Humble Audio — Quad Operator

- Manual PDF

Quad Operator Manual PDF

Humble Audio Quad Operator: modulation ideas for aggressive percussion, basslines, and haunted pads

The **Quad Operator** is a 4-operator digital linear FM voice with a very flexible **modulation matrix**, variable operator **waveshapes** (sine → triangle → square → saw), per-operator **gain CV**, **self-modulation**, **cross-modulation**, **independent outputs**, and an **external audio-rate FM input**. That combination makes it much more open-ended than a fixed-algorithm FM synth.

The key to getting great sounds out of it is understanding a few things from the manual:

- In **lock state**, operators stay in **integer ratios** relative to the master pitch. This is where the most useful **harmonic FM** lives.
- In **free state**, each operator becomes an **independent oscillator** with its own tuning. This is where the module gets more unstable, clangorous, inharmonic, and wild.
- **Gain CV** is very important: it changes both:
- the operator's **audio output level**
- and how strongly that operator modulates other operators through the matrix

- The **AR FM input** lets you inject an **external audio-rate modulator** and route it to any/all operators with its own modulation sends.
- The module supports **self-FM**, which is excellent for grit, edge, tearing basses, and impact transients.
- The **Reset** input can force phase restart, which is especially useful for repeatable percussion and tempo-synced modulation shapes.

First: the best mindset for patching this module

Think of each operator as simultaneously being:

1. **a sound source**
2. **a modulator**
3. **a VCA-controlled modulation source**

That means the most interesting patches usually come from modulating:

- **operator gain CV**
- **shape CV**
- **ratio CV**
- **external AR FM gain + send amounts**
- and switching between **lock/free use-cases**

If you only modulate pitch, you'll get some movement.
If you modulate the **amount of FM itself**, the module becomes much more animated and "alive."

General modulation strategies that work especially well on Quad Operator

1. Animate FM depth with envelopes, not just static knobs

Since **Gain CV** controls both output amplitude and modulation intensity, patching envelopes there creates very organic FM timbre motion.

This is one of the strongest features on the module.

Try:

- Put one operator mostly as a **carrier** (the one you listen to)
- Use another as a **modulator**
- Send a **fast decay envelope** to the modulator's **Gain CV**
- Set the modulation send from that modulator to the carrier

Result: - The note starts bright/noisy/aggressive - Then decays into a cleaner tone

That gives: - punchy kicks - snares - plucks - bass attacks - evolving pad strikes

This is classic FM behavior, but here it's especially intuitive.

---

2. Modulate shape slowly for spectral drift

Each operator can morph continuously through: **sine → triangle → square → saw**

This is huge. In standard FM, changing the waveform of the modulator dramatically changes the sideband structure.

Good uses:

- Slow random or triangle LFO into **Shape CV** for atmospheric textures
- Envelope into **Shape CV** for a bass that starts rounded and becomes buzzy
- Audio-rate modulation into **Shape CV** for unstable digital tearing textures

Important note:

The manual warns that overtone-rich shapes plus FM can quickly become noisy/aliased.
That's not always bad — for distorted percussion and bass, that's often exactly the point.

---

3. Use lock state for "designed" tone, free state for chaos

A very effective technique is:

- Start in **lock state** for harmonic, musically stable structure
- Introduce a single operator in **free state** as a destabilizer

This gives you the best of both worlds: - fundamental pitch remains readable - a rogue operator adds nasty, inharmonic edge

This is especially strong for: - reese-like basses - metallic attacks - haunted drone pads - industrial percussion

---

4. Self-modulation is your distortion engine

Because each operator can modulate itself, you can treat self-FM like a kind of internal waveshaping/distortion.

Low self-mod:

- slight sharpening
- brighter harmonics
- more bite

High self-mod:

- tearing digital distortion
- unstable transients
- noisy bass aggression
- broken percussion

For best results: - modulate the operator's **Gain CV** or the overall modulation source dynamically - pair self-mod with **square/saw** shape for brutal textures - pair self-mod with **sine/triangle** for more controllable growl

---

5. Use AR FM input as a fifth chaos source

The **AR FM input** is one of the coolest parts of the module.

You can patch in: - another oscillator - filtered noise - a resampled drum loop - a wavefolder output - even one of Quad Operator's own outputs for externalized feedback-style behavior

Then route that external source via **Mod 1–4** on the AR section.

Excellent sources for AR FM:

- noise burst for snare texture
- a synced saw VCO for bass tearing
- a sub oscillator for wobble complexity
- another operator output for pseudo-feedback
- a harsh digital oscillator for screaming sidebands

Watch the **clipping LED** and use the AR gain control intentionally: - moderate clipping = useful grit - heavy clipping = crushed, broken, industrial tone

---

6. Use Reset for repeatable attacks and percussion

The **Reset CV** resets all operator phases.

For percussion and tight bass attacks, this matters a lot. Without phase reset, transients can vary from hit to hit. With reset:

- kicks hit more consistently
- FM toms sound more focused
- bass stabs feel tighter
- modulation can lock better to clocked events

Patch a trigger from your sequencer to **Reset** for percussion patches.

Patch design ideas by sound category

---

1. Distorted percussive sounds

The Quad Operator should be very good for: - kicks - metallic toms - snares - rimshots - digital hats - broken industrial hits

The trick is to use **short envelopes on pitch and FM amount**.

A. FM kick drum

Setup

- Put all operators in **lock**
- Start with **sine shapes**
- Choose one operator as carrier, say **Op 1**
- Use **Op 2** to modulate **Op 1**
- Set Op 2 ratio to something simple like **2**, **3**, or **4**
- Send **Op 2 → Mod 1**
- Monitor **Op 1 out**

Modulation

- Send a **fast pitch envelope** to **LF FM**
- Send a **very fast decay envelope** to **Gain CV of Op 2**

Result

- Initial pitch snap from LF FM
- Initial click/thump brightness from FM burst
- Body settles into low sine-heavy tone

To distort it

- Add slight **self-mod on Op 1**
- Move Op 2 shape toward **triangle or square**
- Increase Op 2 ratio for more smack/click
- Patch **Reset** from the trigger source

For harder techno/industrial kicks

- Add **AR FM** with a short noise burst or clipped oscillator
- Route AR FM lightly to Op 1
- Let it just dirty the transient

B. Snare / clap-like digital percussion

Setup

- Carrier: **Op 1**
- Modulators: **Op 2 and Op 3**
- Op 2 ratio around **6–8**
- Op 3 ratio around **1 or 2**, or set one free for inharmonicity
- Use more angular shapes: **triangle/square/saw**

Modulation

- Envelope to **Op 2 Gain CV** with short decay
- Envelope to **Op 3 Gain CV** with slightly longer decay
- Optional envelope to **Shape CV** of Op 1 or Op 2
- Use a noise source into **AR FM**
- Route AR FM mainly to Op 1 and maybe Op 2

Result

- Body from lower modulator
- Rattle/noise from higher modulator + AR FM noise
- Shape CV creates “snap opens into sizzle”

Make it more broken

- Put Op 3 in **free state**
- Slight self-mod on Op 1
- Push AR FM gain until clipping LED flickers

C. Metallic percussion / FM toms / industrial hits

This module should excel here.

Setup

- Carrier: Op 1
- Modulators: Op 2, Op 3
- Put at least one modulator in **free state**
- Tune by ear to non-integer relationships
- Use triangle or sine first, then push to square

Modulation

- Very short decay envelopes to modulator gain CVs
- Trigger **Reset**
- Optional slow random to one modulator's **shape CV**

Result

- Bell/tom/metal strike with unstable overtone bloom

For really mangled hits

- Add **self-FM** on a modulator
- Route **Op 4** back conceptually as extra modulator to Op 1
- Or use **Op 4 out → external processing → AR FM**

That creates semi-feedback percussion textures.

D. Hi-hats and noisy ticks

Setup

- Use several high-ratio or free operators
- Listen to one output, or mix multiple outputs externally
- Shapes more toward **square/saw**
- Lots of inharmonic modulation

Modulation

- Fast decay envelopes to gains
- Noise or digital oscillator into AR FM
- Trigger Reset

Great trick

Use multiple operator outputs as separate hat layers: - one for body - one for sizzle - one for metallic tail

Then externally mix and process.

---

2. Crazy basslines for dubstep / drum and bass

This module is very capable of modern bass design because it gives you: - FM tone shaping - internal VCA-style modulation of FM amount - waveform morphing - self-FM - external audio-rate modulation - multiple outputs to layer externally

For dubstep and DnB, the best patches usually combine: - a stable low fundamental - aggressive moving harmonics - modulation of FM amount, not just filter cutoff - multiple layers

---

A. Basic neuro / growl bass core

Setup

- Keep **Op 1** in **lock**, ratio **1**, shape near **sine/triangle**
- Monitor **Op 1 out**
- Use **Op 2** in lock, ratio **2 or 3**, as main modulator
- Use **Op 3** as secondary modulator, ratio **5, 7, or 8**
- Optional mild **Op 1 self-mod**

Modulation

- LFO or envelope follower into **Op 2 Gain CV**
- Different LFO/envelope into **Op 3 Gain CV**
- Slow CV into **Shape CV** for one or more modulators
- Small movement on **Detune** for one modulator
- Optional stepped random into shape or ratio CV, attenuated

Result

- fundamental stays present
- harmonic profile shifts over time
- bass sounds like it's "talking" or "chewing"

Make it more dubstep

- Use synced LFOs into gain CVs for rhythmic wobble
- Use different modulation rates for nested movement
- Push one modulator shape toward square during stronger moments

---

B. Reese-like bass using free-state destabilization

Classic reese is detuned saws, but here you can get a related vibe through FM instability and layering.

Setup

- Op 1 = main carrier in lock
- Op 2 = lock ratio 1 or 2, slight detune
- Op 3 = **free state**, tuned close but not harmonically exact
- Use Op 3 to modulate Op 1 lightly
- Optionally monitor Op 1 + Op 3 mixed externally

Modulation

- Slow LFO to **Op 3 Ratio CV** in free mode
- Slow LFO to **Op 3 Shape CV**
- Envelope or LFO to **Op 3 Gain CV**
- Small self-FM on Op 1 or Op 3

Result

- unstable stereo-like movement even in mono
- shadowy beating and tearing edge
- excellent for dark DnB

If you have external processing: - distort after mixing - then bandpass/filter - then compress

This will get very “record-ready.”

C. Talking bass / vowel-ish FM movement

This module doesn’t have a filter built in, so “vowel” movement has to come from **changing sideband structure**.

Setup

- Op 1 as carrier
- Op 2 and Op 3 as modulators
- Keep harmonic ratios at first: 2, 3, 4, 5
- Start from sine/triangle

Modulation ideas

- Put a slow triangle LFO into **Op 2 Gain CV**
- Put a different phase-offset LFO into **Op 3 Gain CV**
- Put a third LFO or envelope into **Shape CV** of Op 2 or Op 3
- Sequence different FM depths with CV into gain inputs

Result

- the harmonic emphasis shifts in a mouth-like way
- more animated than simple filter sweeps
- especially strong when later run through a lowpass or bandpass externally

---

D. Bass stab with violent transient

Setup

- Op 1 carrier ratio 1
- Op 2 ratio 4–8 for high transient bite
- Op 3 ratio 2 or 3 for body
- Add light self-mod on Op 1

Modulation

- Sharp envelope to **Op 2 Gain CV**
- Longer envelope to **Op 3 Gain CV**
- Very fast pitch envelope to **LF FM**
- Trigger **Reset**

Result

- click/snap from high-ratio short FM
- punch/body from lower-ratio FM
- stable low pitch with lots of impact

This is ideal for: - one-shot bass hits - staccato DnB sequences - machine-like dubstep punctuation

---

E. External audio-rate FM for monstrous bass

Setup

- Build a decent FM bass internally first
- Patch another oscillator or processed signal into **AR FM**
- Route AR FM lightly to Op 1 and/or Op 2

Good external sources

- hard-synced VCO
- wavefolder output
- noisy digital oscillator
- distorted sub octave
- one of the Quad Operator outputs itself via external effect

Modulation

- Modulate **Gain AR FM CV** rhythmically
- Alternate between no external FM and bursts of it
- Use clipping intentionally

Result

- bass tone suddenly opens into violent tearing layers
- very effective for fills, transitions, and drop moments

---

3. Haunting atmospheric pads and drones

The Quad Operator can absolutely do pads, but the patching approach is different: - keep modulation comparatively restrained - use mostly **lock mode** for harmonic coherence - animate **gain CV** and **shape CV** slowly -

use multiple outputs layered externally - use LFO mode if you want internal phase-locked modulators

The manual specifically notes LFO mode can generate **phase-locked complex modulation signals**. That can be extremely useful.

A. Evolving FM pad

Setup

- Keep all operators in **lock**
- Ratios: start simple, like **1, 2, 3, 4**
- Shapes near **sine/triangle**
- Monitor multiple outputs externally, not just one

Modulation

- Very slow LFO to **Op 2 Gain CV**
- Different very slow LFO to **Op 3 Gain CV**
- Slow random or triangle to **Shape CV** on one or two operators
- Subtle detune on one operator
- Very small LF FM vibrato overall

Result

- gently shifting overtone architecture
- chorused, spectral movement without obvious filter sweeps
- ghostly harmonic bloom

Best practice

Use the individual outputs as layers: - one output for the body - one for shimmer - one for unstable upper haze

Then mix with reverb and delay externally.

B. Frozen-glass pad with free-state contamination

Setup

- Most operators in lock
- One operator in **free state**
- Keep that free operator fairly low in modulation amount
- Use sine or triangle first

Modulation

- Very slow CV into the free operator's ratio CV
- Slow envelope/LFO into its gain CV
- Maybe a touch of shape modulation

Result

- stable musical core with eerie drifting inharmonic halo
- ideal for dark ambient and horror-adjacent textures

C. LFO-mode internal animation patch

Because VCO/LFO switch changes the base frequency range globally, you can use the module as a modulation network too.

Idea

Use the Quad Operator in **LFO mode** to generate phase-locked complex modulation, then use its outputs to animate other modules — or self-patch in creative ways if you're repatching between voices.

Example

- Set operators to simple harmonic relationships in lock mode
- Use internal modulation matrix among them

- Take one or more outputs as CV/audio-rate hybrid modulation sources
- Use Reset to sync movement

This can create: - repeating spectral swells - pseudo-organic tremolo - cyclic but non-obvious animation for pads elsewhere in your rack

---

D. AR FM with field recordings / texture layers

For haunted atmospheres, the AR FM input is excellent.

Patch

- Send a filtered noise source, radio noise, contact mic texture, or granular source into **AR FM**
- Set low/moderate gain
- Route subtly to one or two operators only

Modulation

- Slowly modulate **Gain AR FM CV**
- Slowly modulate operator gain CVs too

Result

- organic contamination of the pad
- whispering, breathy, haunted upper detail
- much more unique than ordinary oscillator + reverb patches

Specific modulation tips by control

Ratio CV

In lock mode

Best for: - changing harmonic relationships in stepped or semi-stepped ways - shifting from mellow to bright intervals - creating sequence-dependent timbre changes

Use: - stepped CV - sequencer rows - sample & hold with attenuation

In free mode

Best for: - independent oscillator pitch movement - drifting dissonance - unstable bass tearing - metallic percussion

Use: - slow random - pitch envelopes - audio-rate sources for chaos

---

Detune

The manual notes ±6 semitones per operator.

Best uses: - tiny amounts for animated beating - moderate amounts for unstable bass complexity - larger amounts for bells, metal, broken percussion

For pads: - use tiny detune offsets

For bass: - automate or manually sweep one detuned operator while keeping carrier stable

---

Shape CV

One of the best sound-design controls on the module.

Use it for:

- transient aggression
- brightening during note onset
- slow spectral drift
- moving between clean FM and abrasive digital tone

Especially good pairings:

- envelope to modulator shape CV for punchy attacks
- LFO to carrier shape CV for bass growl articulation
- random CV to secondary modulator shape for haunted pad drift

---

Gain CV

Probably the most important modulation input on the entire module.

Because it affects both: - modulation depth - output amplitude

It is the natural place to patch: - ADSR/decay envelopes - VCAs controlling modulation amount - LFOs for wobble - random for evolving textures

If you only explore one thing deeply on this module, explore **Gain CV modulation**.

LF FM

Per manual: good for vibrato, bends, pitch envelopes.

Best uses:

- kick pitch drops

- bass attack pitch snap
- subtle vibrato on pads
- coordinated global movement across locked operators

Because it affects all operators in lock state, it is especially useful when you want the whole sound to move together.

AR FM + Gain AR FM CV

This is where external chaos enters.

Use it for: - dirtying transients - adding external sidebands - pseudo-feedback - introducing non-matching tone sources into the FM network

The gain CV here is perfect for: - burst modulation - drop accents - rhythmically opening the external FM only on selected steps

---

Three full patch recipes

Patch 1: Distorted industrial kick/snare hybrid

Goal

A hard, broken drum voice with body plus digital crack.

Setup

- Op 1 = carrier, lock, ratio 1, sine/triangle
- Op 2 = lock, ratio 2 or 3, modulates Op 1
- Op 3 = free, tuned high-ish, modulates Op 1 lightly
- Op 4 optional self-mod or extra attack component
- Noise into AR FM
- Monitor Op 1

Modulation

- Trigger to Reset
- Fast decay envelope to LF FM
- Fast decay envelope to Op 2 Gain CV
- Very short envelope to AR FM gain CV
- Slight slower decay to Op 3 Gain CV

Tune by ear

- Increase Op 3 inharmonicity until it sounds metallic/broken
- Raise AR FM until crack appears
- Add slight Op 1 self-mod for crunch

Outcome

A drum hit that can sit between kick, snare, and machine impact.

Patch 2: Dubstep talking growl

Goal

A rhythmic, vocalized bass with evolving aggression.

Setup

- Op 1 carrier, lock ratio 1
- Op 2 modulator, lock ratio 2
- Op 3 modulator, lock ratio 5
- Op 4 free or lock ratio 7 for extra complexity
- Monitor Op 1 and maybe Op 4 mixed externally

Modulation

- Tempo LFO to Op 2 Gain CV
- Offset LFO or envelope sequencer to Op 3 Gain CV

- Slow triangle to Op 2 Shape CV
- Subtle random to Op 4 Ratio CV if free
- AR FM from another oscillator, brought in only on accents via Gain AR FM CV

Outcome

Chewing, morphing bass movement with lots of variation across the bar.

Improve further

Run the result through: - distortion - multimode filter - phaser/flanger - compression

---

Patch 3: Haunted glass pad

Goal

Slow-moving dark ambient harmonic texture.

Setup

- Op 1, 2, 3 in lock, simple ratios
- Op 4 in free state, tuned by ear for slight dissonance
- Shapes mostly sine/triangle
- Monitor multiple outputs and mix externally

Modulation

- Slow sine LFO to Op 2 Gain CV
- Different slow LFO to Op 3 Gain CV
- Very slow random to Op 4 Ratio CV
- Very slow CV to one shape input
- Subtle vibrato to LF FM
- Textural source into AR FM very quietly

Outcome

A pad that feels harmonic but fragile, dusty, and haunted.

Best practices for avoiding “just noise” when you want control

The manual is honest: this module can easily become dissonant/noisy. To stay musical while still getting interesting sounds:

For harmonic tones

- Use **VCO mode**
- Keep operators in **lock**
- Set **detune to noon**
- Start with **sine waves**
- Start with **all modulation sends down**
- Add only one modulation path at a time

Then introduce instability gradually

- one operator to free
- one shape toward square/saw
- one self-mod path
- one external AR FM source
- one moving gain envelope

That staged approach gives much better results than turning up everything.

Advanced creative ideas

1. Use independent outputs as multiband layers

Each operator has its own output. Even if one operator is mainly acting as a modulator, its output may still sound great on its own.

Try: - Op 1 = low body - Op 2 = mid growl - Op 3 = high grit - Op 4 = unstable fizz

Process them separately: - lowpass the body - distort the mids - bandpass the grit - reverb the fizz

This is a huge advantage over closed FM synths.

---

2. Feedback-style patching with AR FM

The manual specifically suggests trying feedback patches with a phase-locked operator.

Try: - patch one operator output out of the module - process it through distortion, filtering, delay, wavefolder, or VCA - return it to **AR FM** - route it back into one or more operators

This gives controllable external feedback networks.

Excellent for: - screaming basses - unstable drones - tearing percussion

---

3. Use one operator as a transient designer

Instead of thinking of all operators as “tones,” treat one as purely attack content.

Example

- Op 1 = bass body
- Op 2 = body modulator
- Op 3 = very short bright attack FM burst
- Op 4 = noisy or inharmonic click layer

Then shape each with separate envelopes via gain CV.
This is a great way to make complex bass hits and drum impacts.

---

4. Sequence timbre, not just notes

Because the FM matrix is open-ended, a sequencer lane can control: - operator gain CVs - shape CVs - AR FM gain CV - ratio CVs

This means one pitch sequence can become far more alive if another sequencer row changes timbre per-step.

Excellent per-step controls: - Op 2 gain amount - Op 3 shape - AR FM amount - one free operator pitch offset

---

My strongest recommendations for your target sounds

For distorted percussion

Prioritize: - **Reset** - **fast envelopes to Gain CV** - **short LF FM pitch envelope** - **self-FM** - **AR FM with noise or clipped oscillator** - **free-state modulator for metallic edge**

For dubstep / DnB bass

Prioritize: - **lock-state carrier** - **one or two moving modulators** - **Gain CV wobble** - **Shape CV animation** - **light self-FM** - **AR FM bursts** - **independent output layering**

For haunting pads

Prioritize: - **mostly lock-state operators** - **very slow Gain CV motion** - **subtle Shape CV drift** - **one free operator very low in mix** - **tiny detune** - **quiet AR FM texture source** - **external reverb/delay**

Bottom line

The Quad Operator is most interesting when you stop treating it like a fixed FM synth voice and start treating it like a **small modulation ecosystem**. The most unique sounds will usually come from:

- modulating **Gain CV** constantly
- mixing **harmonic lock-state structure** with **one unstable free-state operator**
- using **self-FM** as distortion
- using **AR FM** as external contamination/feedback
- layering the **independent outputs**

If you want, I can also give you:

1. **10 concrete patch recipes with knob-by-knob starting positions**, or
2. **a “best modulation sources for Quad Operator” guide** using envelopes, random, sequencers, and VCAs.

Generated With Eurorack Processor