

Hypna

Five-voice prime-ratio drone.

A five-voice drone instrument built on prime-ratio tuning. A fundamental and four tones sit at integer ratios whose factors come from a prime set you choose, so every interval is a just ratio. The voices are not keyboard polyphony: each has its own sustained Gate.

The output starts silent (all five gates off) at -12 dB. The device is based on a hardware drone module's algorithm, adapted with original wavetables, reverb and timing.

TUNING

```
fundamental Hz = Base Hz x 2^(Octave + Transpose / 12)
tone Hz        = fundamental Hz x numerator / denominator
```

Voice	default ratio	default frequency
Fundamental	1/1	58.270 Hz
Tone 1	21/16	76.479375 Hz
Tone 2	7/4	101.9725 Hz
Tone 3	31/16	112.898125 Hz
Tone 4	63/32	114.7190625 Hz

QUICK START

- 1 Drag Hypna onto a MIDI track. Turn a voice's **Gate** to On: gates are independent sustained switches, and MIDI notes and the transport do not trigger them.
- 2 Raise each voice's **Gain** (-40 dB is silence) and set pan on the four tones.
- 3 Choose a **Wavetable** and automate **Wave offset** with a slow sweep for evolving drones.
- 4 Change the primes or the numerator and denominator to retune a voice; the display shows effective ratios and frequencies.
- 5 Turn gates off to release. Reverb can keep ringing afterwards.

CONTROLS

VOICES

CONTROL	RANGE	WHAT IT DOES
Gate (x5)	Off / On	Independent sustained switches.
Gain (x5)	-40 dB = silence	Per-voice level.
Pan (x4)	-	The fundamental is centred; the four tones pan independently.
Bass wave	Wavetable / Sine / Triangle / Square	Fundamental waveform. The three shapes are band-limited and independent of the bank.

TUNING

Base Hz, Octave, Transpose	-	Base Hz is the readable form of the hardware parameter, before the octave shift. Base 30 Hz with Octave 1 gives a 60 Hz fundamental.
Primes	up to 32767	The allowed prime set. Composites snap to the nearest prime (lower wins ties). Prime 1 cannot be disabled; set any other to 1 to disable it.
Numerator / Denominator	1-1024 / 1-256	Snap to the nearest integer whose factors are all in the prime set (lower wins ties). Changing primes resnaps current ratios.
Slew	ms	One-pole frequency glide time.
Crossfade	ms, default 20	Retunes crossfade between two phase-aligned oscillators; later retunes wait until the fade ends and the latest target wins.

SOUND

Wavetable	8 banks	Classic, Bloom, Hollow, Glass, Formant, Reed, Fold, Comb. Bank changes crossfade over 50 ms without resetting phase.
Wave offset	-100 to +100	Scans 16 frames inside the bank, with 10 ms smoothing.
Attack / Release	ms, default 10 / 1000	Shared linear times for five independent envelopes.

REVERB AND OUTPUT

Reverb	mix, RT60, size, damping	Original four-delay feedback network. Size changes can cause pitch motion in the tail.
Output	dB, default -12	Master level. The mix has per-voice headroom and a final soft saturation stage.

NOTES

Wavetable banks

- **Classic:** sine to triangle to soft saw to square-like. **Bloom:** a dark stack opens into a bright spectrum. **Hollow:** a resonant band moves through odd harmonics.
- **Glass:** two narrow upper bands move at different rates. **Formant:** three broad peaks shift through vocal-like shapes. **Reed:** odd/even balance and brightness evolve together.
- **Fold:** partial polarities progressively invert. **Comb:** repeated spectral peaks and notches sweep through the harmonics. All banks keep integer harmonics, so the prime tuning holds.

Behaviour

- Frequencies at or above 45 % of the sample rate are muted rather than folded to another pitch. The target stays visible in the display.
- All visible sound and tuning controls are Live parameters, with named banks, and gains, pan, wave position, master and reverb mix have 10 ms smoothing.

Not implemented

- The hardware's MicroSD wavetable library and user import, its six CV inputs and external FM, its four reverb models, its 0-127 timing curves, and its physical wave and envelope outputs.

STATUS

Fifteen behavioural tests and the structural checks pass. The DSP harness translates the arithmetic to JavaScript; it does not compile GenExpr or emulate Live, so loading it in Live is still the real check.