sends
- **LFO mode**
- **Reset input** for phase reset
- **Algo expander** with 3 saved algorithms + Live, and **crossfading between matrix states**

This means the module is especially good at songmaking through:

- **controlled harmonic FM**
- **voice stacking**
- **timbral automation**
- **algorithm morphing**
- **reusing one sound architecture across multiple sections**

The big strategy: use Quad Operator for arrangement, not just tone

To make full songs, you need recurring tools for:

- **intro**
- **groove establishment**
- **verse / main A section**
- **lift / pre-chorus**
- **chorus / peak**
- **breakdown**
- **return**
- **ending**

Quad Operator can support all of those if you think in terms of **state changes over time**:

- different operator gains
- different FM depths
- different ratio relationships
- different shapes
- switching lock/free roles
- changing what is heard directly at the outputs
- using the Algo expander as “scene recall”
- crossfading algorithms gradually instead of hard switching

In other words, it excels at **evolving arrangement states**.

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

One of the strongest song techniques is to let the **same patch play different musical roles** over the course of a track.

Example role progression

Intro

- Use only **Op 1 output**
- All operators in **lock mode**
- Low FM depth
- Sine/triangle shapes
- Slow modulation of gain CV on one modulator
- Sparse melody or drones

Verse

- Add **Op 2 as a hidden modulator**, not directly audible
- Introduce slight FM on Op 1
- Sequence a bass line from 1V/Oct
- Use a VCA/envelope on Gain 2 so the timbre has note articulation

Pre-chorus

- Increase FM sends from Op 2 and Op 3
- Shift one shape toward square/saw
- Bring in **Op 2 output** mixed quietly beneath Op 1
- Add subtle LF FM for instability/tension

Chorus

- Mix **Op 1 + Op 2 + Op 4 outputs**

- Increase operator gains and modulation sends
- Use broader envelopes, more harmonics
- If using Algo, crossfade to a brighter, denser algorithm

Breakdown

- Drop back to only one operator output again
- Or switch one operator to **free mode** for unstable, drifting inharmonic texture
- Feed in external AR FM from a noise source or filtered drum loop

Final chorus

- Return to lock mode harmonic clarity
- Use the most complex algorithm and widest output layering
- Open shape and gain CV more fully

This is how one voice becomes a full arrangement element rather than a static loop.

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2. Exploit the independent outputs as separate arrangement layers

The manual notes **independent output per operator**. This is huge for song construction.

Instead of hearing the module as only one mixed FM result, treat each output as a separate recorded/processed layer.

Patch concept: one source, multiple stems

Send: - **Op 1** → main melodic voice chain - **Op 2** → wavefolder / filter / VCA for a midrange counter-layer - **Op 3** → bass-focused LPG or lowpass path - **Op 4** → long reverb / shimmer / ambience

Even if the operators are cross-modulating internally, the separate outputs give you **parallel arrangement channels**.

Why this helps for songs

You can mute/unmute or automate each layer across sections: - intro: only Op 4 ambient wash - verse: Op 1 + Op 3 - chorus: Op 1 + Op 2 + Op 3 + Op 4 - bridge: Op 2 alone through heavy delay - outro: Op 4 reverb tail

This creates song form without repatching the core voice.

Best companion modules

- **Mixer with mutes**: Happy Nerding Mix, WMD Performance Mixer, Befaco Hexmix
- **VCAs** for automation: Veils, Quad VCA, A-135-2
- **Stereo effects**: Mimeophon, FX Aid, Desmodus Versio, Magneto
- **Filters/LPGs**: QPAS, Three Sisters, Ripples, Optomix

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3. Use lock mode for “musical sections,” free mode for “transition sections”

The manual makes a strong distinction:

- **Lock state** = integer frequency ratios relative to master pitch, good for harmonic FM

- **Free state** = independent oscillators, more inharmonic and flexible

This maps beautifully to song structure.

Lock mode = stable musical identity

Use for: - bass lines - tonal hooks - choruses - sequenced riffs - pads with harmonic stability

Free mode = tension, transitions, atmosphere

Use for: - intros - bridges - fills - breakdowns - risers - noisy interludes

Songwriting trick

Keep the “main song” mostly in lock mode. Then, for transitions: - flip one operator to free - modulate its ratio CV independently - send it heavily into one or more locked operators - fade it up only during transitions

That gives you section contrast without destroying the harmonic center of the piece.

Example

- Ops 1–3 in lock mode for a stable chord/bass ecosystem
- Op 4 in free mode as a chaos/tension operator
- During verse: Gain 4 low or zero
- During build: raise Gain 4 and Mod sends into Ops 1–3
- At chorus drop: abruptly mute Gain 4, returning clarity

That’s a classic arrangement move in modular form.

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4. The Gain CV inputs are your secret arrangement controls

One of the most important details in the manual:

> Gain CV affects both output level and how intensely the operator modulates other operators via its modulation sends.

This means each operator's gain is effectively a **macro for presence + timbral influence**.

That is incredibly useful for long-form composition because one envelope or automation lane can: - bring in a layer - increase harmonic density - raise perceived intensity - reshape the whole FM network

Practical use

Patch each operator's Gain CV to: - an envelope for note articulation - a sequencer lane for section changes - a slow CV source for long-form evolution - a manual controller for live performance

Song arrangement use cases

A. Verse vs chorus

- Verse: low Gain on modulators, high Gain on carrier
- Chorus: higher Gain on modulators for brightness/complexity

B. Build-up

- Slowly raise Gain 2 and Gain 3 over 16 or 32 bars
- FM complexity naturally increases with tension

C. Breakdown

- Drop all modulator gains to near zero

- Leave one carrier output audible as a pure sine/triangle line

D. “Human arrangement”

- Use random stepped CV, attenuated, into one Gain input
- Creates recurring but non-repetitive note-to-note brightness differences

This is one of the best anti-loop tools in the whole module.

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5. Build songs from FM “scenes” with the Algo expander

The manual describes the **Algo expander** as a way to: - save modulation send positions - recall them - crossfade between saved algorithms and live knob positions

This is perhaps the most direct “song mode” feature in the whole ecosystem.

Think of the saved states not as “algorithms” in a DX7 sense, but as:

- **Scene A** = intro/verse
- **Scene B** = chorus
- **Scene C** = breakdown
- **Live** = improvised fill / transition state

How to use it for song sections

Save:

- **A** = simple harmonic FM, mostly one carrier and one modulator
- **B** = denser cross-modulation for chorus energy
- **C** = self-mod and feedback-like wild texture for breakdown/noise bridge

Then: - start on A - crossfade slowly toward B over 8–16 bars - snap to C for breakdown - fade from C back to A for reset - final chorus lives between B and Live with manual tweaks

Why it matters

In many modular systems, changing FM routing for a new section means repatching or lots of hand movement. Here, you can make **repeatable, recallable arrangement transitions**.

That is exactly what helps turn ideas into songs.

Great pairings

- performance CV source into crossfade input
- pressure/joystick controller
- preset sequencer
- automation lane from a DAW/CV interface

Examples: - **Planar 2** - **Tetrapad/Tête** - **Pressure Points + Brains** - **OXI One / Hermod / Metropolix modulation lanes** - **DAW via ES-8 / FH-2**

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6. Use external AR FM as a “section glue” input

The manual includes a dedicated **AR FM external modulation input** with: - gain knob - clipping LED - gain CV - modulation sends to all 4 operators

This is gold for arrangement because it lets an outside signal act like a shared energy source for the entire voice network.

Best external sources for AR FM in songs

Drums or percussion bus

Patch a percussion oscillator or even a full drum submix into AR FM. - Low amount in verse - More in chorus - Result: the melodic voice feels rhythmically fused with the drums

Another oscillator

Patch a fifth oscillator into AR FM. - Tune it to root/fifth/octave - Use it as a section-dependent “super modulator” - Great for builds and choruses

Noise or filtered noise

Use noise bursts or bandpassed noise into AR FM. - Makes transitions, intros, and breakdowns more animated

Resampled material

Patch a sampler loop, granular source, or radio/noise texture into AR FM. - The song acquires a shared texture identity across sections

Songwriting insight

This input helps solve a common Eurorack problem: the melody patch, bass patch, and drums often feel like separate islands. AR FM can make the Quad Operator react to another musical layer, creating **interdependence**.

That’s very song-like.

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7. Make one operator the bass, another the lead, another the pad skeleton

Because operators can be **unlocked and tuned independently**, the module can act like a small oscillator bank.

That means you can create **interrelated parts** from a single module.

Example “mini ensemble” patch

Op 1: bass

- Free mode
- Sequenced by dedicated pitch CV
- Sine/triangle shape
- Lowpass filter after output
- Short envelope

Op 2: lead

- Free mode
- Separate sequencer lane
- More complex shape
- Delay/reverb chain

Op 3: drone/pad

- Free mode or locked to master
- Slow VCA envelope or sustained level
- Heavy reverb

Op 4: hidden modulator

- Locked or free

- Not heard directly, or heard quietly
- FM source for others

Why this works for songs

Even if these parts are separate, they share a sonic fingerprint. That helps with: - coherence across sections - natural transitions - a “signature sound” for the track

This is especially useful in minimal techno, ambient, IDM, electro, soundtrack, and experimental song forms.

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8. Use LFO mode to generate section automation from inside the same module

The manual says **VCO/LFO switch** changes the base frequency range and that LFO mode can generate phase-locked complex modulation signals.

This makes the Quad Operator capable of being not just the sound source but also part of the arrangement automation system.

Approach

Dedicate one operator output in LFO mode as a modulation source for: - filter cutoff - VCA level - effect send - panning - delay time modulation - wavefolder symmetry

Because the operators can be related, you can create **musically synchronized internal modulations**.

Song use

- In intro, use Quad Operator as modulation generator only

- In main section, switch back to VCO mode for audio use
- Or keep one operator in free-state LFO role while others are musical voices elsewhere in the patch ecosystem

If your surrounding system supports it, one great long-form strategy is: - one Quad Operator operator = audible - one = modulation source - one = bass oscillator - one = transition/noise FM source

That kind of multifunction patching is ideal for complete songs in small systems.

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9. Use reset for repeatable phrasing and section starts

The manual notes a **Reset CV** input that resets all operators' phase.

This is especially useful if: - the module is being used as a modulation source - you want consistent transient behavior - you want section starts to feel intentional

Song applications

Trigger reset: - on the first step of every bar - only at phrase boundaries - only at section changes

This creates audible "re-centering," which can make modular patches feel more composed and less drift-prone.

Good uses

- percussive FM plucks where attack consistency matters
- synchronized bass re-entry after breakdown
- restarting an LFO-based timbral cycle at chorus downbeat

It's subtle, but structure often comes from subtle repeatability.

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10. Create full songs by sequencing timbre as much as pitch

The module's design encourages a crucial compositional principle:

> Don't just sequence notes. Sequence the FM relationships.

To get from loop to song, automate: - operator gains - matrix sends - shape CVs - ratio CVs - external FM amount - Algo crossfade

Suggested modulation architecture

Use separate modulation sources on different time scales:

Fast scale: note articulation

- envelopes into Gain CV
- accents into shape/gain
- per-step modulation from sequencer

Medium scale: phrase variation

- 8 or 16-step CV lane into one ratio or shape input
- clocked random into one mod send via VCA
- occasional reset changes

Long scale: section structure

- manual fader or joystick controlling Algo crossfade
- slow envelope over 32 bars into AR FM gain
- mute/unmute separate outputs through VCAs

That time-scale layering is how songs emerge.

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11. Pair it with a sequencer that supports song form, not just loops

To turn Quad Operator into a song instrument, combine it with a sequencer that can handle: - chained patterns - per-track modulation lanes - probability/mutation - mutes - fills - scene changes

Excellent partners

- **Intellijel Metropolix**: great for evolving hooks, transpositions, and phrase changes
- **Five12 Vector**: strong song structure and modulation lanes
- **Squarp Hermod+**: arrangement-friendly, multiple CV tracks
- **OXI One**: excellent for pattern chaining and performance
- **Winter Modular Eloquencer**: modular-friendly structured sequencing
- **NerdSEQ**: best if you want explicit tracker-style song arrangement

How to patch with Quad Operator

Use the sequencer for more than pitch: - 1V/Oct to master pitch - separate modulation lanes to Gain CVs - lanes to Shape CV - triggers to reset - slow CV to Algo crossfade - gate patterns to external VCAs on operator outputs

This turns the module into a song-responsive instrument rather than a static voice.

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12. Build verse/chorus contrast with processing chains, not only oscillator changes

Because Quad Operator has separate outputs, you can route each operator into a different post-processing voice.

Example processing layout

- **Op 1** → lowpass filter → VCA → center mono
- **Op 2** → wavefolder → stereo delay
- **Op 3** → LPG → spring reverb
- **Op 4** → distortion → bandpass filter → sidechain VCA

Then use mutes/VCAs/effect sends to define sections.

Section map

- intro: Op 3 + Op 4 only
- verse: Op 1 + subtle Op 2
- chorus: all operators
- bridge: Op 2 distorted alone
- final chorus: all operators plus increased FM and wider FX

This is a powerful way to get “produced track” structure from one synthesis source.

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13. Use one operator as a sidechain-like dynamic modulator

A smart modular song trick: use one operator output as a control signal elsewhere.

Since outputs are audio/CV capable and run at 48kHz according to the manual, you can: - rectify/filter one output to become an envelope-ish motion source - use it to duck another layer - use it to animate filter cutoff in another voice - use it to modulate effect depth

This can create internal relationships that make a song feel arranged and glued together.

Example

- Op 4 in LFO or low audio range
- Route Op 4 through envelope follower / rectifier / slew
- Use that CV to duck the Quad Operator lead reverb send during busy phrases
- Result: evolving arrangement dynamics without external DAW automation

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14. Make transitions deliberately: risers, fills, breakdowns, and returns

Songs live or die on transitions. Quad Operator is very good at transitions because FM can move from clean to chaotic smoothly.

Transition recipes

Riser

- slowly increase Gain on one modulator
- sweep Shape from sine toward saw
- increase AR FM gain from noise or another oscillator
- add reverb send

Fill

- briefly switch one operator to free mode
- raise self-modulation or cross-modulation
- route only that operator through delay
- mute it on the next downbeat

Breakdown

- kill all modulator gains
- leave only one operator output
- move to LFO range or low register
- use reset sparsely

Return/drop

- restore lock mode harmonic ratios
- reset phase on downbeat
- crossfade Algo into the denser scene
- unmute bass-focused output chain

This gives you the macro-movement full songs need.

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15. Use harmonic restraint for the body of the song, save chaos for punctuation

The manual specifically recommends for harmonic FM results: - VCO mode - all operators in lock state - detune at 12 o'clock - shape fully CCW (sine) - modulation sends at zero to start

This is excellent songwriting advice, not just synthesis advice.

Translation into arrangement

For most of the track: - keep the patch restrained - make changes gradually - use one or two modulator relationships at a time

For special moments: - increase detune - add overtone-rich wave shapes - increase multiple modulation sends - feed AR FM externally - introduce free-mode instability

If everything is extreme all the time, it's harder to make a song. The manual's "sane beginning" approach is actually a recipe for arrangement headroom.

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16. Example complete song workflows

Workflow A: techno / electro track

Modules to pair

- kick + percussion voices
- sequencer with pattern chaining

- mixer with mutes
- filter
- stereo delay/reverb
- 2–4 VCAs
- utility envelopes/LFOs

Quad Operator role

- Op 1 = bass/lead carrier
- Op 2 = hidden harmonic modulator
- Op 3 = metallic top layer output
- Op 4 = transition modulator / noise-adjacent texture

Song form

- **Intro**: Op 3 through delay, no kick
- **Groove in**: kick + Op 1 bass riff
- **Verse/A section**: restrained FM, low harmonic density
- **Build**: bring Op 4 gain up, increase AR FM from hi-hat bus
- **Drop/chorus**: crossfade to denser Algo, open Op 3 top layer
- **Breakdown**: bass muted, only Op 2/4 FX tails
- **Final section**: full mix, more shape brightness, wider effects
- **Outro**: return to Op 3 ambience

This works because the Quad Operator handles both hook and development.

Workflow B: ambient / soundtrack piece

Pair with

- slow sequencer or quantizer
- random voltage source
- large reverb
- delay
- matrix mixer

- LPG
- joystick/controller

Quad Operator role

- All operators mostly in lock mode
- Very low FM depth initially
- Independent outputs to separate spatial paths

Song form

- **Intro**: Op 4 alone, slow shape modulation
- **A section**: Op 1 enters with root drone, Op 2 quietly modulates
- **B section**: Algo crossfades to denser overtones, chords implied by ratio changes
- **Bridge**: one operator in free mode with drifting pitch CV
- **Climax**: external AR FM from another oscillator or tape loop
- **Resolution**: return to clean sine-leaning ratios

This creates a genuine narrative arc from one coherent sonic source.

Workflow C: melodic IDM / experimental pop skeleton

Pair with

- sequencer with multiple melodic tracks
- sampler/drums
- envelope follower
- multimode filter
- performance mixer
- clocked modulation source

Quad Operator role

- Op 1 = lead voice

- Op 2 = bass support or hidden modulator
- Op 3 = pluck or countermelody output
- Op 4 = utility modulation or transition voice

Song structure

- **Verse**: dry plucky lead, bass light
- **Pre**: shape and FM intensify
- **Chorus**: multiple outputs layered, wider FX, Algo scene B
- **Middle 8**: free-mode drifting operator and external FM from sampler loop
- **Final chorus**: return to harmonic lock with maximum gain complexity

This is a strong use case because FM can sound both percussive and lyrical.

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17. A practical “song patch template” to try

Here is a concrete patch plan that should help produce a real full-length track.

Core setup

- All operators in **lock**
- Start with all shapes at **sine**
- Start with all modulation sends at **0**
- Sequence master **1V/Oct**
- Use **Op 1** as the main audible output

Add structure

- **Gain 2 CV** from envelope with moderate decay

- **Op 2** → **Mod 1** raised slightly
- **Op 3 output** to a separate VCA/effect path, muted at first
- **Op 4** either:
- hidden modulator for builds, or
- free-mode transition oscillator

Add arrangement control

- slow CV or manual control to:
- Gain 3
- Shape 1
- AR FM Gain CV
- Algo crossfade if available

Song sections

Intro

- only Op 3 effected output
- no Op 1 bass/melody yet

Verse

- bring in Op 1
- slight Op 2 modulation

Pre-chorus

- increase Gain 2 and Shape 1
- unmute a little Op 3

Chorus

- unmute Op 3 fully
- bring Op 4 modulation in
- crossfade to brighter Algo

Breakdown

- mute Op 1
- leave Op 3/4 with reverb and reduced pitch density

Final chorus

- reset phase on downbeat
- full Op 1 + Op 3 + stronger Op 2 modulation
- external AR FM from percussion or another oscillator

That's a full song architecture from one module.

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18. Best supporting module categories for making songs with Quad Operator

If your goal is specifically long-form composition, these are the most useful companions:

1. Song-capable sequencer

For pattern chaining and modulation lanes.

2. Performance mixer

For bringing independent operator outputs in and out by section.

3. VCAs

Critical because Gain CV is central to this module's musicality.

4. Envelopes and function generators

To animate operator gain and timbre per note and per phrase.

5. Effects

Especially stereo delay/reverb to turn outputs into distinct arrangement layers.

6. Filters / LPGs

Helpful for making operator outputs occupy different song roles.

7. Modulation recorder or controller

Joystick, faderbank, pressure controller, preset manager, CV recorder.

8. External audio source

To exploit the AR FM input musically.

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19. The most effective songmaking techniques with this module

If I had to boil it down as a Eurorack musician, I'd say the Quad Operator becomes a song machine when you use it for these five things:

1. Sectional timbre states

Different FM networks for intro/verse/chorus/breakdown.

2. Parallel output arrangement

Each operator output as a separate stem or layer.

3. Gain-CV-driven orchestration

Since gain changes both loudness and FM influence.

4. Harmonic vs inharmonic contrast

Lock mode for song body, free mode for transitions and tension.

5. External interaction

AR FM lets outside material animate the whole patch.

Those are the levers that move you from “great loop” to “track with form.”

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20. Final advice: compose the arrangement first, then deepen the patch

With a module this flexible, it’s easy to get lost in FM complexity. For full-length songs, I’d recommend this workflow:

1. Start with a **simple locked patch**
2. Define **3 or 4 song sections**
3. Decide which operators are audible in each section
4. Program **Gain CV changes** first
5. Add **one FM relationship per section**
6. Then add:
7. shape motion
8. external AR FM

9. free-mode transitions
10. Algo morphing

That keeps the patch musical and lets complexity serve structure.

The Quad Operator is especially strong for full songs because it can provide: - a consistent sonic identity - multiple arrangement layers - evolving harmonic complexity - recallable/morphable structural states

In short: it's not just a sound design module. It's a **form-building module** if you patch it with VCAs, a good sequencer, a mixer, and a plan for section changes.
