

# Humble Audio – Quad Operator Algo Extension

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[Quad Operator Manual PDF](#)

## Humble Audio Quad Operator (+ Algo) for melodic patching

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The **Quad Operator** is a 4-operator digital FM voice for Eurorack, with:

- 4 independently available operators
- lock/free modes per operator
- variable waveshapes per operator: **sine** → **triangle** → **square** → **saw**
- a full **modulation matrix**
- per-operator gain acting like a built-in modulation VCA
- external **AR FM** input for bringing another oscillator/audio source into the FM network
- optional **Algo expander** for storing and morphing FM matrices

From a melodic musician's perspective, this is not just an FM drum/noise machine. It can be a:

- classic FM voice
  - chord/harmony generator
  - 4-oscillator melodic bank
  - animated bass/lead source
  - complex phase-locked modulation source
  - algorithm-morphing timbre voice
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# What matters most for melodic use

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## 1. Lock mode is the melodic sweet spot

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In **lock state**, each operator tracks the master pitch in **integer ratios** relative to the global Coarse/Fine tuning. This is the most important mode for tonal FM because:

- harmonic relationships are preserved
- pitch stays musically stable
- classic FM sidebands are easier to control
- operators can act as harmonically related carriers/modulators

If your goal is **basslines, leads, bells, keys, plucks, pads, or chord-like tones**, start here.

### Best starting point for melodic FM

The manual itself strongly suggests this kind of setup:

- **VCO mode**
- all operators in **lock**
- all **Detune** knobs at 12 o'clock
- all **Shape** knobs fully CCW for **sine**
- all **Mod sends** fully CCW to begin

That gives you a clean, harmonically sensible baseline. Then add FM gradually.

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## 2. Free mode turns it into a 4-oscillator melodic bank

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In **free state**, an operator becomes an independent oscillator:

- the **Ratio knob** becomes coarse tuning

- **Ratio CV** becomes **1V/oct** for that operator
- each output can be patched as its own voice or layer

This is very useful melodically if you want:

- 4 tuned drones
- intervals/chords from separate operators
- paraphonic textures
- layered detuned melody lines
- one operator as audible pitch, others as tuned modulators

This means the Quad Operator can behave like either:

- **one complex FM voice**, or
- **four related oscillators**

That flexibility is the key to melodic composition with it.

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## Core melodic patching strategies

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### Strategy A: Classic 2-op or 4-op FM voice

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Use one operator as the main audible output and the others as modulators.

#### Patch idea

- Put all operators in **lock**
- Send your sequencer to **1V/Oct**
- Listen primarily to **Op 1 out**
- Turn up modulation sends from Op 2 and/or Op 3 into Op 1
- Use **Gain CV** on the modulating operators with envelopes to animate timbre

## Why this works

Because operator gain controls both:

- the output level of that operator
- how strongly it modulates other operators through its sends

So if an envelope opens/closes the gain of a modulator, you get **dynamic FM index**—the classic recipe for:

- plucks
- electric piano tones
- struck metal
- evolving bass
- vowel-like movement

## Melodic results

- **Low FM amount:** warm, stable leads and basses
  - **Envelope-shaped FM:** punchy attack transient with mellow sustain
  - **Multiple modulators:** richer harmonic motion across the melody
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## Strategy B: Chord voice from multiple outputs

Since each operator has its own output, you can use the Quad Operator as a harmonic cluster generator.

### Patch idea

- Put all operators in **free** mode
- Send different pitch CVs to each **Ratio CV** input
- Patch all four outputs to a mixer
- Tune operators as chord tones:
  - Op 1 = root
  - Op 2 = third
  - Op 3 = fifth
  - Op 4 = seventh or octave

- Optionally send one common envelope/VCA downstream

## Why this works

In free mode, each operator is a separate oscillator. You can make:

- triads
- jazz chords
- stacked octaves
- contrapuntal lines if each goes to a separate VCA/filter

## Extra musical trick

Keep one or two operators in free mode and others in lock mode for a hybrid patch: - locked operators provide harmonic FM structure - free operators add independently tuned chord tones or dissonant color

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## Strategy C: One melodic carrier, self-FM and cross-FM for expression

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The matrix allows each operator to modulate:

- other operators
- **itself**

That means you can use subtle self-modulation for extra brightness and edge.

## Patch idea

- All ops in **lock**
- Use **Op 1** as the main audible voice
- Turn up:
  - Op 2 → Op 1 slightly
  - Op 3 → Op 1 slightly
  - Op 1 → Op 1 very subtly
- Envelope the gain of Op 2 or Op 3

## Result

You get a very playable melodic timbre that can move between:

- sine-like purity
- reed-like brightness
- metallic bite
- buzzy harmonic saturation

This is especially good for **melodic techno**, **IDM leads**, and **FM bass**.

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## Strategy D: Use shapes beyond sine for more melodic density

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Each operator can morph continuously:

**sine** → **triangle** → **square** → **saw**

For melodic work, this is huge. Classic FM often starts with sine waves, but the Quad Operator lets you begin with already-rich spectra.

### Practical use

- Start with **sine** for clean, stable pitch perception
- Move a modulator toward **triangle** or **square** for stronger harmonic complexity
- Move the carrier toward **saw** if you want brighter, more present melodic lines

### Caution

The manual notes that overtones plus modulation can quickly create:

- aliasing
- noise
- harsher spectra

Musically, that means: - use richer shapes sparingly for melody - try brighter modulators but keep the carrier simpler - reserve full saw/square FM for accents, choruses, or aggressive passages

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## Best melodic roles for each control

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### Coarse + Fine

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These are global master tuning controls for locked operators.

Use them for: - setting the overall register - transposing the patch - making the voice sit as bass, alto, or lead

### 1V/Oct

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This controls all operators in lock state together.

Use it from: - pitch sequencer - keyboard controller - quantized random source

This is the main melodic entrance point for conventional pitched use.

### LF FM

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This is  $\pm 6$  semitones and best for slow pitch movement.

Excellent for: - vibrato - pitch envelopes - portamento-like bends - expressive melodic instability

Use a slow LFO or envelope here for phrasing.

### Reset

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This resets phase of all operators.

For melodic use, this matters because phase reset can make attacks more repeatable, giving: - more consistent transients - tighter plucks - more percussive note starts - repeatable modulation shapes when using LFO mode

Good for sequenced melodies where each note should articulate similarly.

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## The hidden melodic superpower: Gain CV per operator

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The manual makes a critical point: **Gain CV affects both output level and modulation intensity.**

That means one envelope can simultaneously control:

- how loud an operator is
- how much it modulates others

This is extremely powerful for melodic FM because it creates natural timbral articulation.

## Musical applications

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### FM pluck

- Op 1 audible
- Op 2 modulates Op 1
- Envelope into **Gain CV 2**

Result: - bright attack - mellow decay - very playable plucked tone

### Dynamic harmonic bloom

- Op 2 and Op 3 both modulate Op 1
- give each a different envelope or LFO
- one fast decay, one slow decay

Result: - attack sparkle followed by sustained body - useful for keys, mallets, bells, and evolving leads

## Carrier/modulator balance as composition

Because gain also controls output, you can mix audible operators and hidden modulators in fluid ways: - start with modulator unheard but active - fade it into audibility for a duet/chord feel - blur the line between timbre generator and melodic voice

This is one of the most musical aspects of the module.

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# Using the Algo expander for melodies

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The **Algo** expander stores and morphs the modulation matrix states. It does not store every panel setting—specifically it stores the **Mod x knob positions** for all four operators plus AR FM.

Think of this as storing FM routing/intensity presets.

## Why this is musically useful

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For melody, changing algorithm is often more dramatic than changing pitch. With Algo you can:

- store a mellow FM structure in slot A
- store a bright, stacked, feedback-heavy structure in slot B
- crossfade between them during a phrase

That gives you **timbre progression** over a melody line.

## Great melodic uses

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### Verse / chorus timbre states

- **A** = soft, simple 2-op voice
- **B** = brighter, denser 4-op voice
- crossfade between them over a pattern

### Performance morphing

- assign CV to crossfade
- slowly move from one algorithm to another over several bars

### Call and response

- use one sequenced melody
- alternate between two algorithm states for contrast

Because the modulation matrix is the heart of the sound, Algo effectively gives you **macro-form timbral composition**.

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## Using AR FM with the Quad Operator melodically

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The **AR FM** input lets you bring in an external audio-rate source and route it to any operator with its own modulation sends and gain control.

# Melodic applications

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## External oscillator as master color source

Feed another VCO into AR FM and use it to modulate one or more operators. This can produce:

- more organic FM tones
- richer attacks
- layered harmonic motion

If the external oscillator tracks the same pitch sequence, you get a tightly related but more complex melodic tone.

## Feedback-ish melodic textures

The manual specifically suggests trying a phase-locked operator, processing it externally, and feeding it back in.

That can create: - vocal-like resonances - metallic but pitch-stable leads - aggressive basses with a coherent note center

## Audio-rate ornamentation

Patch a fast oscillator, wavetable source, or filtered noise burst into AR FM for: - note attack articulation - transient brightening - unstable shimmer on top of a melodic line

Watch the **clipping LED**, and use the AR FM gain knob to avoid overdriving unless distortion is desired.

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# Patch recipes for melodic music

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## 1. FM bass

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**Goal:** solid, punchy, harmonic bassline

- VCO mode
- all operators in **lock**
- all shapes on **sine**
- all detune centered
- sequence into **1V/Oct**
- listen to **Op 1**
- Op 2 modulates Op 1 moderately
- envelope to **Gain CV 2**
- slight envelope or LFO to **LF FM** for subtle pitch movement if desired

### Result

Clean low-end pitch center with a bright attack and rounded sustain.

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## 2. Electric piano / mallet voice

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**Goal:** percussive melodic keys

- all operators in **lock**
- Op 1 = carrier out
- Op 2 and Op 3 modulate Op 1
- keep ratios simple/integer
- sine or triangle shapes
- fast-decay envelope to Gain CV of modulators
- optional slight self-mod on Op 1

## Result

A struck, harmonic timbre with evolving overtone decay.

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## 3. Bell lead

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**Goal:** metallic but still playable melody

- all operators in **lock**
- use nontrivial integer ratios
- add a little detune to one operator if desired
- use sine carrier, triangle/square modulator
- moderate to high modulation depth
- long decay envelope on modulator gain

## Result

Shimmering melodic tones with bell-like sidebands.

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## 4. Chord stack oscillator

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**Goal:** one module producing harmonic accompaniment

- all operators in **free**
- send pitch CV individually to ratio inputs
- tune root/third/fifth/seventh
- mix Op 1–4 outputs
- optionally modulate shape separately per operator

## Result

A compact 4-oscillator chord source. Great into a shared filter/VCA for pads or stabs.

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## 5. Morphing lead with Algo

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**Goal:** one melody, evolving algorithms

- create two FM matrices:
- **A:** gentle/simple
- **B:** dense/aggressive
- save each on Algo
- sequence pitch normally
- crossfade manually or with CV over phrase length

### Result

A lead that grows from pure to complex without repatching.

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## 6. Counterpoint patch

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**Goal:** several melodic layers from one module

- put some operators in **free** and others in **lock**
- locked ops create the main FM voice
- free op becomes a separate drone/countermelody
- route outputs to separate VCAs/channels
- sequence or modulate independently

### Result

One module can handle foreground melody plus harmonic accompaniment.

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# Tips for keeping melodies musical

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## Stay simple first

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FM can become dissonant quickly. For tonal writing:

- start with **sine**
- start with **one modulator**
- keep **detune centered**
- use **lock mode**
- add modulation slowly

## Use integer ratios for stable tonality

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The manual emphasizes that lock mode is essential for harmonic overtone relationships. If you want notes to read clearly as pitches, stay there.

## Use gain envelopes instead of cranking static modulation

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This creates notes that speak with articulation, rather than sounding constantly over-complex.

## Shape is a big compositional control

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Changing shape may be more musically effective than adding more FM.

## Use Reset for repeatable attacks

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Especially useful for sequenced melodic lines and plucks.

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# Limitations to keep in mind

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The manual suggests a few rough edges:

- some sections are incomplete, such as firmware notes and algorithm translation guidance
- the Algo stores modulation matrix states, not the entire voice
- complex shape + heavy FM can get noisy/aliased quickly
- free mode is less naturally harmonic unless intentionally tuned

None of these are dealbreakers, but they shape how melodic patches are best approached.

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## Bottom line

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The **Quad Operator** is especially strong for melodic music because it combines:

- stable locked-ratio FM for tonal playing
- four available outputs for layering and chords
- dynamic modulation index via Gain CV
- external audio-rate FM integration
- morphable FM matrix states with the Algo expander

In practice, the most musically useful workflows are:

1. **Locked 2-op/4-op FM voice** for bass, leads, keys, bells
2. **Free-mode oscillator bank** for chords and layered harmony
3. **Algo morphing** for phrase-level timbral development
4. **Gain-CV animated modulators** for expressive note articulation

If you want, I can also turn this manual into: - a “**best melodic patch recipes**” cheat sheet - a **signal-flow diagram** - or a **beginner-friendly explanation of how to program DX-style algorithms on the Quad Operator**.

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