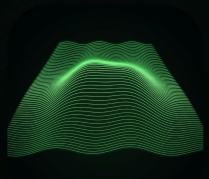
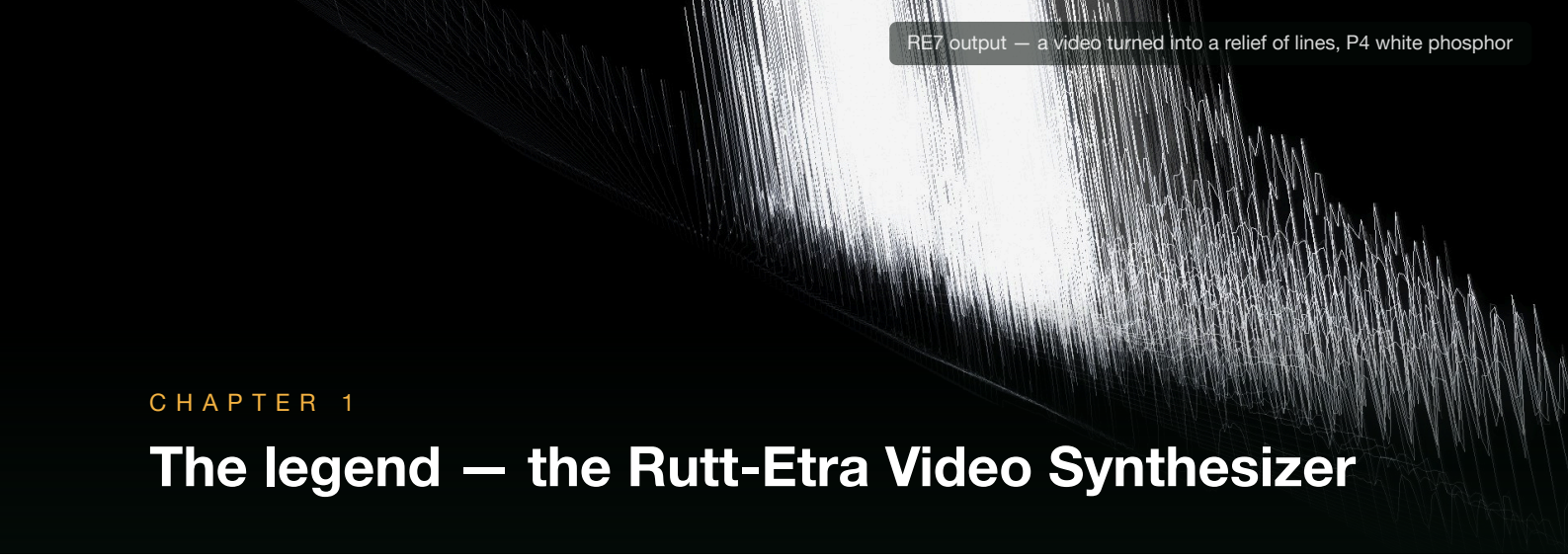
ANALOG VIDEO SYNTHESIS

RE7

The visual piano of 1973: light lifts the scan lines, live, on macOS.



BY MESCALINA — 2026



RE7 output — a video turned into a relief of lines, P4 white phosphor

CHAPTER 1

The legend — the Rutt-Etra Video Synthesizer

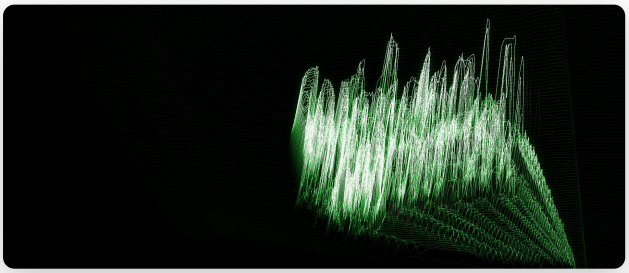
New York, 1973. Steve Rutt, an engineer, and Bill Etra, a video artist, build a machine unlike any other: an analog computer that deflects the scanning signals of a cathode-ray tube.

The principle is radically simple. A television picture is nothing but a beam sweeping the screen line after line. If you make **the beam rise in proportion to the brightness** of the point it is drawing, every scan line lifts wherever the image is bright: a face becomes a mountain range, a sky becomes a plateau, light takes on relief. Add ramps, oscillators and multipliers, and the whole picture stretches, twists, flips over, comes alive — in real time, by hand.

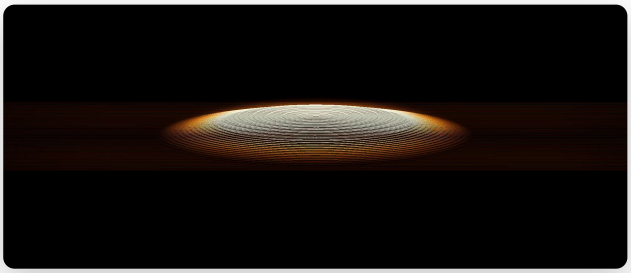
The **RE-4** manual (1974) describes a *Display Control Unit* — height and width (down to collapsing the picture into a single line or inverting it), depth, position, horizontal scroll, intensity, 0° or 90° scan — and *Animation Control Modules*: a ramp generator, an audio interface, two waveform generators, a summing amplifier to combine everything. Rutt and Etra presented it as “a visual piano”: an instrument for composing, not an effect.

Its black-and-white images, re-shot and then colorized, fed video art (Nam June Paik, Steina and Woody Vasulka, Gary Hill), television and cinema. Half a century later, these sheets of glowing lines lifted by the picture remain one of the most recognizable signatures of creative video.

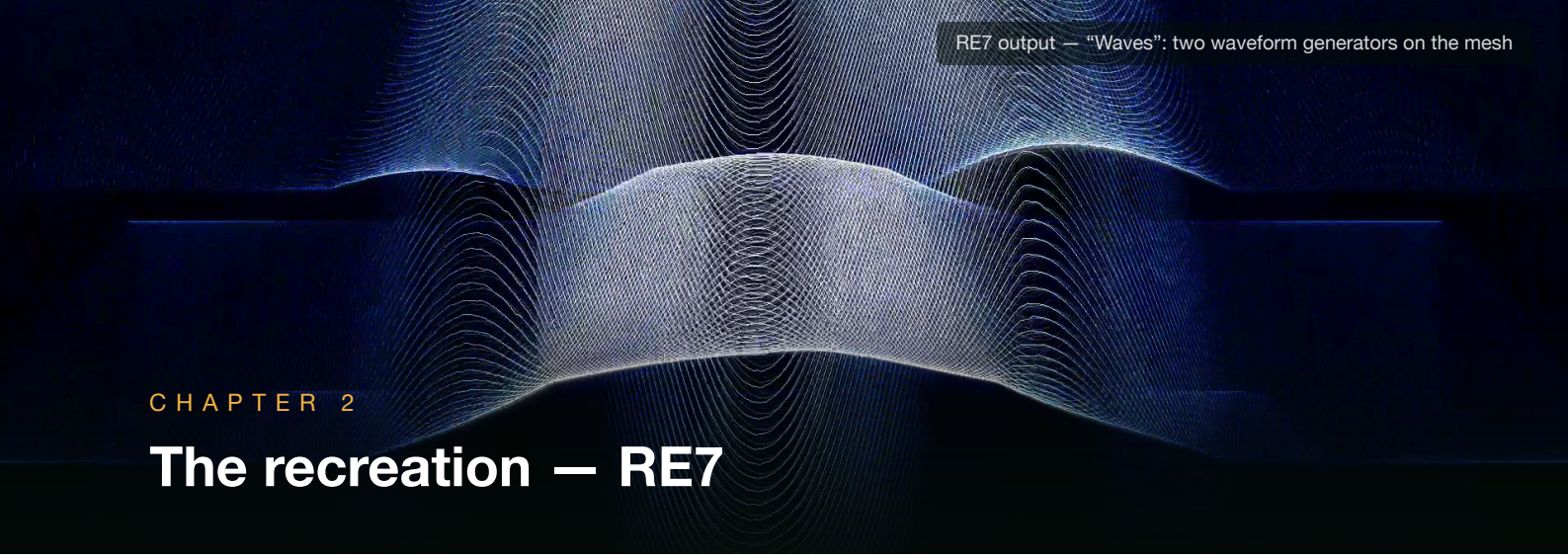
> The Rutt-Etra did not apply a filter: it *redrew* the image, line by line, with light as its only sculptor. That is the instrument RE7 brings back to life.



Classic relief on a video: luminance lifts each line and pushes it forward.



“A single line”: height brought down to zero, as the RE-4 allowed.



RE7 output — “Waves”: two waveform generators on the mesh

CHAPTER 2

The recreation — RE7

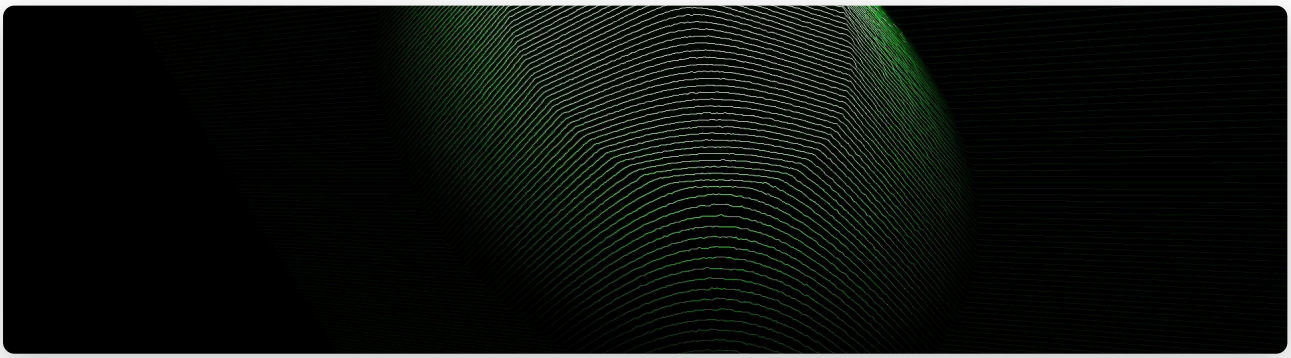
RE7 is a native macOS application (Swift + Metal) that recreates the complete instrument: the mesh of lines, the RE-4 display controls, the animation modules — and the period colorizer.

Faithful to the machine

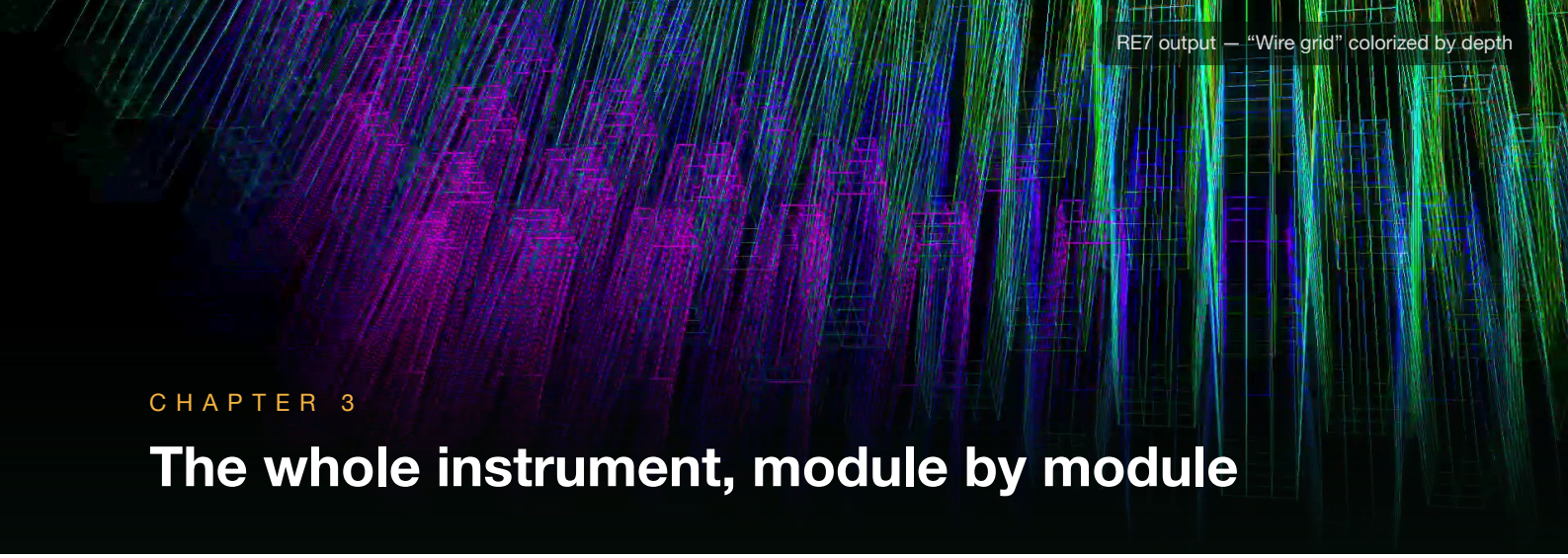
- the raster is **real geometry**: up to 720 lines of 1024 points, drawn in additive light as on a tube;
- **vertical relief** and **depth relief**: luminance lifts and pushes forward every point;
- **negative** width and height (inversion), **~0** (a single line), position, camera depth, tilts, scroll, 0°/90° — the gestures of the RE-4;
- two **waveform generators** on nine axes, a **ramp generator**, an **audio interface**;
- monochrome output, **then** colorized: the colorizer is a separate stage, as at the Videolab.

An instrument for today

- **3 LFOs** (add, multiply, replace) and **2 ramps** on any parameter;
- 8-step **sequencer** at tempo, **gestures** recorded and replayed;
- **MIDI**: Learn on every knob, one-click Korg nanoKONTROL2 mapping;
- live **REC** and deterministic **export** (H.264, ProRes);
- 13 presets, personal settings, undo, output window for a second display.



The “Classic relief” preset on the test generator's sphere pattern: 128 lines, high-angle view, green phosphor — the first image RE7 shows.



RE7 output — “Wire grid” colorized by depth

CHAPTER 3

The whole instrument, module by module

Video input
Test generator (bars, sphere, checker, ramp, text, circles), video with In/Out, image, camera; framing.

Signal
Gain, threshold, negative, intensity, base glow — the RE-4's *Intensity*.

Mesh
Lines 0° or 90°, grid, point cloud; 8 to 720 lines, 16 to 1024 points, thickness.

Relief
Vertical relief and depth relief: light sculpts the raster.

Display controls
Width, height, position, camera depth, X/Y tilts, Z and continuous rotation, scroll.

Distortions
Twist, cylinder bend, spherize — the non-linearities of the analog computer.

Waveform generators ×2
Sine, triangle, saw, square on 9 axes: X along Y, Z along X, radial, accordions, swirl, relief × wave…

LFO ×3 · Ramps ×2
Modulation of any parameter; ramps start → end, once / loop / ping-pong, curve.

Audio interface
Mic, video sound or audio file → level, bass, mids, highs → 3 routings.

Sequencer · Gestures
8 steps at tempo with glide; knob movements recorded, replayed on export.

Videolab colorizer
12 palettes by intensity or depth, bands, hue; phosphor glow and persistence.

Re-scan camera
Output format, scanlines, noise, vignette, tube curvature, gamma, background level.

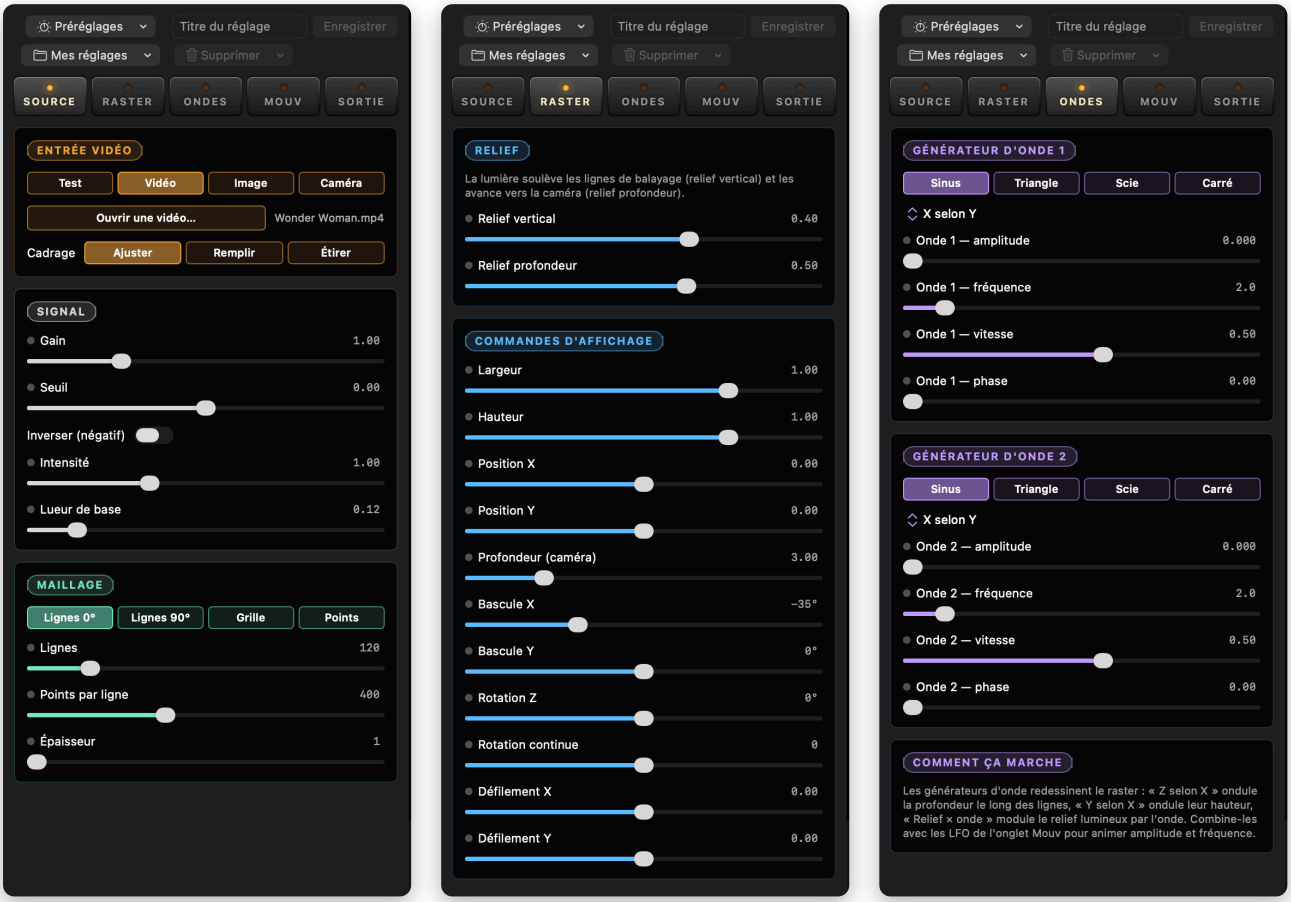
An instrument played live

- **MIDI**: Learn on the ◎ dot of every knob, actions on buttons, pickup mode, hot-plugging, **nanoKONTROL2** mapping included (faders → relief, tilts, width, height…);
- ● **REC**: the output is recorded in real time, gestures included, at a constant frame rate;
- **Export** offline, frame by frame, identical to the preview: LFOs, ramps, sequencer, gestures and audio file replayed identically; H.264 or ProRes 422/4444;
- **Output window** for a second display or OBS; **My settings** as JSON, 13 presets that keep the loaded source.

CHAPTER 4

The interface — the sidebar and the transport

On the left of the window, the **sidebar**: presets and personal settings at the top, then five tabs — **Source · Raster · Waves · Motion · Output** — grouping the instrument's modules in signal order. On the right, the Metal-rendered preview, the video timeline and the transport bar. Real screenshots below.



Tab	Modules	Role
Source	Video input · Signal · Mesh	Choose what comes in (test, video, image, camera), set gain / threshold / intensity, define the raster (orientation, number of lines and points, thickness).
Raster	Relief · Display controls · Non-linear distortions	The heart of the Rutt-Etra: vertical and depth relief, then width, height, position, camera depth, tilts, rotations, scroll; twist, bend, spherize.
Waves	Waveform generator 1 · 2	Waveform, axis, amplitude, frequency, speed, phase — two oscillators that redraw the mesh.

The transport bar



Open… video · **Image…** · **Camera** · **Play / Pause** (space) · ♪ **Audio** turns audio reactivity on · ● **REC** records the output · **Export…** offline render · **Output** opens the output window · **MIDI** · ↶ ↷ undo / redo · **Reset** flat raster · **About**. Above it, the timeline with the **[In** and **Out]** points that bound the loop and the export.

Animate and colorize





Motion — the animation modules

LFO 1-3: On, target (any knob), sine / triangle / square / random shape, *Add*, *Multiply* or *Replace* mode, speed (Hz), depth.

Ramp 1-2: target, start and end (fraction of the range), duration, once / loop / ping-pong, curve; *Trigger* from the button or MIDI.

Audio interface: mic, video sound or audio file (mp3, m4a, wav…), sensitivity, four meters, three routings level / bass / mids / highs → target, in add or multiply mode.

Step sequencer: eight stored steps (Store / Recall), BPM, beats per step, glide.

Gestures: ● Record the knob movements, looped replay, JSON files.

Output — the Videolab and the re-scan camera

Colorizer (Videolab): 12 palettes — Green phosphor, P4 white, Amber, Blue, Chrome, Rainbow, Neon, Fire, Ice, Peacock, Purple, TV pastel — applied by the mesh's *Intensity* or *Depth*; bands, hue, hue rotation, saturation, brightness.

Phosphor: glow and its radius, persistence of previous frames, echo zoom and hue.

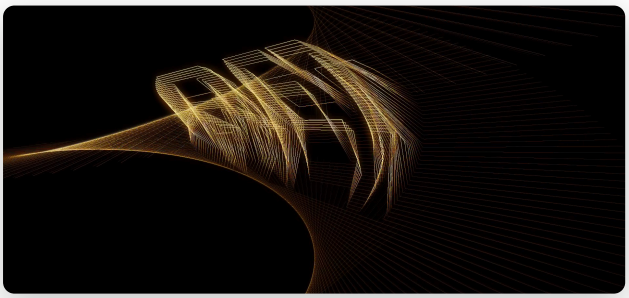
Re-scan camera: output format (1080p, 720p, 4:3, PAL, NTSC, square, vertical), scanlines, noise, vignette, tube curvature, gamma, background level.

Conventions: dragging a knob sets the value; **double-click the label** = default value; **click the number** = keyboard entry; the ◎ dot = MIDI Learn. All screenshots are rendered by the application itself.

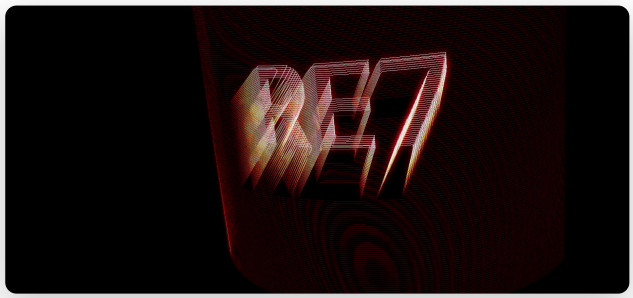
CHAPTER 5

Technical sheet

Item	Detail
Platform	macOS 14+ (Apple Silicon and Intel), native application. English interface, French available
Licence	Personal licence key (one per application), received by e-mail after purchase and entered once at first launch; single online activation (2 computers per key), then offline signature verification, no account
Technologies	Swift + SwiftUI, Metal rendering (instanced line mesh, 16-bit float additive blending, glow, compositor), AVFoundation, CoreMIDI
Sources	Video (In/Out, loop), image, camera, test generator (6 patterns, free text)
Raster	8 to 720 lines × 16 to 1024 points, 0° / 90° / grid / points, vertical and depth relief
Animation	2 waveform generators (9 axes), 3 LFOs, 2 ramps, 3 audio routings (mic, video, file), 8-step sequencer, gestures
Color	12-palette colorizer (intensity or depth), glow, persistence, re-scan camera
Output	1080p, 720p, 4:3, PAL, NTSC, square, vertical; second-display output window
Recording	Real-time .mov H.264, constant 25 / 30 / 50 / 60 fps
Export	Deterministic offline: master video (the file's frame rate, duration and sound, In/Out range) or generative 24 / 25 / 30 / 60 fps; H.264 3 qualities, ProRes 422 / 4444; audio file mixed in
Control	Mouse, keyboard (direct entry), MIDI Learn + pickup + actions, nanoKONTROL2 mapping
Files	Settings, gestures and MIDI mappings as JSON in `~/Library/Application Support/RE7/`
Documentation	Illustrated step-by-step tutorial (PDF)



“Twist” on the text pattern: the raster twists around the vertical axis.



“Cylinder”: the RE7 text wrapped around, colorized in fire.

> RE7 joins **Sandin FX**, **SCAN7**, **Q5K** and **PB7**: five By Mescalina instruments that bring back to life the founding machines of creative video, from the analog laboratory of the 70s to the digital control room of the 80s.

Visuals: real outputs computed by the RE7 engine. RE7 — By Mescalina, 2026.