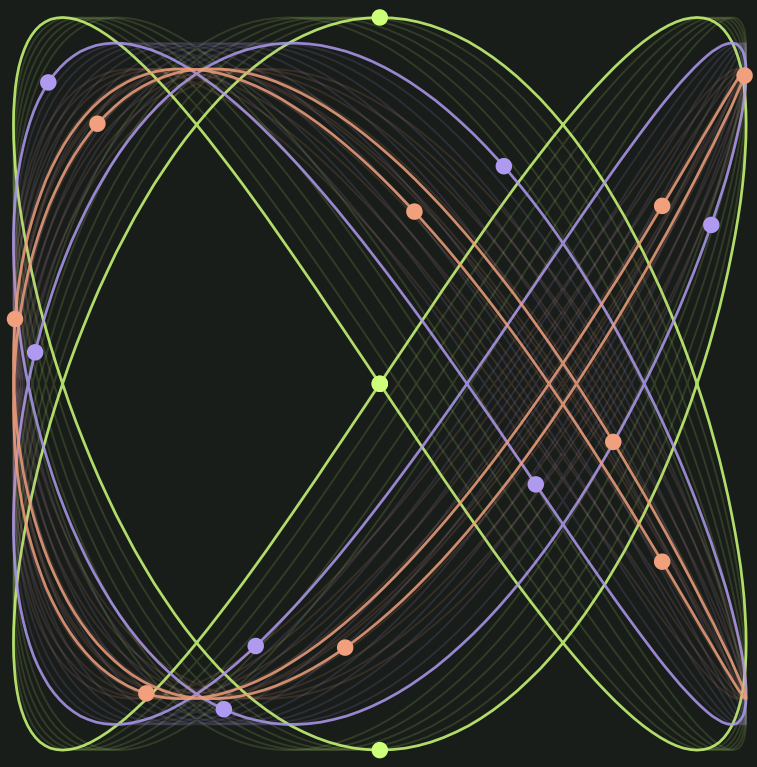


Órbita

a generative instrument · FM synthesis, euclidean rhythms, phase plots

USER MANUAL · WEB · VST3 · AU · M-VAVE FM-1

ENGLISH EDITION

Dark Funk Durcal design · built at **POLARIS SOUND LAB** · Mérida, Yucatán, México · ♥ DONATE

Instagram @polaris.sound.lab · YouTube @PolarisSoundLab · drophlex.github.io/ORBITA

WELCOME

Music drawn by orbits.

ÓRBITA is a small generative instrument. Three FM voices — a sub bass, a prism and a crystal — play euclidean rhythms over a scale, and the screen draws each voice as a curve in the phase plane: every note you hear is a point on its orbit. Change the density, the phase or the FM ratio and both the sound and the figure change together.

WEB

Open it and press Play. Computer or phone, nothing to install. drophlex.github.io/ORBITA

VST3 · AU

An FM instrument for Ableton Live on Mac (Apple Silicon and Intel) that follows Live's transport.

FM-1

32 voices installed in one click, and four MIDI scenes, for the M-VAVE FM-1.

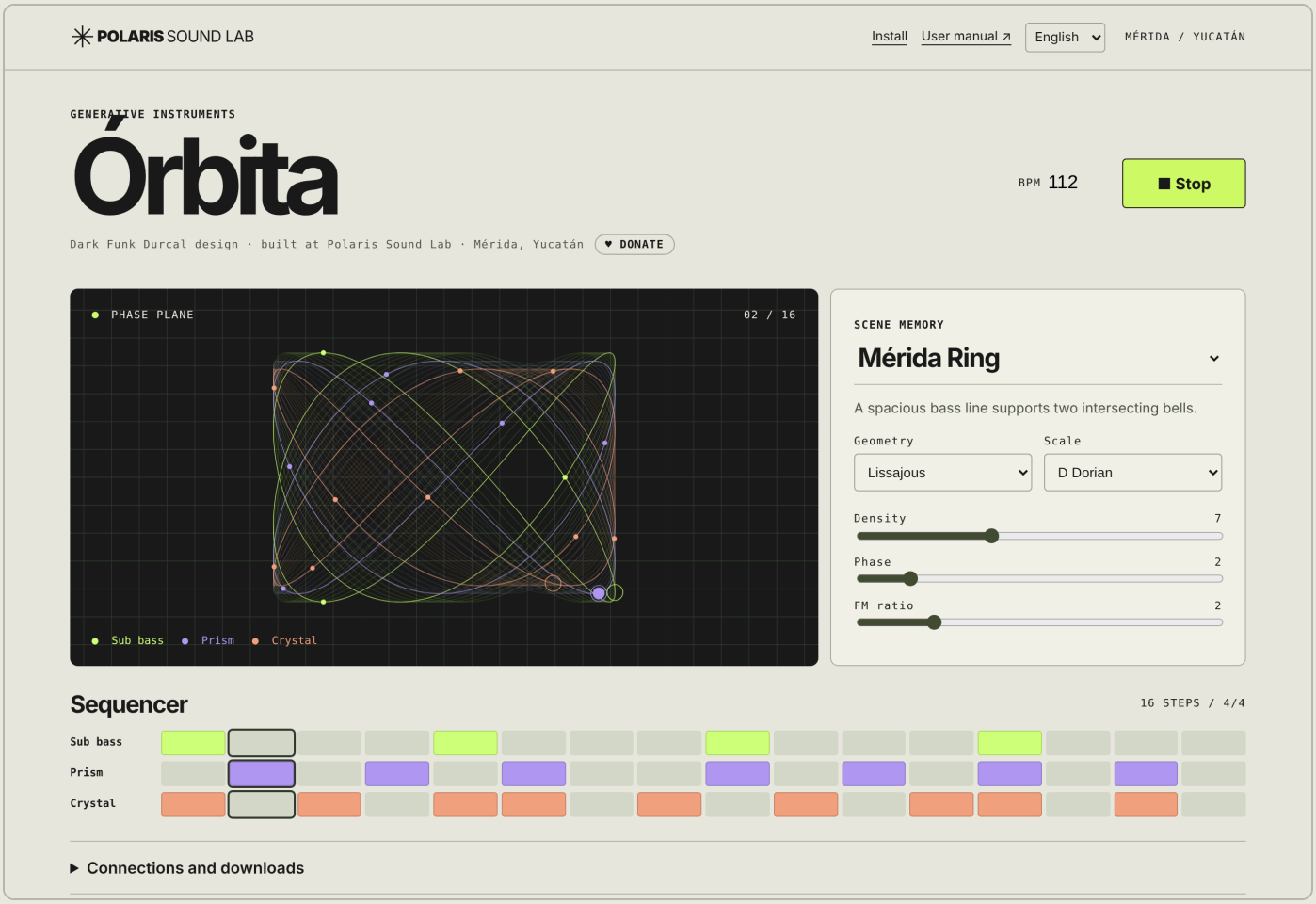
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10. FM-1 edition: install
11. The 32 voices and 4 scenes
12. The fm1-dock module
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14. Problems and answers
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> Everything is free and open source. Downloads, updates and the step-by-step install guide: drophlex.github.io/ORBITA/guide.

01 · QUICK START

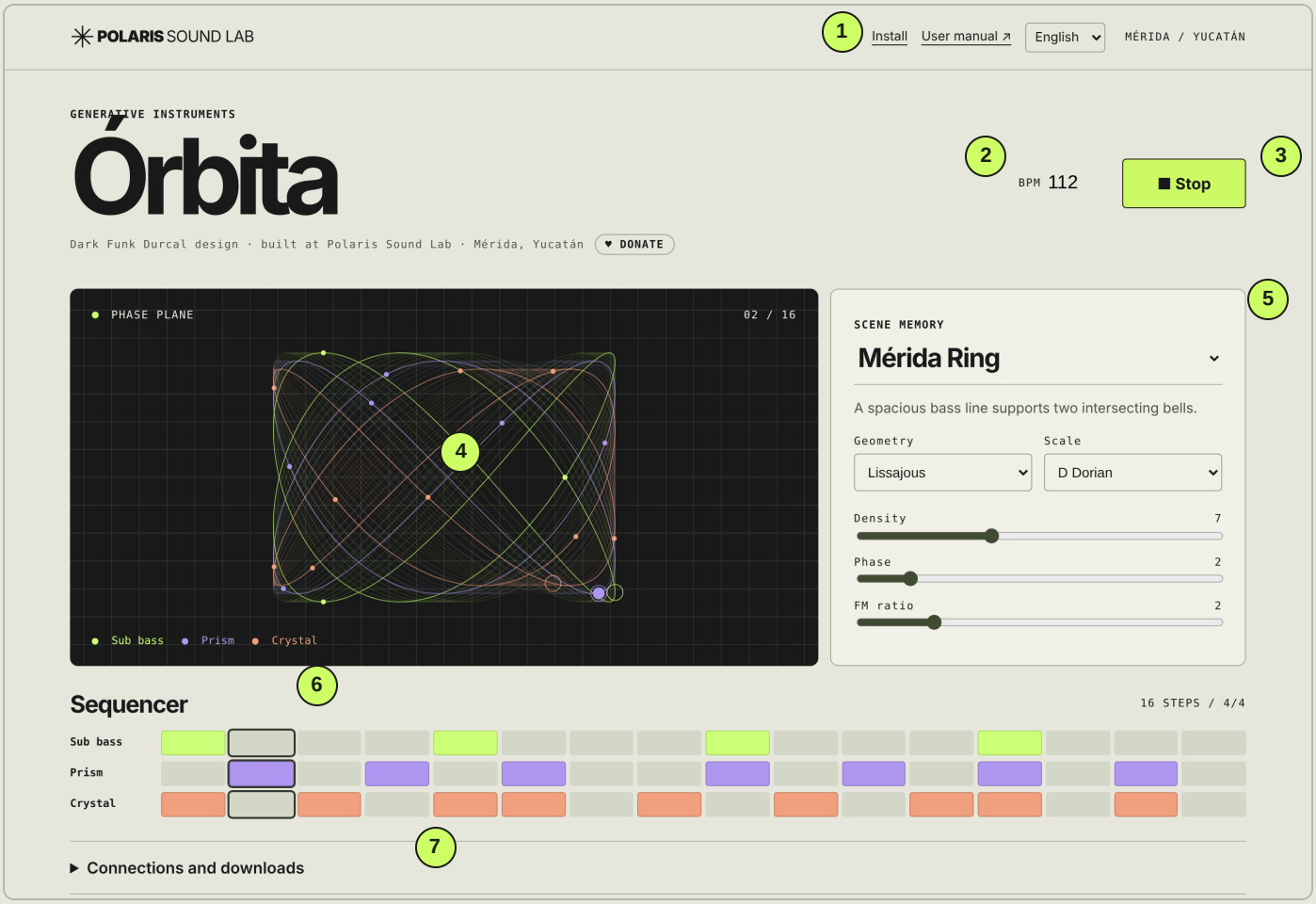
Sound in one minute



1. Open drophlex.github.io/ORBITA in Chrome, Edge, Safari or Firefox and press **▶ Play**.
2. Listen to a full cycle of **Mérida Ring**: a spacious bass and two bells crossing each other.
3. Tap **Prism** in the sequencer to mute it; tap again to bring it back when the bass comes in.
4. Move **FM ratio** from 2 to 3.5: the bells turn metallic and the orbits twist.
5. Pick another **scene**. Each one sets tempo, geometry, scale, density, phase and ratio at once.

> **Tip** The language switch (English / Español) is in the top bar; the web remembers it, and the manual link opens the matching edition.

Everything on one page

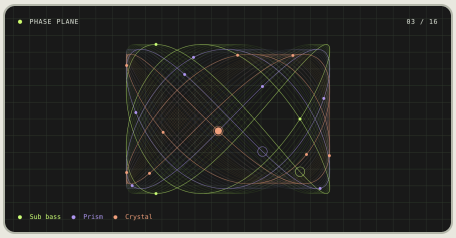


#	PART	WHAT IT DOES
1	Top bar	Install guide, user manual, language.
2	BPM	Tempo, 40–220. Type a value and press Return.
3	Play / Stop	Starts and stops the three voices.
4	Phase plane	The three orbits, the notes as dots, the step counter (01 / 16).
5	Scene memory	Scene, geometry, scale and the three sliders.
6	Sequencer	16 steps × 3 voices; tap a name to mute.
7	Connections and downloads	MIDI output, FM-1, MIDI clip, plug-in and FM-1 downloads.

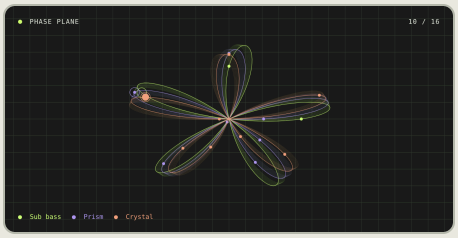
> On a phone the screen stacks: the phase plane on top, then the scene panel, then the sequencer.

Three geometries

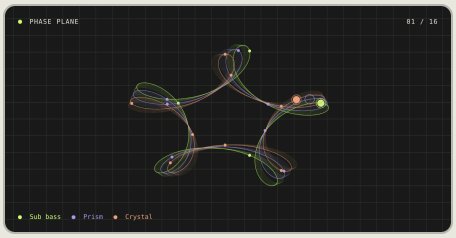
Each voice is a curve; its sixteen steps are sixteen points along it, and the hits are the coloured dots. While it plays, a ring marks the step sounding now. The faint copies around each curve open up as the **FM ratio** grows; a muted voice fades out of the picture.



Lissajous · x = sin(2t + φ), y = sin(3t)



Polar rose · r = cos(5t + φ)



Epicycle · a circle riding a circle

Geometry does more than draw: it is also how the melody is chosen. For every step, the height of the curve picks a degree of the scale — so the same rhythm sings a different line on a Lissajous, a rose or an epicycle. The **Phase** slider turns the figure and shifts where the notes fall.

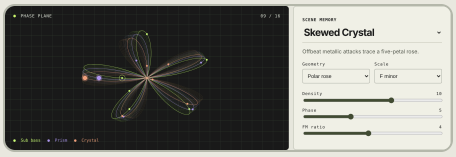
GEOMETRY	SHAPE OF THE LINE	GOOD FOR
Lissajous	Wide arcs up and down	Bass lines that breathe, calm scenes
Polar rose	Jumps to the centre and back	Off-beat bells, syncopation
Epicycle	Small turns inside a big circle	Arpeggios, dense patterns

04 · SCENES

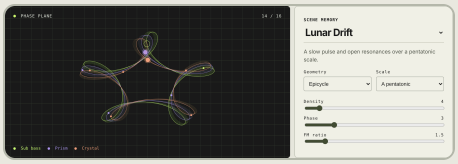
Four starting points

A scene is a memory: choosing one sets the tempo, the geometry, the scale and the three sliders, and un-mutes every voice. Then change anything — the scene is only where you start.

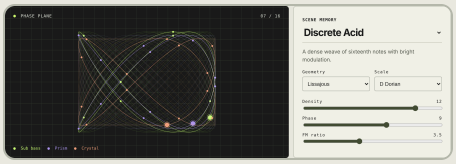
SCENE	BPM	GEOMETRY	SCALE	DENSITY	PHASE	FM RATIO	CHARACTER
Mérida Ring	112	Lissajous	D Dorian	7	2	2	A spacious bass line supports two intersecting bells.
Skewed Crystal	136	Polar rose	F minor	10	5	4	Offbeat metallic attacks trace a five-petal rose.
Lunar Drift	74	Epicycle	A pentatonic	4	3	1.5	A slow pulse and open resonances over a pentatonic scale.
Discrete Acid	148	Lissajous	D Dorian	12	9	3.5	A dense weave of sixteenth notes with bright modulation.



Skewed Crystal

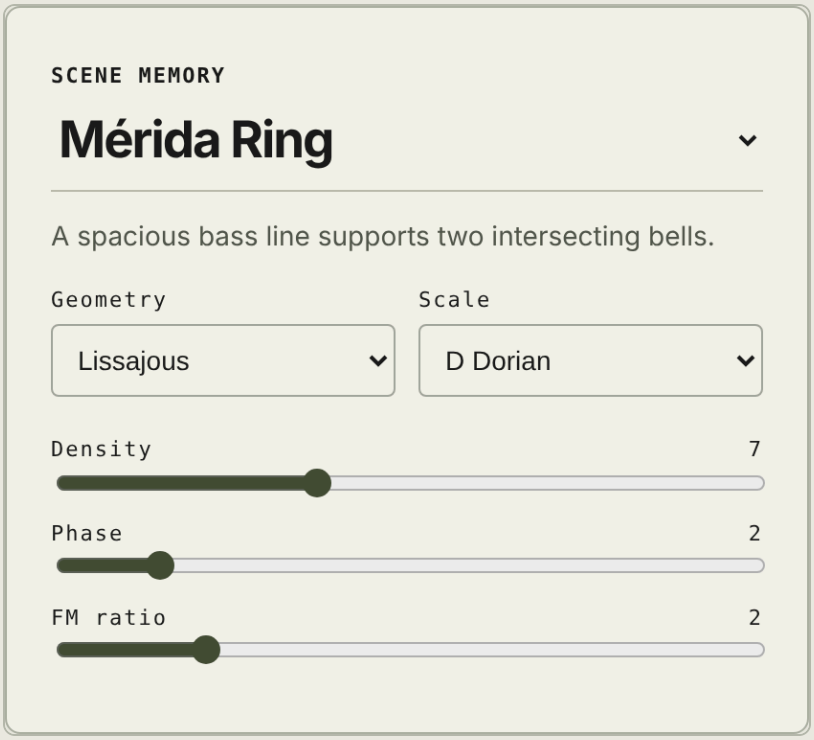


Lunar Drift



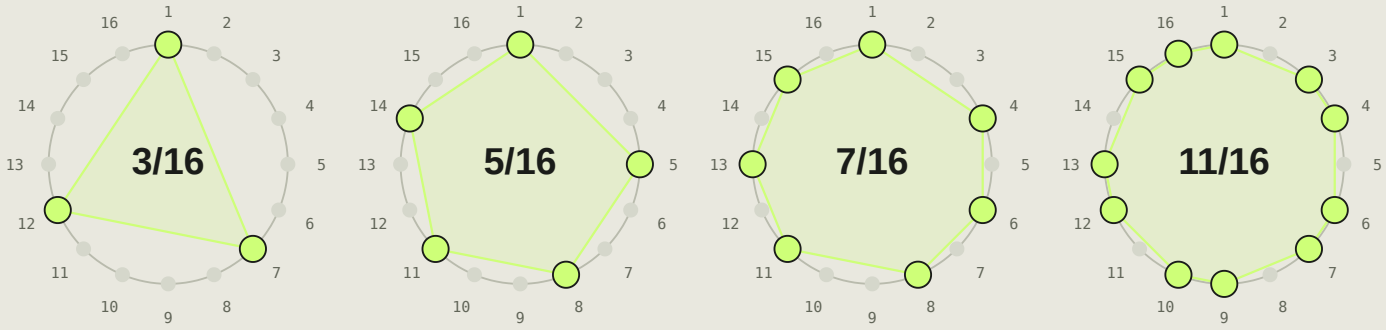
Discrete Acid

Density, phase, FM ratio



Density (3–14): euclidean rhythms

Density spreads that many hits as evenly as possible over the 16 steps — the euclidean rhythms found in music all over the world. The three voices take different amounts: the **sub bass** three fewer, the **prism** exactly the density, the **crystal** two more, so they interlock instead of doubling.



Phase (0–15): rotation

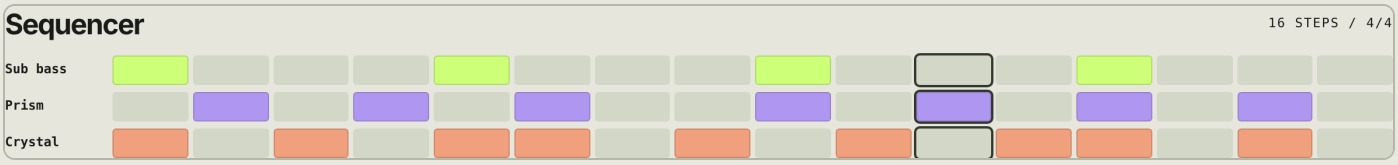
Phase rotates each voice's pattern by a different amount (none for the sub bass, once for the prism, twice for the crystal) and turns the figure. Small changes move the accents off the beat; big ones make a new groove from the same hits.

FM ratio (0.5–8): the colour

The modulator runs at the note's frequency times the ratio. Whole numbers (1, 2, 3, 4) give harmonic, warm tones; halves (1.5, 2.5, 3.5) give hollow, bell-like or metallic tones. The higher the ratio, the brighter the attack.

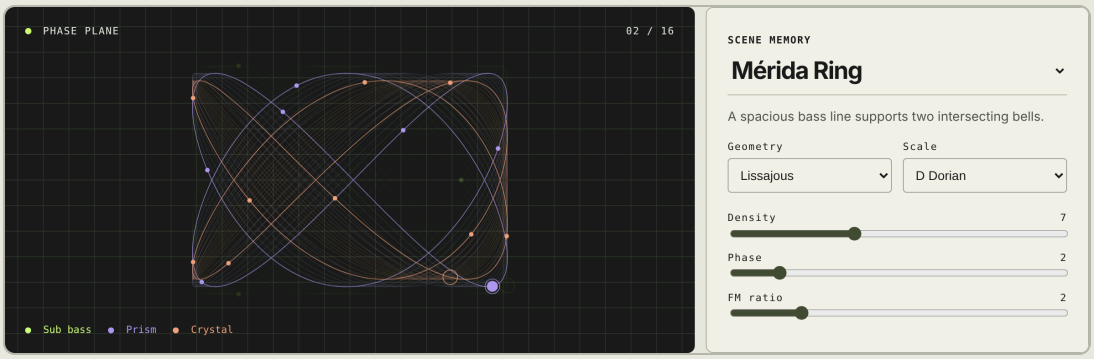
06 · SEQUENCER

Three voices, sixteen steps



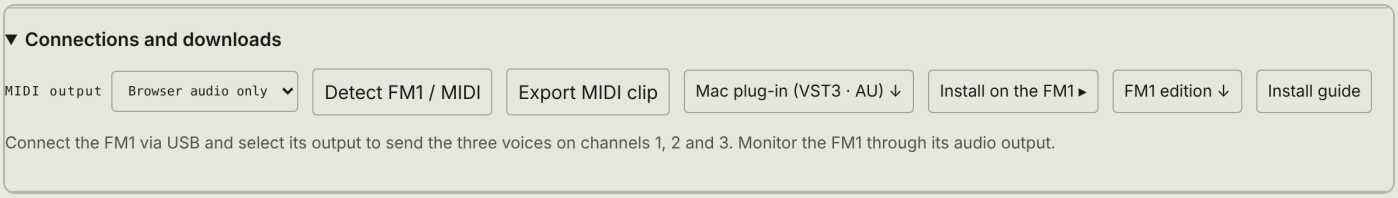
VOICE	COLOUR	REGISTER	SOUND	HITS
Sub bass	lime	the root octave	soft FM, short tail	density − 3
Prism	violet	one octave up	bright FM, medium tail	density
Crystal	coral	two octaves up	glassy FM, long tail	density + 2

The highlighted column is the step playing now. Tap a voice's **name** to mute it or bring it back; muted voices dim in the sequencer and in the phase plane. Arrangements come from muting and un-muting while it plays: start with the crystal alone, add the prism, drop in the bass.



Sub bass muted: its orbit fades.

Take it out of the browser



Export MIDI clip

Saves one bar of what is playing (muted voices left out) as a standard MIDI file with the tempo: the sub bass on channel 1, the prism on 2, the crystal on 3. Drop it in Ableton Live or any DAW and loop it.

Play your FM-1 (or any MIDI synth) from the web

1. Use Chrome or Edge (they have Web MIDI). Connect the FM-1 with a USB **data** cable.
2. Open **Connections and downloads** and press **Detect FM1 / MIDI**; allow MIDI when the browser asks.
3. Choose the FM-1 under **MIDI output** and press Play: the three voices go out on channels 1, 2 and 3, and the browser goes quiet. Listen from the FM-1's own output.

> **Tip** Load ÓRBITA's own voices on the FM-1 first (page 12): ORSUB on track 1, ORBELL or ORKEY on track 2, ORHALO on track 3.

"Browser audio only" sends nothing out. If no output appears, check the cable (many USB cables only charge) and reload the page.

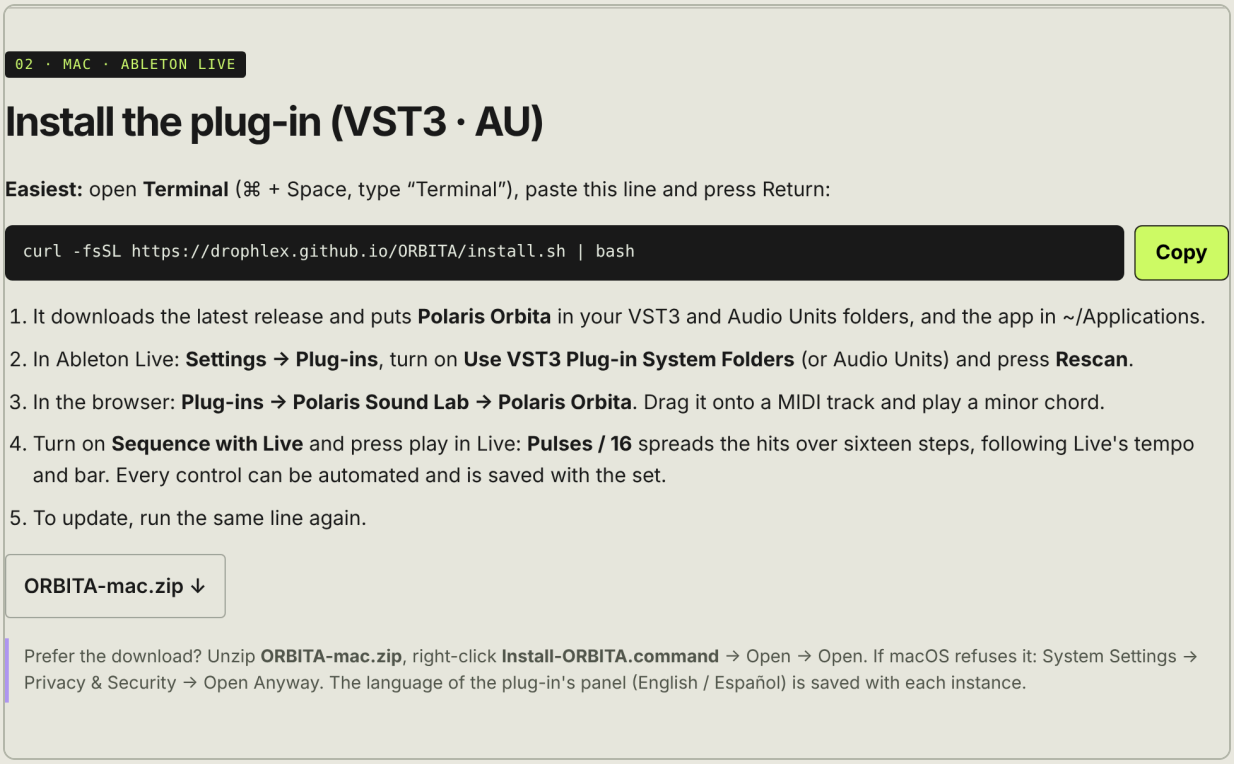
Install in one line

For Ableton Live (or Logic, Bitwig, Reaper…) on a Mac with Apple Silicon or Intel, macOS 11 or later.

1. Open **Terminal**: ⌘ + Space, type “Terminal”, Return.
2. Paste this line and press Return:

```
curl -fsSL https://drophlex.github.io/ORBITA/install.sh | bash
```

3. It installs **Polaris Orbita** as VST3 and Audio Unit in your user plug-in folders, and the standalone app in ~/Applications.
4. Ableton Live → **Settings → Plug-ins** → turn on **Use VST3 Plug-in System Folders** (or Audio Units) → **Rescan**.

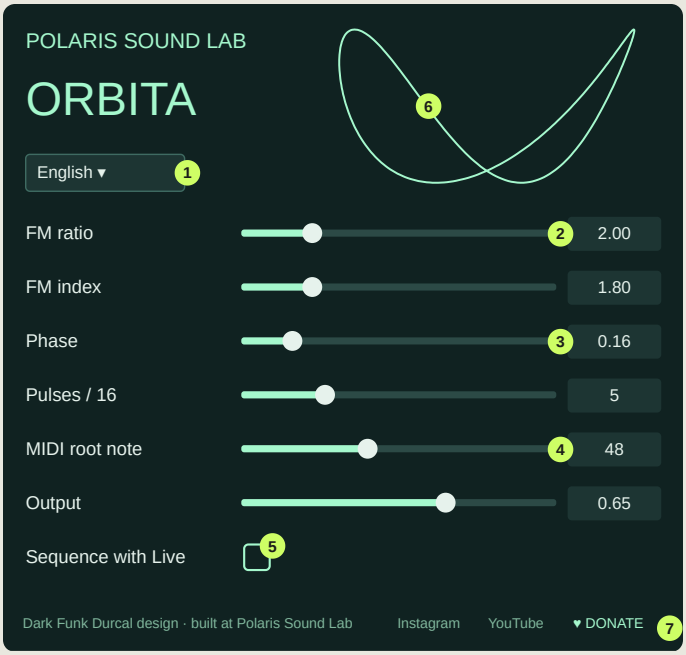


The install guide on the web has the same line with a Copy button.

Without Terminal

Download **ORBITA-mac.zip** from the latest release, unzip it, right-click **Install-ORBITA.command** → Open → Open. If macOS refuses: System Settings → Privacy & Security → Open Anyway. To update, run the line or the installer again.

An FM instrument that follows Live



The panel (diagram drawn from its layout).

#	CONTROL	RANGE
1	Language	English / Español
2	FM ratio	0.25 – 8 · 2
	FM index	0 – 8 · 1.8
3	Phase	0 – 1 · 0.16
	Pulses / 16	1 – 16 · 5
4	MIDI root note	24 – 84 · 48
	Output	0 – 1 · 0.65
5	Sequence with Live	on / off
6	Figure	follows ratio, index, phase
7	Links	credits · donate

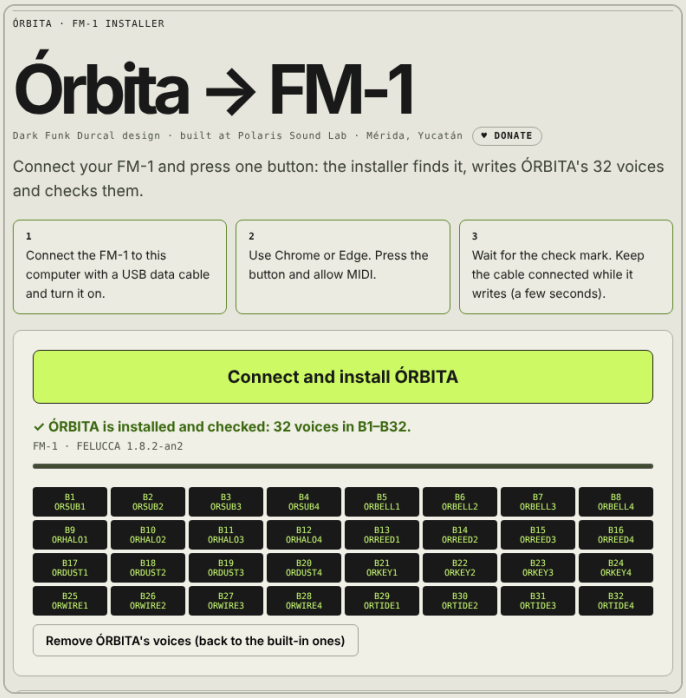
1. Drag **Plug-ins → Polaris Sound Lab → Polaris Orbita** onto a MIDI track. Play a minor chord: 12 voices of two-operator FM.
2. Raise **FM index** for more partials; move **FM ratio** from 2 to 2.37 to go from harmonic to metallic; automate **Phase** to slide the modulator.
3. Turn on **Sequence with Live** and press play in Live: **Pulses / 16** spreads that many hits over sixteen sixteenths (5 pulses: steps 1, 5, 8, 11, 14), on a minor pentatonic phrase from the **root note**. It follows Live's tempo, bar and jumps.

Tip Every control is a Live parameter: show automation (A) and draw ratio sweeps, or map them to your controller. Everything is saved with the set, including the panel language.

One click: the installer

The FM-1 edition is 32 voices (plus four MIDI scenes). It is **not a firmware**: the installer only adds voices.

1. Connect the FM-1 with a USB **data** cable and turn it on.
2. Open drophlex.github.io/ORBITA/fm1 in Chrome or Edge.
3. Press **Connect and install ÓRBITA** and allow MIDI. It finds the FM-1, writes the voices, reads them back and checks all 32 names.



YOUR FM-1 RUNS	WHAT THE INSTALLER DOES	THEN
ANDROMEDA · Dark Funk Durcal · Felucca 1.4.1+	writes the FM6 voice bank B1–B32 and checks it; music, projects and presets untouched. **Remove** brings the built-in voices back	track → hold EDIT + 2nd white key (FM6) → HOME, KNOB 4 SLOT → B1…B32
official M-VAVE (V15, V16, FM1 Open)	sends the standard DX7 32-voice bank	choose on the FM-1 the bank A–D to save it in (its old voices are replaced: export them first with the Workbench to keep them)

Without the installer

ORBITA-FM1.zip (latest release) has **Orbita-32.syx** (the bank) and **voces/** (one file per voice) for the M-VAVE Workbench or any DX7 librarian, the **escenas/** MIDI clips and the manuals.

> Checked on a computer against the FM-1 firmware's own code (ANDROMEDA's): every reply, the 32 names read back, each voice loaded byte for byte and played (no clipping, no DC), and Remove. Not yet tried on a physical FM-1, nor on the official firmware — tell us how it goes.

Eight families, four variations

FAMILY	VOICES	NUMBERS	SOUND
SUB	ORSUB1 – ORSUB4	01 – 04	basses
BELL	ORBELL1 – ORBELL4	05 – 08	bells
HALO	ORHALO1 – ORHALO4	09 – 12	soft layers
REED	ORREED1 – ORREED4	13 – 16	reeds
DUST	ORDUST1 – ORDUST4	17 – 20	percussion
KEY	ORKEY1 – ORKEY4	21 – 24	electric keys
WIRE	ORWIRE1 – ORWIRE4	25 – 28	metal strings
TIDE	ORTIDE1 – ORTIDE4	29 – 32	slow pads

Each family uses three carrier/modulator pairs; its four variations change intensity, fine tuning and feedback — 1 is the gentlest, 4 the most extreme.

The scenes (MIDI clips)

CLIP	BPM	HITS / 16	TRY IT WITH
Perigeo-102.mid	102	5	ORSUB1
Isoclina-124.mid	124	7	ORKEY2
Lagrange-76.mid	76	3	ORHALO3
Sideral-138.mid	138	11	ORDUST4

Four bars of 4/4 in D minor; the rotation moves the first hit and the phrase changes degree every bar.

1. In Live: Settings → Link, Tempo & MIDI → turn on **Track** for the FM-1's MIDI output.
2. Drag a clip from **escenas** onto a MIDI track; set its **MIDI To** to the FM-1, channel 1 (the first track on Open V14).
3. Press play: the clip follows Live's tempo; its name gives the suggested BPM.

12 · FM1-DOCK

ÓRBITA on the FM-1's screen

The **modulo/orbita** folder is the source of a monophonic ÓRBITA instrument for fm1-dock, a community firmware for the FM-1 that loads instruments as modules. The screen draws a Lissajous figure that answers K1 and K3, with the sixteen steps of the pattern along the bottom.

CONTROL	WHAT IT DOES	CC
Hold a key	starts a pattern of sixteenths; the note sets the carrier, velocity the intensity	—
K1	FM ratio 1–8	20
K2	1–16 hits per cycle	21
K3	rhythmic phase 0–15 steps	22
K4	internal clock 40–200 BPM	23
EDIT	screen language: English / Español	—

For developers

1. Set up fm1-dock, its JieLi toolchain and the AC79 SDK files as its "Build it" section says.
2. Copy the **orbita** folder to **modules/orbita** in that project.
3. From its root:

   ```
   python3 tools/hbmod.py modules/orbita
   ```

   then validate **build/modules/orbita.dock** in its emulation before loading it on an instrument running that host firmware.

> Status: tested with GCC on Linux against hb_module.h (note and control events, non-silent stereo output, note release, screen bounds, pulse counts for all 256 density/rotation pairs). The JieLi build and the hardware test are still to do, so there is no ready-to-install file yet. Licence GPL-3.0-only.

Six places to start

Night drive

Lunar Drift · Epicycle · ratio 1.5 → 2.5 over a minute · mute the crystal for 4 bars, then back.

Gamelan clock

Skewed Crystal · Polar rose · density 9 · phase 6 · ratio 3.5 · 128 BPM.

Acid study

Discrete Acid · ratio 4 · then phase 0 → 15 one step per bar: the groove keeps turning.

From the web to Live

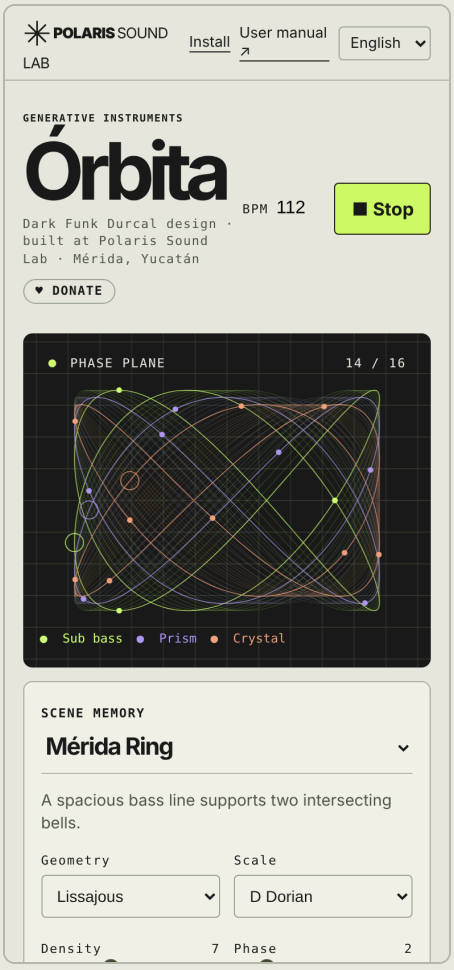
Find a figure you like, Export MIDI clip, drop it on a track with Polaris Orbita, automate FM index.

FM-1 trio

ORSUB2 on track 1, ORKEY3 on 2, ORHALO1 on 3; play the web into the FM-1 (page 9) at 102 BPM.

Live pulses

Polaris Orbita with Sequence with Live on, pulses 5, root 50; a second instance with pulses 7, root 62, ratio 3.5.



ÓRBITA on a phone: everything works with touch.

Problems and answers

No sound in the browser

Press Play once more (browsers need a tap to start audio), turn the volume up, and check that “Browser audio only” is selected as MIDI output.

The FM-1 is not listed

Use Chrome or Edge, a USB data cable, allow MIDI, then press Detect FM1 / MIDI again. Safari and Firefox on iPhone have no Web MIDI.

Live does not show the plug-in

Settings → Plug-ins → turn on Use VST3 Plug-in System Folders (or Audio Units) and Rescan. Live must be the native Apple Silicon or Intel version that matches your Mac.

macOS says the installer is from an unidentified developer

Right-click → Open → Open, or System Settings → Privacy & Security → Open Anyway. The one-line Terminal install avoids it.

Sequence with Live does nothing

It plays only while Live’s transport runs. Press play in Live; check Output is up.

The installer does not find the FM-1

Chrome or Edge on a computer, a USB data cable, the FM-1 on; close the Workbench, editors and DAWs that hold its MIDI port, reload, press again.

> Something else? Open an issue at github.com/drophlex/ORBITA/issues.

15 · CREDITS

Made in Mérida

ÓRBITA · Dark Funk Durcal design · built at **Polaris Sound Lab**, Mérida, Yucatán, México.

Follow

Instagram @polaris.sound.lab
YouTube @PolarisSoundLab

Support it

ÓRBITA is free. If it is useful to you, a small donation keeps it growing.

♥ DONATE (PayPal)

PART	LICENCE
ÓRBITA (web, plug-in, FM-1 edition, fm1-dock module)	GPL-3.0
JUCE 8 (plug-in framework)	its own terms (AGPL-3.0 / commercial)
DX7 voice format	documented by the DX7Dump project

Source, releases and issues: github.com/drophlex/ORBITA · Web: drophlex.github.io/ORBITA · Guide: drophlex.github.io/ORBITA/guide

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