
# PlaitsXplorer

# RC4

4th Draft

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A port of Emilie’s Plaits DSP algorithms adapted for the Korg Prologue with Front Panel control of MultiEngine parameters.

**PlaitsXplorer** – Plaits Explorer for Prologue.

This release of 'Plaits for Prologue' features Front Panel control of the MultiEngine User Oscillators. The knobs in the VCO control section have been repurposed to provide direct manipulation of Plaits Timbre, Morph, and Harmonics input values and PlaitsXplorer's dynamic modulation Intensity channels. Additionally, the VCO Octave switches now select among several useful matrix modulation configurations for Timbre and Morph inputs. Further controls implemented in the MultiEngine menus control the various Key Tracking and Built-in modulation types and their timing, while direct access to Prologues hardware EG Envelope, LFO, and EG Note Velocity vastly extend Oscillator modulation expressiveness.

These are the Plaits DSP models currently included with PlaitsXplorer:

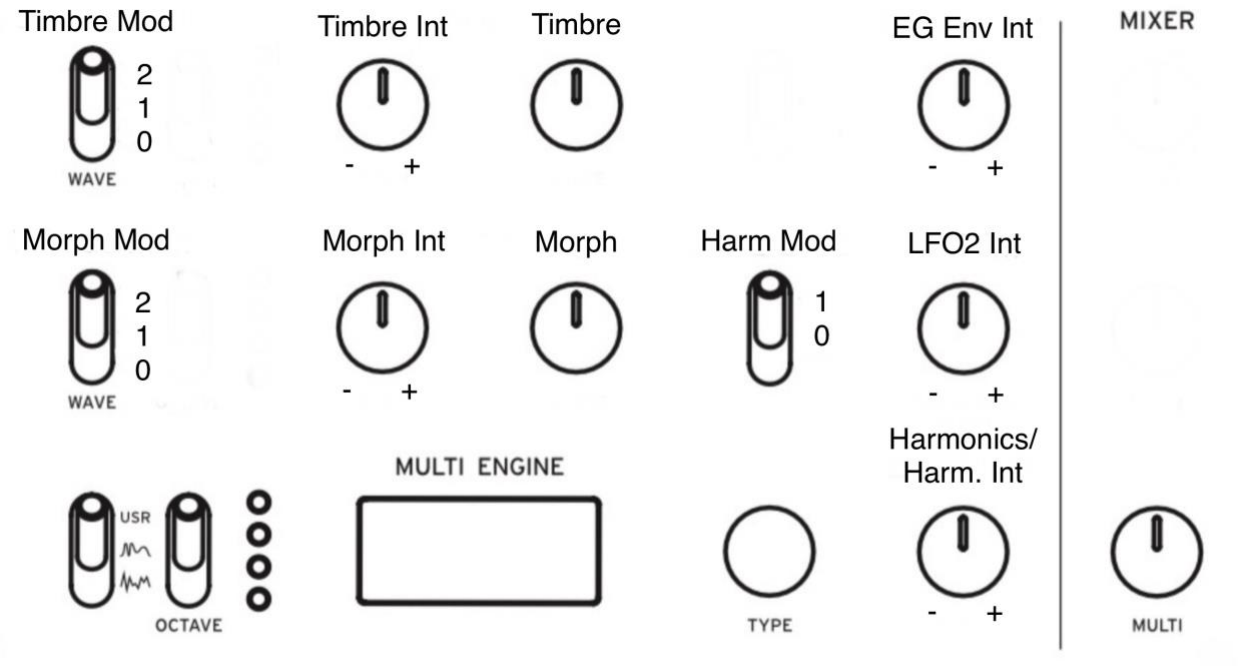
- VA; Virtual Analog with classic waveforms.
- VAsync; Hard Sync Virtual Analog, lots of squelch on this one.
- Tides; Wavefolder found in Tides.
- Warps; Wavefolder found in Warps.
- FM; 1 and 2 operator Frequency Modulation with variable feedback.
- Grain; Granular formant synthesis.
- Zbraids; filter simulation with Peaking/LP/BP/HP response.
- Additive; Additive mixture of harmonically related sine waves.
- SWARM; Granular swarm of 8 enveloped SAW Waves.
- Noise; Variable-clock white noise processed by a resonant filter.
- NoiseDBP; Variable-clock white noise processed by a resonant filter with dual bandpass filters.
- Bassdrum Analog/Synth; simulations of two types of bass drum.
- Snare Analog/Synth; simulation of two types of snare drum.
- Hi Hat Harsh/Clean; simulation of two types of hi hat.
- Plaits 2D Wavetables; 6 sets of 32 spectrally related Wavecycles arranged in a 4x8 entry Wavecycle table for modulating in two directions.
- VCFHP/LP; Virtual LP and HP filters with Classic waveforms from Plaits final 1.2 release.

**Overview of Features**

PlaitsXplorer (PX hereafter) is designed as a platform for players. It features an identical control schema for all Plaits models, so memorizing multiple oscillator control schemas is unnecessary. PX is a comprehensive polyphonic synthesis workbench expressed as an extremely wide range of synthesis techniques all with a common, simple control schema. PX's front panel modulation controls allow performing keyboardists to easily explore a wide range of sonic spaces without digging into menus, looking up obscure settings, and all without managing the complexity of individual programming schemas for each type of synthesis method.

**Front Panel Description**

PX reuses existing controls saved and restored with normal Prologue Preset functionality. Plaits Timbre, Morph, and Harmonics DSP model inputs, plus the PX Modulation Channel control schema, map onto VCO controls in a straightforward manner, grouping functions related to Timbre or Morph in the same physical rows. While Harmonics, takes the remaining two controls.




Pictured above, are the PX control assignments for the VCO section with unused controls removed for simplicity.

Timbre's modulation controls are in the top row knobs and switches; Morph's controls are the next row down; and Harmonics controls populate the remaining switch and the Shape/Shift-Shape knob. A large pointer knob is recommended for the Shape control to aid in both pitch accuracy, and performance ease of use for VA and VAsync models and other models. Timbre and Morph Matrix Modulation operations combine available modulators to serve as matrix operators for complex modulations.

Hardware LFO and Envelope modulators may serve as dynamic operators in certain modes across all three inputs. This allows a non key-synched Global LFO, and a fully variable Envelope may be applied to any channel. Built-in LFO and Envelope modulations are always synchronized with the beginning of the note. Main Modulation Intensity controls allow multiple instances of the same modulator to appear as different polarities per instance for opposing or concerted modulations.

N.B. For proper operation of PX, the remaining unused controls should be set to the following positions:

- VCO1 & 2 Octave switches to 16'. These affect Timbre and Morph Intensity range calibration.
- Pitch EG switch to VCO1+2. You may use ALL for digital pitch effects.
- VCO1&2 Mixer Level's to zero. Use layering to bring in VCO's. Or zero out front modulation controls and use builtins on Harmonics.

**Hardware Modulation Types**

PX provides MultiEngine access to Logue hardware modulation sources not supported by Korg's SDK1.

Hardware LFO:

- PX recreates Logue's Bipolar hardware LFO internally. PX's LFO is independent of Logue's LFO Target and Intensity controls. PX's LFO follows Logue's LFO Key Sync Menu settings and Waveform Selection and Rate control. This allows you to use the hardware LFO for PX as well as Cutoff or Pitch at the same time. Use Shift to Invert the Logue LFO from the PX's independent LFO, or use the Main Modulation channel to invert PX's LFO.
- PX also creates a Unipolar LFO version for use in Matrix Modulation (1). This allows a cleaner a multiply modulation between LFO and builtins.

Key Tracking:

- PX uses note data normally supplied to the oscillator to provide emphasis and note dependent voicing and modulations. In Matrix Modulation mode (2), KT varies the modulation intensity curve across the keyboard for dynamic voicing. In all other Modes KT provides a static modulation useful for adding emphasis and de-emphasis to each input.

EG note Velocity:

- EG Velocity is adjustable in Menu Location [Modulation Menu 6:EG Velocity], this will vary Timbre's EG Envelope intensity and Morph LFO2 rate and intensity modulations with note velocity for exceptional dynamic expression.

Filter EG Envelope:

- Provides direct access to the EG Envelope with an independent bipolar Intensity control. This allows the models Timbre input to track filter envelope response. Pitch EG Intensity controls Envelope amplitude and polarity. The EG Envelope along with Note Velocity appears in Timbre Velocity Channel, as well as the MultiMod selector without Velocity, for use in Morph and Harmonics modulation channels.

## Built-in Modulation Types

In addition to enhanced platform modulations, PX also provides two built-in dynamic modulators; an LFO with normal and velocity sensitive vibrato modes, plus MultiMod; a multifunction waveform generator, capable of multiple envelopes or LFO modulations.

LFO2 features:

- Variable rate Triangle wave.
- Tremolo: positive values produce a triangle wave with frequency proportional to the value of LFO2rate.
- Vibrato: negative values produce a triangle wave with a frequency proportional to the absolute value of LFO2 rate, with rate further modulated by EG Velocity.

MultiMod Envelopes:

- AD: Attack, Decay envelope.
- ASR: Attack, Sustain, Release type envelope.
- ADSR 40%: an ADSR with 40% Sustain level. Release is a fixed multiple of Decay.
- ADSR 70%: an ADSR with 70% Sustain level. Release is a fixed multiple of Decay.
- Linear Ramp: linearly increasing Ramp. (set Decay +100, Attack to taste).

MultiMod Envelope features:

- Logarithmic or Linear Envelope Attack (model dependent).
- Linear Decay and Release slopes.
- Log Attack features 'advance to Decay on Note Off' modeling analog synth envelopes for more dynamic behavior.

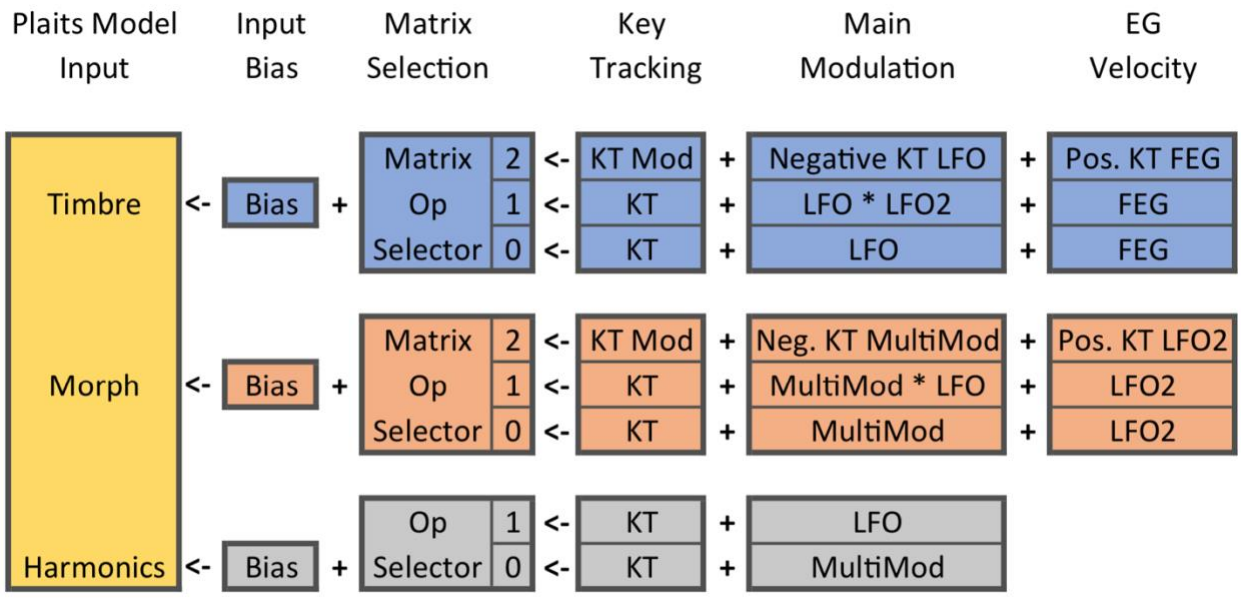
MultiMod LFO3 features:

- Four types of variable rate Triangle or Saw wave LFO.
- Tremolo: positive values produce a Triangle or Saw waveform with frequency proportional to the value of MultiMod programming
- Vibrato: negative values produce a Triangle waveform with a frequency proportional to the absolute value of MultiMod, with rate further modulated by Key Tracking, or frequency modulated by LFO.

**Modulation System**

PX provides three Modulation Channels for each Plaits model input: Timbre, Morph, and Harmonics; plus a Velocity sensitive channel for Timbre and Morph. Modulation Channels provide each input: a static Bias Value used as a baseline value for following dynamic modulations; a Key Tracking channel to provide a note dependent offset for emphasis and deemphasis of each input; a Main Modulation channel to apply time variant dynamic modulations; and for Timbre and Morph, an EG Velocity sensitive modulation channel for expressive performance. Finally, these four channels, summed together, are then presented to the Oscillators Model input.

- Bias: These controls are found on the Front Panel VCO and Shape section.
- Key Tracking: this Bipolar Intensity, found in the six entry MultiEngine menus [MultiEngine Menu, Param2-4), governs an instance of Key Tracking for each channel. Negative values accentuate lower pitches, while positive values boost the high end.
- Main Modulation: these Bipolar Intensities found on the Front Panel VCO Pitch controls, governs the main dynamic modulations; LFO, MultiMod, and Matrix operations for all three inputs.
- Velocity Modulation: these Intensities found on the Front Panels EG Pitch Intensity and Crossmod controls, governs Timbre's EG Envelope, and Morph's LFO2 intensities, both provided with EG Note Velocity.



**Matrix Operations**

VCO Octave and Sync switches are repurposed to manage Matrix Modulation Selection settings for Timbre, Morph, and Harmonics inputs.

- Timbre Matrix Modulation Select [VCO1 Waveform] has three settings:
  - (2) Key Track Multiplication; with this Matrix operation, Key Tracking controls the slope of modulation intensity for Bipolar LFO and Timbre's Velocity EG Envelope modulators across the keyboard. Adjusting Timbre's Key Tracking channel behaves as described below:
    - Negative values increase Timbre's Main Modulation in the low end, and its Velocity EG Envelope Modulation in the high end of the keyboard.
    - Positive values reverse this by increasing Timbres Velocity Modulation in the low end, and its Main Modulation in the high end of the keyboard.
    - A value of Zero will result in no modulation at either end.
  - (1) LFO Multiplication; multiplying Unipolar LFO and Velocity sensitive LFO2 operators will modulate the intensity of LFO2 by LFO.
  - (0) Normal; no Matrix operation. Only Bipolar LFO modulation

- Morph Matrix Modulation Select [VCO2 Waveform] has three settings:
  - (2) Key Track Multiplication; with this Matrix operation, Key Tracking controls the slope of the modulation intensity of MultiMod and Morphs EG Velocity LFO2 modulators across the keyboard. Adjusting Morphs Key Tracking channel behaves as described below:
    - Negative values increase Morphs Main Modulation in the low end, and LFO2 Velocity Modulations in the high end of the keyboard.
    - Positive values reverse this by increasing Morphs LFO2 Velocity Modulation in the low end, and Main Modulation in the high end of the keyboard.
    - A value of Zero will result in no modulation at either end.
  - (1) LFO Multiplication; multiplying Unipolar LFO and MultiMod operators will modulate the intensity of MultiMod by LFO.
  - (0) Normal; no Matrix operation. Only Multimod modulation.

- Harmonics Modulation Select [Sync/Ring] has two settings:
  - (1) LFO modulator.
  - (0) MultiMod modulator.

**MultiEngine Menu Params 1-6**

PX parameters for the Builtin modulators LFO2, Key Tracking and MultiMod programming are in the MultiEngine Menu. For convenience, on Prologue PX model input name for Timbre, Morph and Harmonics will appear instead of “Key Tracking” in the Menu Text box.

| Param1 | Param2 | Param3 | Param4 | Param5 | Param6 |
|---|---|---|---|---|---|
| LFO2 Mode | Timbre Key Tracking | Morph Key Tracking | Harmonics Key Tracking | Attack mode LFO3 Mode | Decay Mode LFO3 Mode |

Param 1

LFO2: Positive values for Normal Triangle Wave rate. Negative values produce an increase of LFO rate with EG Velocity. LFO2 appears is Timbre Matrix Op (1) multiplied by the hardware LFO, and as the Velocity sensitive channel for Morph.

Param 2

Timbre Key Tracking: Negative values accentuate Timbre on the low end of keyboard, while positive values increase Timbre on the higher end. When Timbre Matrix Op (2) is active, Timbre Key Tracking sets the amount and type of modulation that slopes positively and negatively across the keyboard instead of setting a note dependent offset.

Param 3

Morph Key Tracking: Negative values accentuate Morph on the low end of keyboard, while positive values increase Morph on the higher end. When Morph Matrix Op (2) is active, Morph Key Tracking sets the amount and type of modulation that slopes positively and negatively across the keyboard instead of setting a note dependent offset.

Param 4

Harmonics Key Tracking: Negative values accentuate Harmonics on the low end of keyboard, while positive values increase Harmonics on the higher end.

Param5 and Param6

MultiMod Programming: Morph and Harmonics channels feature a choice of nine waveforms programmed by Param 5 & 6 as described in the next section.

**Multimod programming**

PX provides a multifunction built in modulator featuring various single shot and periodic modulator waveforms. MultiEngine Parameters 5 and 6 value are combined to select one of nine modulation types:

| Param5 Attack/TRI | Param6 Decay/Saw | MultiMod Output Waveform |
|---|---|---|
| [Positive] | [Positive] | Attack/Decay Envelope |
| [Positive] | [Negative] | Attack/Sustain/Release Envelope |
| [Positive] | [Zero] | LFO3 Triangle Tremolo |
| [Negative] | [Zero] | LFO3 Triangle KT Vibrato |
| [Zero] | [Zero] | EG Envelope, no Velocity |
| [Zero] | [Positive] | LFO3 Saw Tremolo |
| [Zero] | [Negative] | LFO3 Triangle LFO Vibrato |
| [Negative] | [Positive] | ADSR with 40% Sustain Level |
| [Negative] | [Negative] | ADSR with 70% Sustain Level |

MultiMod Envelopes

- Two Bipolar Params are used to define the timing for Envelopes rise and fall times. Positive values for Param 5 yields simple A/D and A/S/R type envelopes. Negative values for Param 5 yields ADSR type envelopes with two Sustain levels. Timing range is a 2-piece linear approximation of a logarithmic range, with a knee at 60%. Values between |1-59| are in the fast range, while values in the |60-100| range are 5x slower.

MultiMod LFO3

- A single Param defines this LFO rate. Setting a Zero value for Param 6, then setting Param 5 to a positive value will produce a Triangle LFO with Tremolo rate proportional to the value of Param 5. While a negative value for Param 5 produces a Key Tracked note dependent Vibrato. Higher notes produce faster Vibrato.

- Setting a Zero value for Param 5, then setting Param 6 to a positive value will produce a Ramp LFO with Tremolo rate proportional to the value of Param 6. A negative value for Param 6 produces an LFO FM modulated Triangle.

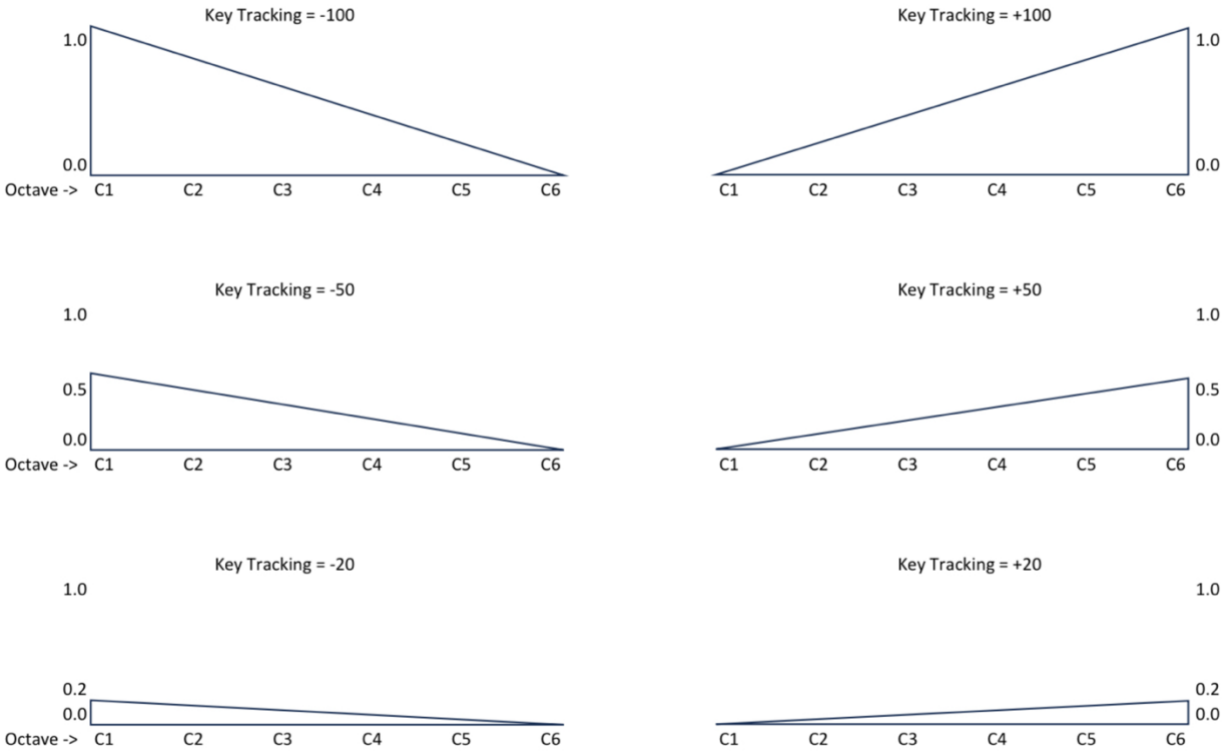
EG Envelope

- The EG Envelope, provided without Velocity, is selected by setting both Param 5 & 6 to a Zero value.

**Working with Key Tracking**

PX's uses Key Tracking based on MIDI note number for two types of voicing: one is to apply a positive bias to a control; the other is to use the MIDI note to control the amplitude of Modulations. Generally, in Key Tracking pitch is used, however Logue only provides the MIDI note number. Note that the Keyboard Octave switches shift the keyboard range, and Oscillator Octave switch shift the pitch. MIDI note number is absolute, and independent of these two controls.

Key Tracking is in MultiEngine Menu 7, Params 2 through 4. For convenience, each DSP model, Tracking control is labeled with the Plaits model input description. Tracking controls are Bipolar, and range from -100 to +100. Negative values will Bias in a positive way the low end of the keyboard, while positive Tracking values will bias positively, the high end of the keyboard as shown.




While all models will behave differently depending the DSP function each input controls, here are some simple examples; on the Timbre input, Tracking can emphasis or de-emphasis spectral content based on Key, to either mute or sharpen a tone. On Morph, Tracking can be used to morph a waveform transformation across the keyboard; for example, Triangle to Saw wave, or transform pulse width across five octaves or less. On

**(Key Tracking cont.)**

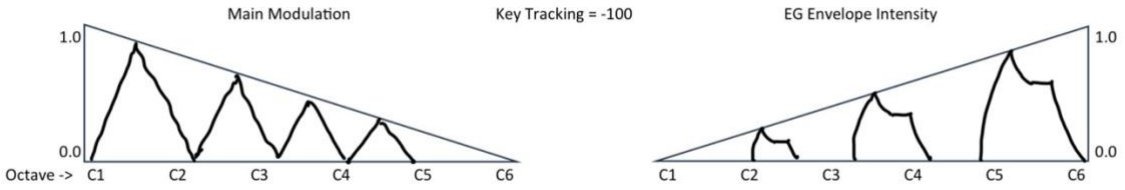
Harmonics, filter response can be mapped across the keyboard to position a LP on the low end, and HP on the high end with BP in the middle, or detune keyboard extremes a few cents, or an octave or more. Not all results have to be strictly musical to be useful.

**Tracking with Matrix Modulation (2)**

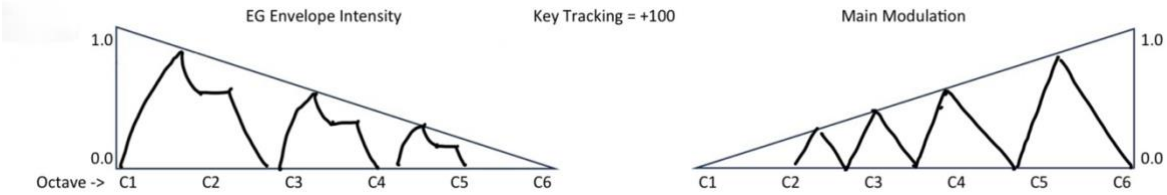
Key Tracking can also be applied to Timbre and Morph's Main Modulation and Velocity Sensitive modulation channels by using each input's Matrix Modulation (2) setting. In this mode tracking provides a static modulation that limits the channels dynamic modulators.

**Timbre**

Timbre's Matrix includes a Main Modulation channel and the Velocity Sensitive EG Envelope. When engaged, you may use tracking to cross fade from LFO in the low end, to the EG Filter Envelope on the high end.



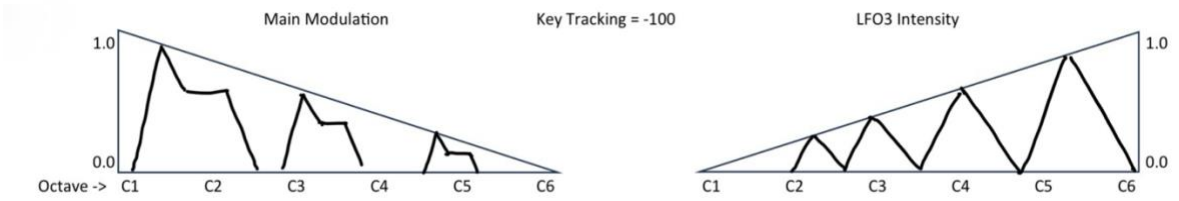

Changing Tracking to a positive value will reverse the modulators placement by placing EG Envelope on the low end, and LFO on the high end.



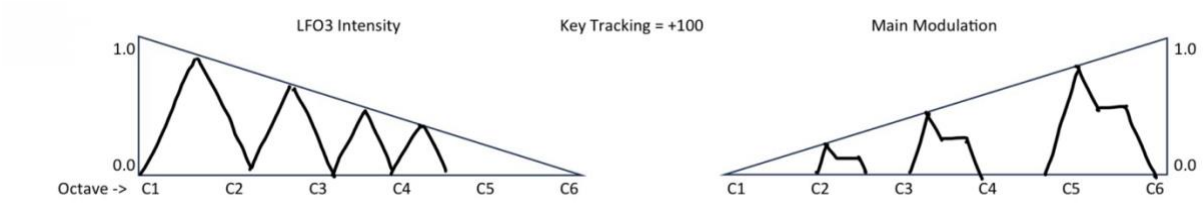
**(Tracking with Matrix Modulation cont.)**

**Morph**

Morph's Matrix includes Multimode and Velocity Sensitive LFO3. When engaged, a negative tracking value will apply Multimode to the low end, and LFO3 to the high end. Multimode is shown here programmed with a linear ADSR, although LFO2 variation may also be used.




Changing Morph's tracking to a positive value will also reverse the modulation assigned across the keyboard. Here, LFO3 will be on the low end, and Multimode on the high end.



**Mod Wheel, Expression Pedal, After Touch, and MIDI CC Targets**

Since PX reuses existing controls, Prologues performance settings programmed with existing controller channels; Mod Wheel, Expression Pedal, and After Touch are all also available to provide more 'hands and feet on' PX modulation controls for even more playability.

A few notes on Controllers:

- Mod Wheel is a variable length throw device. Mod Wheel will add it's value to the assigned front panel control. You may set the extent the Mod Wheel will add to the value of the selected front panel control in the Pedal & Wheel MENU.
- Volume Pedal is a full throw device. It overrides the front panel value of the control it is assigned to. PX Modulations applied to the front panel control are also faithfully applied to the value of the Expression Pedal.
- Expression Pedal is a variable throw device. It will also override the value of the assigned front panel control. However Expression Pedal's generally provide adjustments for starting value and the extent of the throw, and maybe more useful than an Volume Pedal in situations where Bipolar Controls are addressed.
- After Touch behavior is defined by the transmitting device. PX processes AT similarly to Volume and Expression Pedal. Full throw AT will address Unipolar controls
- CC MIDI will directly overwrite addressed front panel controls as normal.

You may assign any of these controllers, or use MIDI CC's to modulate the following PX controls:

- [VCO 1 Pitch/Bipolar] Timbre Main Modulation Intensity
  This Bipolar control works best with Mod Wheel types of additive controllers to control the expression of modulation depth.

- [VCO 1 Shape/Unipolar] Timbre Bias
  This is Unipolar control matches with Expression Controllers best. Also, Plaits DSP model maps full range linear spectral/frequency response functions, if there is one, to the Timbre Control. This makes it ideal for sweeping 'WhaWha' types of expression with Expression pedal or After Touch.

**(Mod Wheel, Expression Pedal, etc… cont)**

- [Pitch Int/Bipolar] Timbre Velocity Modulation Intensity
  This Bipolar control governs the models Timbre Velocity Sensitive EG Envelope response. This modulation channel has numerable matrix operations already, which presents a challenge for further modulation. Reducing EG Velocity will help bring out the Expression Controller Performance.

- [VCO 2 Pitch/Bipolar] Morph Main Modulation Intensity
  Similar Expression Controller use cases apply here as Timbre Main Modulation Intensity. However, the nature of the morph channel is much different from Timbre's linear response. Morph often controls multiple waveform selection and other transformative changes along its range. Here, you can perform PW modulation, waveform transition mixing, or other morphological changes. Here a Mod Wheel or an adjustable AT would work well.

- [VCO2 Shape/Unipolar] Morph Bias
  The Unipolar control also matches Expression controller range best in the Morph Control channel.

- [Crossmod/Bipolar] Morph Velocity Modulation Intensity
  This Bipolar control governs the models Morph Velocity Sensitive LFO2 response. Use case is similar to Timbre Velocity Sensitive channel. However smaller ranges are best here, as well as reduced EG Sensitivity helps.

- [Shape/Unipolar] Harmonics Bias
  This Unipolar control governs a sometimes Unipolar, and sometimes Bipolar Harmonics response, depending on Plaits DSP model. Bipolar types of models are VA's Pitch, Drum Tonality Mix's are 50/50 Bipolar. While FM Freq Ratio, Modal and String Inharmonicity, are Bipolar with model dependent midway point. Other models, such as Particle, SWARM, Noise and the 'Green' Spectral models are mostly Unipolar, with one or two exceptions along the way. As such, each model would adopt a different Expression controller strategy – left to the reader.

**Voicing and Modulation with PlaitsXplorer**

PX is designed as a general control and modulation system for Plaits three input DSP algorithms. Plaits models are categorized into three main groups:

- GREEN: these are pitched sources with a continuous spectral characteristic tone set by Timbre. The Morph input, a continuous or discontinuous ranged structural input; often providing a range of pulse width and waveform warping, or a continuous linear range specific to the DSP model. Harmonics also may be continuous or discontinuous, but will have defining defining characteristic of the DSP model, such as Pitch manipulation, multiband filter response, or a third continuous linear range extending the basic models characteristic.
- RED: these are mostly physical models of strings, materials, and percussive instruments, which also includes three somewhat pitched Noise, Particle, and Granular Saw models.
- ORANGE: so far, I have only ported the Variable Filter with Classic waveforms model. These all follow the general definition of GREEN models.

PX provides a general purpose control and modulation schema for the three input Plaits algorithms. PX's static, periodic, and one-shot modulation sources tailored for each DSP input:

- Timbre. This often continuous linear range input, models filter cutoff frequencies, and other tones that have identifiable pitch or cutoff frequency. The Prologue hardware LP Filter modulators; EG Envelope, LFO, and Note Velocity, are used as the characteristic modulators for this input. PX's version of these modulators may be inverted relative to the Prologue Filter modulators, accentuated or attenuated, or further modulated by Timbre's Matrix Modulation channel, or by use of Expression Pedals, Mod Wheels, and After Touch. You may also use Timbre's Key Tracking input to provide tonal emphasis or deemphasis, by using a pitch related increase or decrease in Timbre's Modulated or static value.
- Morph. This continuous or discontinuous model input governs aspects of the model that change gross spectral content. Morph makes use of the MultiMode modulation scheme for a wide selection of modulation types to cover Morph's various modes, with an additional LFO2, Velocity Sensitive in rate and amplitude. Variable Throw Expression Controllers work best with Morph, as do full throw for continuous range type models.

**(Voicing and Modulation cont.)**

- Harmonics. This input has the most impact on the models sound and controls the most defining characteristic of the model. It has been assigned to the Shape Knob for performance impact and ease of reachability. I originally swapped my Shape knob out for another Filter Cutoff knob to control MultiEngine models with better accuracy. With PX, the larger knob size enhances the fine Pitch tuning effects in the Virtual Analog models, and also helps playability in models with Detune, Inharmonicity, Filter response, etc

**Voicing Example with Virtual Analog (VA)**

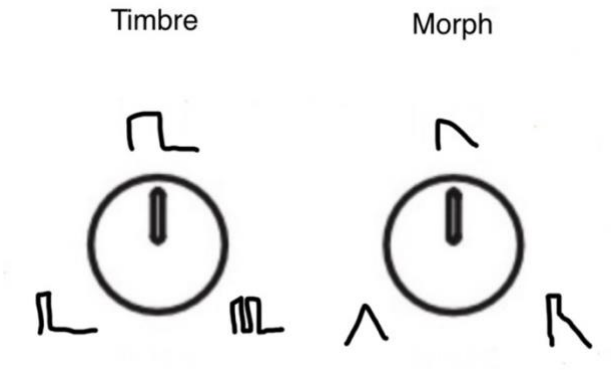
PX's VA oscillator uses the Virtual Analog Plaits DSP model normal Output. The model produces a variety of classic waveforms mapped into four ranges of Timbre and Morph. Harmonics controls a detuning routine that varies the tuning between Timbe and Morph waveforms.

Timbre:

> Variable square waveform. From 0 to 0.5 presents a narrow pulse to full square, then hard sync waveform form 0.5 to 1.

Morph:

> Variable saw waveform. From 0 to 0.5 presents a Triangle morphing to Saw, then from 0.5 to 1 presents as a Saw with an increasingly wide notch.




To get started, first note that there are four ranges of morphable waveforms. Two on Timbre: Variable Pulse Width Rectangle followed by a hard sync sound. Plus two more: Morph's Triangle morph to Saw, then an increasingly Narrow Pulse mixed into the saw. At the

**(VA example cont.)**

extreme end of each control, the pulse width duty cycle goes to zero and the waveform disappears from the synthesis; CCW to 0 for Timbre, and CW to 1 for Morph. A simple strategy to get started would be to silence one of the waveforms and use Key Tracking on the other to make the waveform vary across the Prologue keyboard.

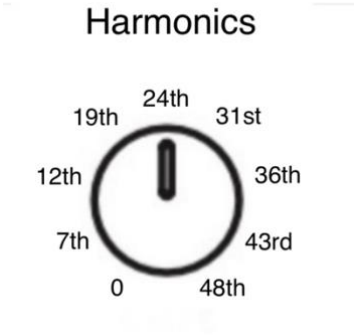
For example, starting with Timbre at 0 to silence that the square, and Morph to 0 to select a Triangle wave when unbiased. Then use [MultiEngine Menu 7 Param 2] Timbre Key Tracking to increase Timbre, producing a shift from Triangle to Saw, presenting higher harmonics and a brighter spectrum either in the low end with a negative value, or on the high end with a positive value. This simple static modulation can apply to any of the four ranges, or even across ranges for interesting effects. Further, bringing the Morph waveform back and mapping it in different way can produce more varied results. These are simple voicing strategies that can be applied either at the beginning, providing a base voicing to work from, or as a final step to brighten, detune, or funkify the low end, or high end as you desire.

The next step is to layer on dynamic modulations. On Timbre, the EG Envelope can be used for instance, for quick transitions into the Hard Sync range with the added Velocity Sensitivity for expression. Use the LFO in non-Key Sync mode to add tonal variation to the beginning of notes, or in Key Sync mode to modulate a delayed LFO modulation to PW. Morph's pulse width range is ideal for PW sweeps with an LFO, or a slow Ramp. Both Timbre and Morph have a selection of periodic and one-shot modulations, some with Velocity some without. Each input also has Matrix Operator Selectors to create more complicated dynamic modulations.

**(VA Example cont. Harmonics)**

Harmonics:

4 octaves of Detuning between Timbre and Morph waveforms. As an aid to playability, the control doesn't map pitch linearly with rotation. Instead, there are dwell points where the pitch/degree of rotation reduces for fine pitch tuning at specific intervals. PX uses the Shape control to present this variable for playability. A larger Shape control aids in 'playing the pitch sweeps', glides and other pitch effects




and tuning. Harmonic Detune can be used to add slight detuning; use MultiMode's LFO FM mode to introduce a delays variable rate slight detune, or octave pitch sweeps with the Multimode Ramp envelope. Use the LFO in Key Sync Square Wave mode to arpeggiate in octaves or 7$^{th}$'s, or other intervals. I've outfitted my Prologue PlaitStations with the same Rogan knobs shipped on Plaits. The large 6P is terrific for this use and available at most Modular Synthesis shops.

**Notes**:

1. Modulator values all range between 0 and 1, except Logue LFO which is +/-0.5. Intensity controls will multiply Modulators by -1 to +1. Plaits model inputs expect values between 0 and 1 and are clipped to that range. When Modulators are multiplied together, the result is always in the 0 to 1 range. When Modulation channels are summed, they can quickly add up when adjusting modulation channels, and you can swamp the input by summing all Modulators without regard. Small variations in modulations are often the best coupled with key tracking.
2. Modulation (1) uses a unipolar version of LFO multiplied by a unipolar LFO2, unipolar Multimode waveform, so the result is unipolar. This is most apparent when switching from Matrix Modulation (0) to Matrix Modulation (1).
3. When initializing a new oscillator, zero out at once the MultiEngine Params before they default to -100. This is a logue bug introduced with bipolar params.
4. You MUST be running firmware 2.10.
5. All Intensity controls are bipolar. To begin a new patch, I null them out with controls at 12 O'clock, and Bias controls at 50%, and Params at zero. Save it, then start the patch.

Caveats: some models are on hold. String and Modal are too memory constrained for this system, as are Wavetables which needs more memory reclamation. Braids Wavetables take some compile time switchroo's so I'll leave that for last.

**Honorable Mentions**

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