Black Noise — Cosmos

- Manual PDF

Cosmos User Manual (PDF)

Black Noise Cosmos: using it to create melodic components

Cosmos is unusually good at **turning simple voltages and waveforms into pitch-related musical material**. It is not just a logic module: it can behave like a **comparator, rectifier, octave doubler, oscillator, wave shaper, PLL, envelope utility, random gate source, and clock processor**. That makes it very useful for building melodic systems out of a small Eurorack setup.

Below is a musician-focused guide to using Cosmos to create **melodies, tuned voices, pitch motion, rhythmic melody triggers, and harmonic variation**.

What Cosmos does best for melody

At a high level, Cosmos helps melodic patching in 5 main ways:

1. **Generate or derive oscillators**
2. Self-patched oscillator
3. Triangle-to-+1 octave voice
4. PLL-based tracking oscillator
5. Looping envelope as oscillator
6. **Shape timbre while preserving pitch relationships**
7. Saw to triangle

8. Variable pulse width from triangle/saw
9. Harmonic wave shaping
10. Clamping ring modulation / AM-RM hybrids
11. **Extract gates and triggers from CV/audio**
12. Comparators and window comparators
13. Rising/falling edge trigger extraction
14. Clock doubling and trigger multiplying
15. **Combine modulation sources into pitch-useful control**
16. Min / Max analog logic for envelope combining
17. Offset-controlled thresholds for note articulation
18. Envelope following for pitch-adjacent response
19. **Create musically useful probabilistic phrasing**
20. Random gate routing
21. Swinged doubled clocks
22. Delayed trigger multiplication

Core melodic building blocks from the manual

1. Use Cosmos as a pitch-related oscillator

The manual shows that Cosmos can become a **self-oscillating square source** by feeding the **XNOR gate back to an input**.

Why this matters musically

This gives you a raw pitched tone source. If you place a **slew or filter in the feedback path**, you gain control over frequency, and with CV over the slew time, you get a kind of **VCO-like voice**.

Patch concept

- Patch **XNOR gate output** back to one input
- Insert a **slew limiter or LPF** in the loop
- Modulate slew time from:
- sequencer CV
- keyboard CV
- envelope
- another LFO

Musical use

- Add as a **second oscillator** for a lead or bass
- Use as a **substitution voice** when your system is small
- Sequence the slew for stepped melodic lines
- Mix with a more stable VCO for grit and edge

Character

This is not a precision VCO first; it is an **analog-computer-style oscillator**. Best for: - raw melodic lines - dirty basses - unstable harmonics - pseudo-digital square sequences

---

2. Create a melody-supporting octave layer

One of the strongest melodic tricks in the manual is:

Triangle wave to +1 octave VCO

Patch a **bipolar triangle** into Cosmos, then patch the **corresponding inverted output** back into the second input. The **MAX output** becomes a signal **one octave higher**. The **OR gate output** becomes a square-wave version.

Why this matters musically

This is excellent for making a single oscillator feel like a composed melodic voice: - root + octave - mellow + bright layer - triangle + pulse hybrid

Musical applications

- Add the octave-up output quietly under a bassline
- Use the OR gate output as a pulse layer for articulation
- Process the octave-up separately through a VCA/filter
- Create a two-register lead from one VCO

Nice performance trick

The manual notes that adding **offset** creates a **sync-like sweep**. That means you can animate the octave relation with: - an envelope for attack brightness - an LFO for animated lead lines - sequencer CV for phrase-dependent harmonic changes

This is one of the best ways in the manual to get a **melodically useful harmonically rich voice from a single VCO**.

---

3. Convert triangle or saw to pulse for melodic articulation

Triangle or saw to variable pulse width

Using Cosmos as a comparator: - send triangle or saw through an **offset** - patch into a Cosmos input - use the **OR gate output** as the resulting pulse wave

Why this matters musically

Pulse width is one of the most classic melodic timbre tools. With this patch you can: - derive a pulse voice from a non-pulse oscillator - animate

the harmonic content without losing pitch tracking - create PWM-like leads and basses

Good melodic uses

- Slow LFO to offset input = evolving pulse width
- Envelope to offset input = brighter attack
- Sequencer CV to offset input = different timbre per note
- Mix original triangle with pulse for richer melody tone

Best in a patch with

- VCF after mixing
- VCA under envelope
- sequenced V/oct source into the original VCO

This turns Cosmos into a **melody timbre animator**.

---

4. Turn saw into triangle or “shark tooth” for melodic tone design

Saw wave to triangle wave

Using full-wave rectification: - patch bipolar saw into X - patch inverted version to Y - use **MAX output** as triangle-like output

With offset, the manual says you can get in-between shapes like **“shark tooth”**, similar to classic Minimoog-style timbral territory.

Musical use

This is useful when you want: - smoother lead tones from a brighter oscillator - a more rounded melodic waveform - filter-like movement from CV-controlled offset

Why it’s melodic

Because the pitch source stays the same, the harmonic shape changes while **the note identity remains stable**. That’s ideal for: - expressive monophonic leads - basses that need controlled brightness - melodic phrases with timbral contour

---

5. Use harmonic wave shaping for animated lead lines

Harmonic wave shaper

This patch combines: - oscillator into X - TZ clipper gate through slew - negative offset - result patched to Y - output from TZ clipper

Why this matters

This is effectively a **harmonic enrichment engine**. The manual describes results close to: - wavefolding - sync-like tones - asymmetric shaping

Musical role

Perfect for: - lead lines that need motion - acid-adjacent melodic voices - harmonically evolving arps - aggressive counter-melodies

Controls that matter musically

- **Rise**: smoothness of added harmonics
- **Fall**: number of harmonics
- **Negative offset**: intensity of shaping

Melodic strategy

Use this after you already have a stable pitch source. Then: - modulate Fall slowly for phrase movement - use envelope on offset for attack harmonics - use sequencer row or random CV to change harmonic density per note

This is one of the most useful “make melody more alive” patches in the manual.

---

6. Build tracked doubled voices with the PLL patches

The manual includes three especially melodic PLL applications.

Phase locked loop: VCO tracking

Patch: - main sequenced VCO into Cosmos - second VCO into Cosmos - Inv. TZ clip out through slew/filter - back into FM or V/oct of second VCO

Musical result

A second oscillator **locks and tracks** the main one over a few octaves. The result is described as close to **PWM-like** tonal behavior.

Why this is excellent for melody

This gives you a melodic voice with: - stable note relationship - moving phase interaction - sync-like complexity - richer harmonics than simple detune

Best use cases

- dual-osc lead
- thicker melody line
- animated bass doubling
- pseudo-sync solo timbre

Phase locked loop: looping envelope

This is one of the coolest melodic tricks in the manual.

A **looping envelope** becomes an audio-rate oscillator and is made to **track a VCO** through the same PLL idea.

Musical use

This lets you create a second voice with a very different shape than a normal VCO: - buzzy - snappy - envelope-shaped - sync-sweep capable

This is especially good for: - expressive melodic leads - unusual paired voices - bright top layer above a root oscillator

---

Phase locked loop: external tracking

An external audio source can drive the tracking behavior: - guitar - synth - voice

Melodic implications

If you feed a simple pitched source, Cosmos can help create **resynthesized melodic doubling**. This is useful if you want: - voice-controlled synth melody - guitar-doubled melodic line - pitched external sound converted into modular melody material

---

7. Use comparators to derive melodic structure from pitch CV

Cosmos is great at creating gates from voltages.

Comparator

The **OR gate** acts as an **over-zero comparator**. Offset the source first, and you can define a threshold.

Melodic uses

Feed in: - sequencer CV - quantized pitch CV - LFO - envelope

Then generate a gate when the signal exceeds a chosen level.

Why this is musically useful

You can create: - note accents only on higher notes - transposition-dependent triggers - phrase changes when pitch passes a threshold - melody-conditioned gate routing

Example: - Sequencer pitch CV to comparator - Threshold set so only upper half of melody opens a second VCA - Result: higher notes gain a second oscillator or more brightness

That is a very musical patch.

Window comparator

The window comparator gives a gate when a signal lies **within a range**.

Melodic uses

Apply it to pitch CV or sequencer output: - only notes near a selected register trigger an event - create a gate when melody hits a chosen pitch zone - use very narrow width as an approximate “equal note” detector

Great musical applications

- Add vibrato only for notes in a chosen range
- Trigger a secondary envelope only on certain notes
- Send a harmony layer only when melody lands near target voltage
- Create a repeating motif emphasis from continuous CV

This is one of the most composition-friendly features in the manual.

---

8. Build melodic rhythms with random gates

Random Gates

This patch uses: - a clock into X - buffered clock to trigger random sample & hold - S&H voltage into Y through offset - XOR and AND outputs become randomly alternating rhythms

Why this helps melody

Melody is not just pitch; it is also **when notes happen**. This patch gives you: - probabilistic note triggers - A/B trigger routing - dynamic phrase generation

How to use melodically

Route the different outputs to: - different envelopes on the same voice - two different VCAs - separate quantizers or sequential switches - different transposition events

Example: - XOR triggers bass notes - AND triggers higher accent notes - OR trigger clocks a transposition or ornament

Now Cosmos is creating **melodic phrasing logic**, not just rhythm.

---

9. Double clocks and triggers for ornamented melodies

Clock multiplier with swing

Mix **OR and NOR triggers** from a pulse source to get doubled timing with adjustable swing.

Trigger multiplier with delay

Send a trigger through slew, then mix edge-derived triggers for a doubled trigger stream with controllable delay.

Melodic uses

These are very good for: - ratchets - grace notes - repeated note ornaments - off-beat melodic echoes - arpeggio enrichment

Example patch

- Main sequencer clock to Cosmos
- Doubled/swinged triggers clock an envelope or strike a LPG
- Pitch stays steady while trigger density increases

Or: - Use original clock for pitch advance - Use doubled trigger stream to retrigger envelope between steps - Result: repeated notes from one pitch step

That is a classic way to make melodies feel more alive.

---

10. Use envelope utilities to shape melodic phrasing

Envelope to LFO

An envelope can self-loop by retriggering from the **NOR gate**.

Melodic use

Create a tempo-related modulation source for: - vibrato - PWM - wave-shaping animation - pitch wobble - filter movement tied to phrase behavior

---

Envelope combiner

Patch two envelopes into Cosmos and use **MIN** and **MAX** outputs as combined envelopes.

Why this matters for melody

Better melodic articulation often comes from more interesting amplitude/filter contours than from pitch alone.

Musical uses

- Short attack envelope + longer slewed gate = ADSR-like contour
- Two different attacks = double-hit or “clap-like” articulation
- Decay envelope + fast LFO = burst-like ornament envelope

Use these envelopes to control: - VCA - filter cutoff - wave-shaping depth - PWM amount - FM depth

This is a strong way to make a melody feel “played” rather than just sequenced.

---

11. Use envelope follower for audio-driven melody behavior

Envelope follower

Audio into X, inverted version into Y, MAX to slew = a CV following audio dynamics.

Melodic applications

If another performer or sound source exists, you can derive expressive control to influence melody: - vocalist amplitude opens VCA on a melodic synth - guitar dynamics increase harmonic shaping - drum loop envelope transposes or accents melody

This is indirect melody generation, but very musical.

Best ways to use Cosmos with other modules for melodic music

The manual repeatedly points to two especially important companion module types:

1. Slew limiter

Essential with Cosmos for: - oscillator frequency control - feedback loop timing - trigger delay - smoothing extracted CV - PLL tuning - envelope following

For melody, a slew becomes: - glide - oscillator core control - rhythm ornament timing - phrase smoothing

2. Offset / attenuator / attenuverter

Essential for: - setting comparator thresholds - pulse width position - harmonic shaper depth - window comparator range - manual melodic bias - CV scaling

For melody, offset is what makes Cosmos behave compositionally instead of just reactively.

Practical melodic patch recipes

Patch 1: One-VCO melodic lead with octave shimmer

Use: - VCO triangle out - Cosmos triangle-to-+1 octave patch - Mix original + octave-up - Envelope to VCA - Optional offset modulation for sync-like brightness

Result: - a compact lead voice with natural top-end lift

Patch 2: PWM bass voice from a triangle oscillator

Use: - sequenced VCO triangle into offset into Cosmos - OR gate output as pulse voice - slow LFO or envelope to offset CV - lowpass filter + VCA

Result: - animated bass with stable pitch and moving harmonics

---

Patch 3: Melody-conditioned accent layer

Use: - quantized pitch CV into comparator - threshold set so only high notes produce gate - gate opens second VCA or extra oscillator layer

Result: - automatic accents only on high notes of the melody

Patch 4: Note-zone triggered harmony

Use: - sequencer CV into window comparator - when melody enters chosen voltage range, trigger: - transposition - second envelope - second oscillator VCA - wave-shaper depth

Result: - specific notes or ranges in the melody get harmonic decoration

---

Patch 5: PLL dual-oscillator solo voice

Use: - master VCO from sequencer - second VCO through PLL tracking patch - slight slew tuning - mix the two voices

Result: - thick, animated lead with sync/PWM-like behavior

Patch 6: Random melodic phrasing engine

Use: - master clock into random gates patch - XOR triggers main envelope - AND triggers accent envelope - OR trigger clocks a transposition event or ornament

Result: - repeating but non-static melody phrasing

Patch 7: Ornament generator

Use: - trigger multiplier with delay - original sequencer trigger advances pitch - multiplied trigger retriggers same pitch before next step

Result: - grace notes, ratchets, repeated-note ornaments

Patch 8: Audio-reactive melodic voice

Use: - external audio to envelope follower - follower controls: - harmonic shaper amount - VCA level - filter cutoff - comparator threshold

Result: - melody line dynamically follows another performer or sound source

---

Strongest melodic features in Cosmos

If your goal is specifically melodic music, the most valuable features from the manual are:

1. **Triangle to +1 octave VCO**
2. **Triangle/saw to variable pulse width**
3. **PLL VCO tracking**
4. **Harmonic wave shaper**
5. **Comparator / window comparator**
6. **Random gates**
7. **Clock multiplier with swing**
8. **Trigger multiplier with delay**
9. **Envelope combiner**

Together, these cover: - pitch generation - harmonic layering - note-dependent events - melodic ornamentation - phrase variation

---

Suggested small-system melodic setup around Cosmos

If building a compact melodic rig with Cosmos, pair it with:

- **1 stable VCO**
- **1 slew limiter**
- **1 offset/attenuverter**
- **1 envelope**
- **1 VCA**
- **1 filter**
- **1 mixer**
- **1 random source / S&H**
- **1 sequencer or quantized CV source**

With just that, Cosmos can supply: - extra oscillator behavior - octave doubling - PWM derivation - comparators - rhythmic phrase logic - harmonic animation - melodic trigger processing

---

Summary

Cosmos is best thought of as a **melodic analog processor and patch-programmable music logic core**.

It helps create melodic components by letting you:

- derive **new pitched voices** from existing ones
- add **octaves, pulse versions, and sync-like harmonics**
- make **dual-oscillator tracked textures**
- create **note-conditioned gates** with comparators
- generate **probabilistic note rhythms**
- add **swing, retriggers, ratchets, and delayed ornaments**
- shape phrasing with **combined envelopes and audio-following control**

In a melodic Eurorack patch, Cosmos is not usually the “main sequencer,” but it can absolutely become the **main intelligence that turns simple pitch and timing into expressive musical structure**.
