

El Rico Loco

FourierSynth P10A

English user manual
Fourier / additive synthesizer with
sample resynthesis

Phase 10A
VST3 instrument
Windows 64-bit
Bitwig Studio



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Quick start

FourierSynth builds a sound from up to 128 harmonics. Create two spectra, Fourier A and Fourier B, then blend continuously between them with Morph. Shape the result with envelopes, filter, LFO, unison and glide. The analyser can convert a WAV or AIFF sample into harmonic and phase information.

Installation

- Place FourierSynthP10A.vst3 in C:\Program Files\Common Files\VST3.
- Restart Bitwig or rescan the plug-in locations.
- Add FourierSynthP10A as an instrument on an Instrument Track.
- Select the required MIDI input and play a note.

Your first sound in six steps

- Choose a factory patch, for example 01 Warm Foundation.
- Choose one spectrum for Fourier A and another for Fourier B.
- Drag in both harmonic displays to edit individual partials.
- Turn Morph from 0 to 1 and listen to the transition.
- Set Amp Env and Filter, then add LFO and Unison if required.
- Enter a name and use SAVE+ to store your own patch.

Start with Master near 0.25. Unison and high resonance can raise the output level considerably.

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Interface overview

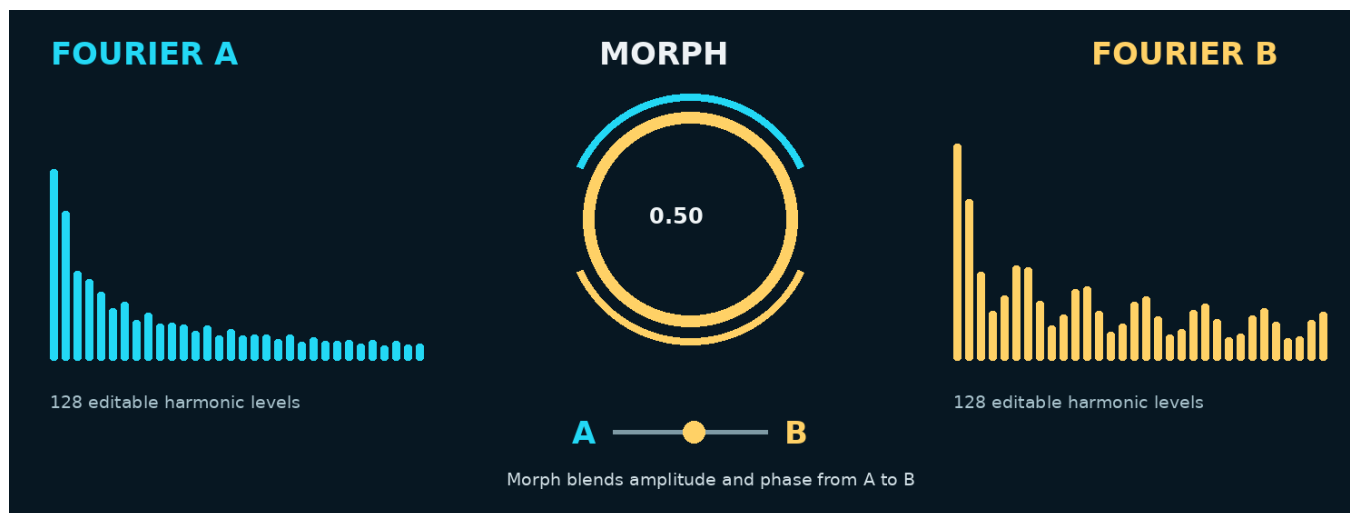


The image shows the module layout. The Phase 10A header additionally contains Patch, SAVE, SAVE+, DELETE and ANALYZE.

1 Fourier A	2 Morph	3 Fourier B	4 Waveform	5 Amp Env	6 Filter
7 Filter Env	8 LFO	9 Unison	10 Glide / Voice	11 Master	

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Fourier A, Fourier B and Morph



Editing harmonics

- Each bar is one harmonic: 1 is the fundamental, 2 is one octave above it, 3 is a fifth above that octave, and so on.
- Taller bars make a partial stronger. A steep roll-off usually sounds softer; many upper partials add brightness or edge.
- SINE, SAW, SQUARE and SOFT create a starting shape. CLEAR empties the spectrum; NORM scales the highest partial to maximum level.

Morph

- 0.000 uses Fourier A only; 1.000 uses Fourier B only.
- Intermediate values blend both amplitude and stored phase information.
- Target Morph with the LFO for slowly evolving pads, vowel motion and rhythmic spectra.
- The Waveform display shows the resulting periodic waveform.

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Sound shaping: envelopes and filter



Amp Env

- Attack sets how quickly the note fades in.
- Decay sets how quickly the level falls to Sustain.
- Sustain is the held level while the key remains down.
- Release sets the fade-out after the key is released.

Filter

- Low-pass keeps low frequencies; High-pass keeps high frequencies; Band-pass keeps a region around Cutoff.
- Cutoff chooses where the filter works. Resonance emphasises the area near that frequency.
- With rich spectra, start with Low-pass and lower Cutoff to tame harshness.

Filter Env

- The second ADSR moves cutoff for each played note.
- Amount sets its strength. Negative values invert the movement.
- For a pluck: short Attack, short Decay, Sustain 0 and a high positive Amount.

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Motion and performance



LFO

Choose Sine, Triangle, Square, Saw or Sample & Hold. Rate runs from 0.05 to 20 Hz. Target can be Morph, Filter, Pitch or Amplitude.

Glide

TIME sets the pitch transition between notes, up to 2 seconds. It is most obvious in the mono modes.

Unison

Voices stacks 1 to 8 voices. Detune offsets them by up to 50 cents; Spread distributes them in stereo. More voices require more CPU.

Transpose

Moves all notes up or down by as much as 24 semitones.

Voice Mode

Poly plays chords. Mono Legato keeps the envelope running for connected notes. Mono Retrig restarts the envelope.

Master

Controls the final output level. Reduce Master with many Unison voices, high resonance or very rich spectra.

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Patches and user presets

Header controls

- PATCH selects a factory patch or a saved user preset.
- SAVE overwrites the selected user preset. Factory patches remain unchanged.
- SAVE+ stores the current sound under the entered name.
- DELETE removes the selected user preset only.
- ANALYZE opens sample resynthesis.

User presets are stored as JSON in:
Documents\RicoLoco Audio\FourierSynth\Presets

20 factory patches

01 Warm Foundation	02 Slow Morph Pad
03 Glass Motion	04 Reed Lead
05 Drawbar Organ	06 Vocal A to O
07 Soft Choir	08 Bass Grawl
09 PWM-ish Motion	10 Spectral Comb
11 Dark String	12 Bright String
13 Hollow Pad	14 Fifth Garden
15 Octave Air	16 Filter Pluck
17 Random Crystal Steps	18 Nasal Lead
19 Crystal Organ	20 Breathing Spectrum

The DAW also stores the complete current plug-in state, including both spectra and phase data.

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Sample analyser: step by step



1	Click ANALYZE and load a WAV or AIFF file. Only the first 60 seconds are read.
2	Set Start and End around one clear, stable note. Avoid silence and other notes.
3	Use Detect Pitch. Check the note name and listen critically; use Auto Correct or Oct -1 / Oct +1 if the octave is wrong.
4	Choose Pitch-Sync + Phase for a stable periodic tone, or Phase A -> B to capture an early and a later state.
5	Check the result graphs and Periodic fit. Edit the bars manually if required.
6	Use Apply A + B, or send each result separately to Fourier A/B. Optionally save a user patch afterwards.

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Which analysis method should you use?

Method	What it does	Best use
Single Frame	Converts one FFT moment into 128 harmonics. Phase is not retained.	A quick snapshot and comparison.
Average Spectrum	Averages 10 FFT frames. Phase is not retained.	A steadier static tone.
Attack -> Sustain	Sends an early region to A and a later region to B.	Timbres that change from attack to sustain.
Pitch-Sync + Phase	Aligns and averages multiple cycles; retains amplitude and phase.	Organ, synth, vowel and other periodic sources.
Phase A -> B	Runs the phase-aware method at an early and a later position.	The most complete two-frame resynthesis in Phase 10A.

Good source

- One sustained note
- Little reverb or background noise
- Clear fundamental
- Stable pitch
- A selection from the sustain region

Difficult source

- Piano or drum attack
- Breath, bow or noise component
- Chords
- Strong vibrato or pitch sweep
- Inharmonic or rapidly changing sound

Periodic fit measures how well the selected period can be reconstructed as a harmonic waveform. A high score helps, but your ears remain the deciding test.

Parameter reference

Section	Parameter	Range / choices	Purpose
Tone	Morph	0.000 - 1.000	Blends Fourier A into Fourier B
Amp Env	Attack	0.001 - 10 s	Fade-in time
Amp Env	Decay	0.001 - 10 s	Decay time
Amp Env	Sustain	0 - 1	Held-note level
Amp Env	Release	0.001 - 20 s	Fade-out time
Filter	Type	Low-pass / High-pass / Band-pass	Filter character
Filter	Cutoff	20 - 20,000 Hz	Cutoff or centre frequency
Filter	Resonance	0.1 - 1.0	Emphasis near cutoff
Filter Env	A / D / S / R	0.001-10 / 0.001-10 / 0-1 / 0.001-20 s	Per-note filter movement
Filter Env	Amount	-1 - +1	Positive or inverted modulation
LFO	Wave	Sine / Triangle / Square / Saw / S and H	Modulation shape
LFO	Rate	0.05 - 20 Hz	Modulation speed
LFO	Depth	0 - 1	Modulation strength
LFO	Target	Morph / Filter / Pitch / Amplitude	Modulation destination
Voice	Transpose	-24 - +24 st	Semitone transposition
Voice	Mode	Poly / Mono Legato / Mono Retrigger	Playing mode
Voice	Glide	0 - 2 s	Pitch slide time
Unison	Voices	1 - 8	Number of stacked voices
Unison	Detune	0 - 50 ct	Pitch offset between voices
Unison	Spread	0 - 1	Stereo width
Output	Master	0 - 1	Final output level

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Practical sound recipes

Warm pad Warm Harmonics in A, Air Band in B; Morph 0.25; Attack 0.8 s; Release 3 s; Low-pass 2.5 kHz; LFO to Morph at 0.1 Hz; 5 Unison voices.	Organ Drawbar Organ in A, Octave Stack in B; Morph 0.1; short Attack and Release; Sustain near 1; little filtering; LFO to Amplitude near 6 Hz.
Expressive lead Odd Reed in A, Hollow in B; Mono Legato; Glide 0.05 s; light pitch LFO; 2 Unison voices; moderate resonance.	Filter pluck Bright Harmonics in A; Amp Sustain 0; Decay 0.4 s; low filter Cutoff; high filter Env Amount; short filter Decay.
Vowel motion Vocal A in A, Vocal O in B; slow LFO to Morph; Low-pass near 8 kHz; little resonance.	Own sample Record a clean held note, analyse with Phase A -> B, verify the fundamental, apply both spectra, then shape envelopes and filter.

Work on spectrum and Morph first, then envelopes and filter, and only then add LFO and Unison. This makes it clear which step changes the sound.

Troubleshooting and limitations

No sound	Check MIDI input, track monitoring, Master, Amp Sustain and whether at least one spectrum contains harmonics.
Plug-in is missing	Check the VST3 folder, rescan Bitwig and verify that the complete 64-bit VST3 bundle was copied.
Sound is too loud or distorted	Reduce Master, Resonance, harmonic levels or the number of Unison voices.
Analysis is one octave wrong	Use Auto Correct, Oct -1 or Oct +1 and run the analysis again.
Resynthesis does not resemble the source	Select one stable note, set the correct fundamental and use Pitch-Sync + Phase or Phase A -> B.
Saved preset is missing	Save with SAVE+ and check Documents\RicoLoco Audio\FourierSynth\Presets.

Phase 10A reconstructs at most two periodic states with 128 harmonics. Non-periodic elements such as piano hammers, breath, bow noise, drums and reverb are not fully reproduced. This is a technical limit of this version, not an analysis error.

Version: FourierSynth P10A 0.10.0 | Format: VST3 instrument | Platform: Windows 64-bit