



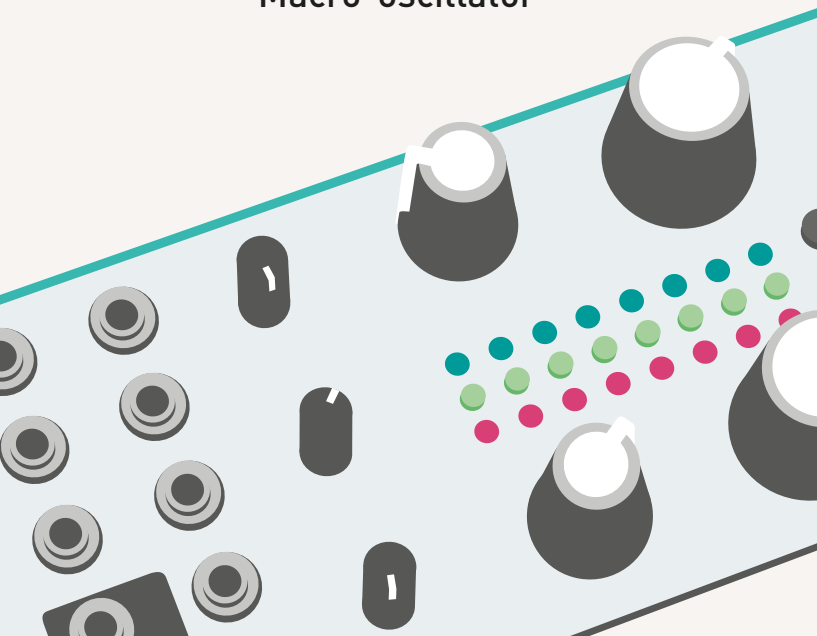
**Mutable** Instruments

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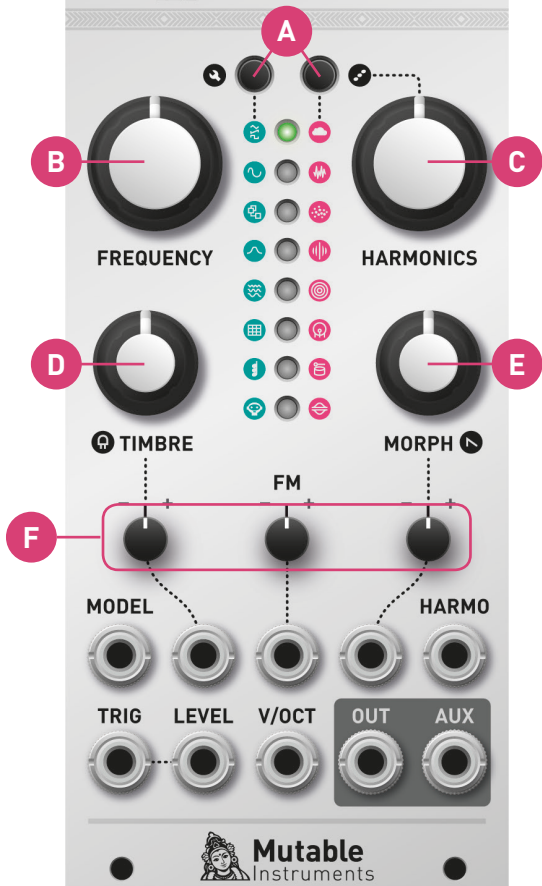


# Plaits

Macro-oscillator



# Plaits



## About Plaits

Plaits is a digital voltage-controlled sound source capable of sixteen different synthesis techniques. Plaits reclaims the land between all the fragmented islands of sound produced by its predecessor, Braids. Its built-in low-pass gate (LPG) and decaying envelope generator allows it to be used as a self-contained voice, in particular for percussive hits.

## Front panel

### Controls

- A. Model selection buttons** and LEDs displaying the active model. Each button cycles through a bank of 8 models. The second bank is focused on noisy and percussive sounds.
- B. Coarse frequency control.** By default, it covers a range of 8 octaves, but it can be narrowed down to 14 semitones (refer to the **FREQUENCY knob range** section).
- C. D. E. Model-dependent tone controls.** Their actual function varies from model to model. In general, **TIMBRE** sweeps the spectral content from dark/sparse to bright/dense, **MORPH** explores lateral timbral variations and **HARMONICS** controls the frequency spread or the balance between the various constituents of the tone.
- F. Attenuverters** for the **TIMBRE**, **FM** and **MORPH** CV inputs. When the corresponding CV input is left unpatched and the trigger input [3] is patched, the attenuverter adjusts the modulation amount from the internal decaying envelope generator. When unplugging a CV input, and if the trigger input is patched, remember to reset the attenuverter to 12 o'clock if you do not want the internal envelope to take over!



# Plaits

**A**

**B**

FREQUENCY

HARMONICS

TIMBRE

MORPH

MODEL

FM

HARMO

1

2

TRIG

LEVEL

V/OCT

OUT

AUX

3

4

5

6

7

Mutable Instruments

## Inputs and Outputs

**1. Model selection CV input.** When this CV input is modulated, two LEDs are lit: the steadily lit LED indicates the current model, and the slowly blinking LED indicates the central value, which would be obtained with a CV of 0V and which is still modifiable with the buttons **[A]**.

Note that when the trigger input **[3]** is patched, model changes occur only whenever a trigger is received.

**2. CV inputs** for the timbre, frequency, morph and harmonics parameters.

**3. Trigger input.** Serves four percussive purposes:

- Triggers the internal decaying envelope generator.
- Excites the physical and percussive models.
- Strikes the internal low-pass gate (unless the **LEVEL CV** input **[4]** is patched).
- Samples and holds the value of the **MODEL CV** input.

**4. Level input.** Opens the internal low-pass gate, to simultaneously control the amplitude and brightness of the output signal. Also acts as an accent control when triggering the physical or percussive models.

**5. V/Oct CV input.** Controls the fundamental frequency of the sound, from -3 to +5 octaves relative to the root note set by the coarse frequency knob **[B]**.

**6. 7. Outputs.** The **AUX** output carries a variant, sidekick, or by-product of the main signal produced on **OUT**.



## Adjusting the internal LPG and envelope

Hold the first button **(A)** and:

- Turn the **TIMBRE** knob to adjust the response of the LPG, from VCFA to VCA.
- Turn the **MORPH** knob to adjust the ringing time of the LPG and the decay time of the internal envelope.

The value of both settings are represented by 4 yellow LEDs.



## Adjusting the FREQUENCY knob range

Hold the second button **(A)** and turn the **HARMONICS** knob to select the range of the **FREQUENCY** knob. The first 8 settings correspond to **C0 +/- 7** semitones, **C1 +/- 7** semitones, and so on. The last setting, with all LEDs lit, corresponds to the **full 8-octave range** from C0 to C8.



# Synthesis models

## Pair of classic waveforms

Virtual-analog synthesis of classic waveforms.

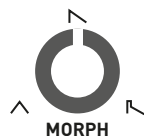
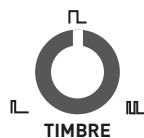
**HARMONICS:** detuning between the two waves.

**TIMBRE:** variable square, from narrow pulse to full square to hardsync formants.

**MORPH:** variable saw, from triangle to saw with an increasingly wide notch (Braids' CSAW).

**AUX:** sum of two hardsync'ed waveforms, the shape of which is controlled by **MORPH** and detuning by **HARMONICS**.

A **narrow pulse** or **wide notch** results in **silence!**



## Waveshaping oscillator

An asymmetric triangle processed by a waveshaper and a wavefolder.

**HARMONICS:** waveshaper waveform.

**TIMBRE:** wavefolder amount.

**MORPH:** waveform asymmetry.

**AUX:** variant employing another wavefolder curve.

## Two operator FM

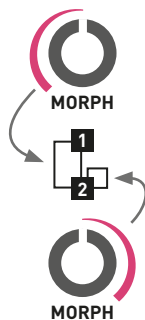
Two sine-wave oscillators modulating each other's phase.

**HARMONICS:** frequency ratio.

**TIMBRE:** modulation index.

**MORPH:** feedback, in the form of operator 2 modulating its own phase (past 12 o'clock, rough!) or operator 1's phase (before 12 o'clock, chaotic!).

**AUX:** sub-oscillator.



## Granular formant oscillator

Simulation of formants and filtered waveforms through the multiplication, addition and synchronization of segments of sine waves.

**HARMONICS:** frequency ratio between formant 1 and 2.

**TIMBRE:** formant frequency.

**MORPH:** formant width and shape.

**AUX:** simulation of filtered waveforms by windowed sine waves – a recreation of Braids' Z\*\*\* models. **HARMONICS** controls the filter type (peaking, LP, BP, HP).



## Harmonic oscillator

An additive mixture of harmonically-related sine waves.

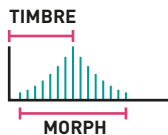
**HARMONICS:** number of bumps in the spectrum.

**TIMBRE:** index of the most prominent harmonic.

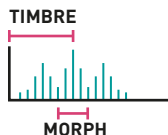
**MORPH:** bump shape – from flat and wide to peaked and narrow.

**AUX:** variant including only the subset of harmonics present in the drawbars of a Hammond organ.

 HARMONICS



 HARMONICS





## Wavetable oscillator

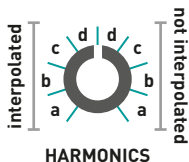
Four banks of 8x8 waveforms, accessed by row and column, with or without interpolation.

**HARMONICS:** bank selection. 4 interpolated banks followed by the same 4 banks, in reverse order, without interpolation.

**TIMBRE:** row index. Within a row, the waves are sorted by spectral brightness.

**MORPH:** column index.

**AUX:** low-fi output.



## Chords

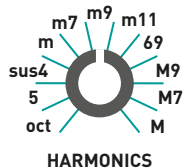
Four-note chords, played by VA or wavetable oscillators.

**HARMONICS:** chord type.

**TIMBRE:** chord inversion and transposition.

**MORPH:** waveform. The first half of the knob goes through a selection of string-machine like raw waveforms, the second half of the knob scans a small wavetable.

**AUX:** root note of the chord.



## Vowel and speech synthesis

A collection of speech synthesis algorithms.

**HARMONICS:** crossfades between formant filtering, SAM, and LPC vowels, then goes through several banks of LPC words.

**TIMBRE:** species selection, from Daleks to chipmunks.

**MORPH:** phoneme or word segment selection. Patch the trigger input [3] to trigger the utterance of a word, use the **FM** attenuverter to control the intonation and the **MORPH** attenuverter to control speed.

**AUX:** unfiltered vocal cords' signal.

## Granular cloud

A swarm of 8 enveloped sawtooth waves.

**HARMONICS:** amount of pitch randomization.

**TIMBRE:** grain density.

**MORPH:** grain duration and overlap.

**AUX:** variant with sine wave oscillators.

## Filtered noise

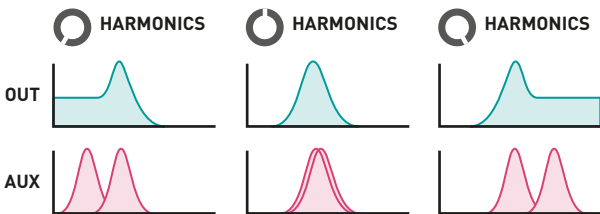
Variable-clock white noise processed by a resonant filter.

**HARMONICS:** filter response, from LP to BP to HP.

**TIMBRE:** clock frequency.

**MORPH:** filter resonance.

**AUX:** variant processed by two band-pass filters, with their separation controlled by **HARMONICS**.



## Particle noise

Dust noise processed by networks of all-pass or band-pass filters.

**HARMONICS:** amount of frequency randomization.

**TIMBRE:** particle density.

**MORPH:** filter type – reverberating all-pass network before 12 o'clock, then increasingly resonant band-pass filters.

**AUX:** raw dust noise.

## Inharmonic string modeling

### Modal resonator bank

For your own pleasure, a mini-Rings! When the **TRIG** input is not patched, the resonator is excited by dust noise.

**HARMONICS:** amount of inharmonicity, or material selection.

**TIMBRE:** excitation brightness and dust density.

**MORPH:** decay time (energy absorption).

**AUX:** raw exciter signal.

### Analog bass drum model

**HARMONICS:** attack sharpness.

**TIMBRE:** brightness.

**MORPH:** decay time.

**AUX:** emulation of another classic bass drum circuit.

### Analog snare drum model

**HARMONICS:** balance of the harmonic and noisy components.

**TIMBRE:** balance between the different modes of the drum.

**MORPH:** decay time.

**AUX:** emulation of another classic snare drum circuit.

### Analog high-hat model

**HARMONICS:** balance of the metallic and filtered noise.

**TIMBRE:** high-pass filter cutoff.

**MORPH:** decay time.

**AUX:** variant with a different flavor of tuned noise based on ring-modulated square waves.

**Note:** all the models listed on this page employ their own decay envelope and filter. The internal LPG is disabled for them.



## Installation

Plaits requires a **-12V/+12V** power supply (2x5 pin connector). The red stripe of the ribbon cable (-12V side) must be oriented on the same side as the “Red stripe” marking on the module and on your power distribution board.

The module draws **50mA** from the **+12V rail**, and **5mA** from the **-12V rail**.

## Online manual and help

The full manual can be found online at [mutable-instruments.net/modules/plaits/manual](https://mutable-instruments.net/modules/plaits/manual)

For help and discussions, head to [mutable-instruments.net/forum](https://mutable-instruments.net/forum)



Please refer to the online manual for detailed information regarding compliance with EMC directives

