

B.I.T.

The screenshot displays the B.I.T. synthesizer interface with the following sections:

- Header:** PRESET (Attic 5th Synth BIT), EDIT, ECS, To Back Screen, BANK (02 Synth 01), ORIG, HELP, MANAGER, B.I.T. logo, and Rob Papen signature.
- OSC 1 & 2:** Controls for two oscillators including WAVEFORM (Saw), OCTAVE, SEMI, FINE, SYM, FEED, VOLUME, and SYNC TO 1.
- FILTER 1 & 2:** Filter sections with TYPE (-12dB Notch+ / Bypass+ / Serial+), CUTOFF, MOD WHEEL, LFO, PAN, ENV, VEL, and KEYTRACK.
- ARP:** Arpeggiator section with 16 Steps, LOCK ARP, TIED MODE, and a table of parameters.
- CHORUS:** Chorus effect section with LEN, WIDTH, SPEED, LP, HP, and MIX.
- Other sections:** PLAY MODE (Poly, Fifth, UNISON), NOISE, PITCH LFO, MOD MATRIX, OUT DISPLAY, AMP, FLANGER, PHASER, DELAY, and REVERB.

STEP	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
TIE																
SLIDE																
TUNE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VEL	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127	127
FREE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Manual

WELCOME

B.I.T. stands for Back In Time...

Instead of combining the best of analogue modelling and hybrid synthesis, as demonstrated in other Rob Papen synthesizers, B.I.T. focuses on Analogue Modelled Synthesis. Why this move you might think? The idea behind it is that the classic analogue type of synthesis has its own charm and simply was not yet covered by the Rob Papen brand. So, no spectrum waveforms, or samples inside B.I.T? Nope – it is pure Analogue Modelled Synthesis.

Although B.I.T. has no patch cables, it is modular by all means! The Modulation Matrix is used for patching. The Matrix is complemented by the smart Advanced Panel below the Oscillators. The advanced features enable you to make often used connections between LFO, Envelope and Oscillator quickly. Oscillator 1 and Oscillator 2 can modulate each other in various configurations such as Phase Modulation, Frequency Modulation and Ring Modulation.

A Rob Papen synthesizer would be incomplete without an arpeggiator. A fully featured Arp (also works in sequencer mode) is available and has a dedicated row to be used as a programmable modulation source.

The icing on the B.I.T. cake is the FX section. Some superb sounding effects are available. Our top-notch Reverb is part of B.I.T., eliminating the need to go outboard for reverb.

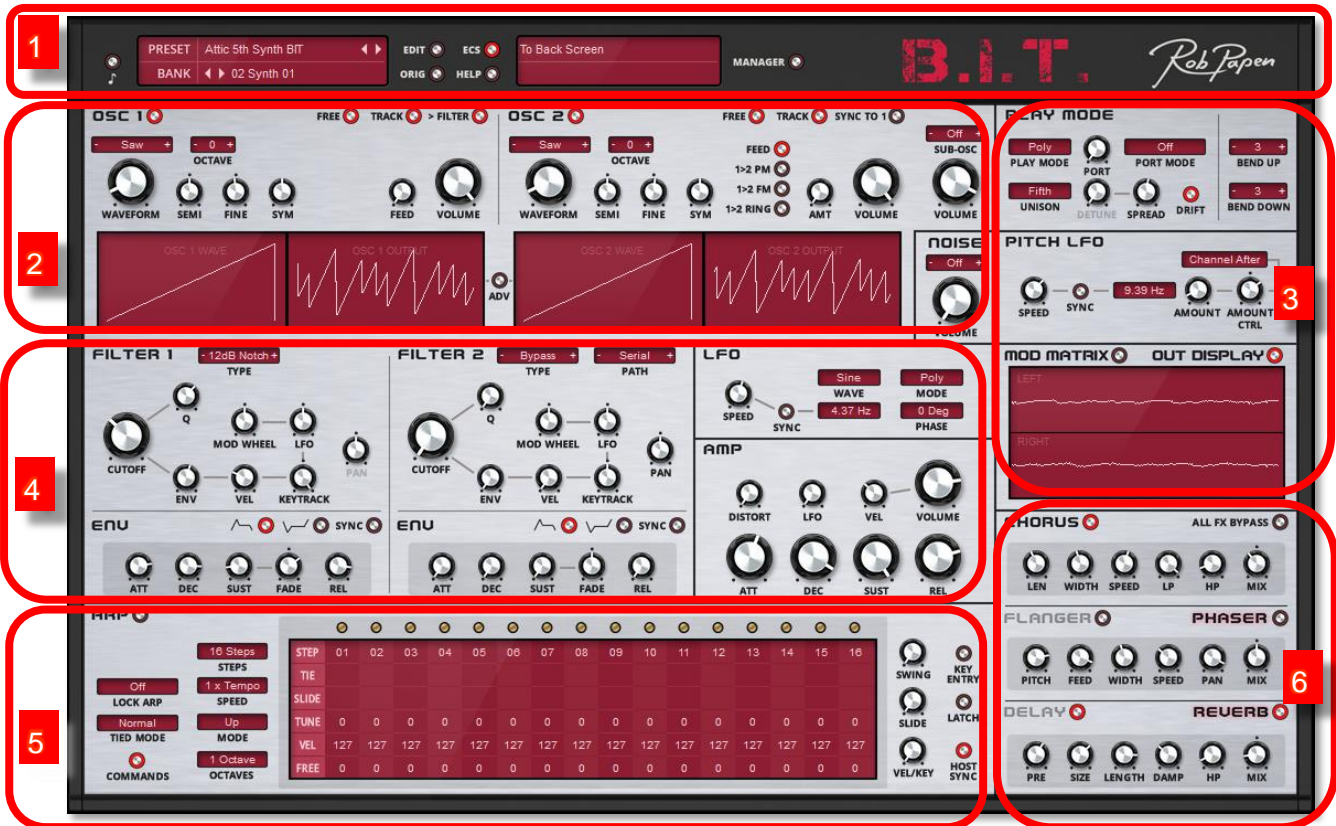
As already mentioned B.I.T. stands for Back In Time. However, we like to think of it as Be Inspired Today while using our new Analogue Modelled Synthesizer.

Enjoy!

Rob Papen and Team, June 2019

NAVIGATING B.I.T.

First, we'll give you a quick overview of B.I.T., so you can find your way around. You will find all the details that make up B.I.T. in the following chapters.



1	Presets and Globals	In this section, you select Presets and Banks and gain access to the Bank Manager, External MIDI Controller Setup and this manual. Click on the B.I.T. logo to open the Back Panel
2	Oscillators	The Oscillator area contains all the controls to adjust the parameters of the oscillators 1 and 2 and Noise Oscillator.
3	Play Mode, Modulation and Pitch LFO	Access the Play Mode settings for Polyphonic / Monophonic / Unison styles. There is a dedicated Pitch LFO for Vibrato. The modulation side is covered by an 8-slot Modulation Matrix. Not that the Mod Matrix can be switched to display the B.I.T. sound output.
4	Filter and Amplifier	This section contains the controls to shape the raw sound of the oscillators through filtering and volume control. It also includes dedicated Filter Envelopes and a modulation LFO
5	Arpeggiator	The Arpeggiator is fully programmable in 16 steps
6	Effects	B.I.T.'s effect section contains a Chorus, Phaser / Flanger, Delay and Reverb

CONTROLS

B.I.T. uses controller knobs, sliders, buttons and drop-down menus to adjust its parameters. You operate the controls with the mouse. In most cases, you click-and-hold the control and move it to the desired value. As you move the control, the readout at the top of the screen displays the parameter name and its value.

If you hold the shift-key while moving the mouse, you can make minor adjustments with high accuracy. Consider this to be a fine-tuning method. To reset a control to its default value you can either double-click or ctrl-click the control.

There are three kinds of buttons:

<i>On / Off Buttons</i>	The value toggles between On and Off with every mouse click. An example is the Free button in the oscillator section.
<i>Radio Buttons</i>	Radio buttons select one option out of several predefined settings by clicking on the desired value, as in the Filter Envelope invert buttons
<i>Trigger Buttons</i>	A Trigger Button starts an action, such as the sound preview (Note Symbol) to the left of the Preset Browser

Menus

<i>Drop-down menus</i>	Drop-down menus work similarly to radio buttons, as they select one out of many predefined values. The first click opens a menu which lists all possible values. The second click selects the value. An example is the ECS menu near the top of B.I.T.
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MIDI / Control Menu

Right clicking (or control-click on Mac) on a control opens the MIDI / control menu. This menu displays the parameter name, its current value and which MIDI control is linked (latched) to the parameter. It allows you to do the following:

- Set control values
- Assign MIDI CC numbers
- Work with modulation paths

Set Control Values

The control value menu items operate directly on the control value.

<i>Set to default</i>	Sets the control to its default value
<i>Set to Zero</i>	Sets the controller to zero (0)
<i>Set to Minimum</i>	Sets the control to its minimum value
<i>Set to Maximum</i>	Sets the control to its maximum value
<i>Set to Mid</i>	Sets the control to its medium value
<i>Set to Value</i>	Enter the value as a numerical value in a text box
<i>Set to Random</i>	Sets the control to a random value
<i>Increase</i>	Increases the control by 1% or to the next menu-entry
<i>Decrease</i>	Decreases the control by 1%.or to the previous menu-entry

MIDI Control through Latching

The Latching constructs sets up connections between MIDI Continuous Controllers (CC) and B.I.T. controls.

<i>Latch to MIDI</i>	Latches the control to the next MIDI control message received.
<i>Unlatch MIDI</i>	Clears the B.I.T. parameter from any MIDI controls.
<i>Set MIDI CC</i>	Enter the MIDI Controller as a numerical value in a text box
<i>Clear MIDI</i>	Clears all MIDI latching.

As an example, to latch Volume to an external MIDI expression controller, go through the following steps:

1. Right click on the Volume Knob
2. Select Latch to MIDI in the pop-up menu
3. Next, move the MIDI Expression controller.

From now the Expression controller will move the B.I.T. Volume knob. You can still operate the B.I.T. Volume knob directly in B.I.T. though. The latched MIDI controllers are global and will work for all Presets and active B.I.T. instruments in your host.

Note: In the Preset section you can save or load your whole MIDI (latch) controller setup to disk. This function is called ECS (External Controller Setup). For an explanation of this function, please see the ECS section later in this manual.

Modulation Settings

The third part of the MIDI / Control menu gives access to modulation routing. More details are provided in the Modulation Matrix chapter.

<i>Modulated by</i>	Displays the modulation source that controls this parameter.
<i>Set Modulation To</i>	Creates an entry in the Modulation Matrix that has this parameter as its destination.
<i>Default Modulation Slot Amount</i>	Sets all the entries in the modulation matrix that have this parameter as their destination, to the default amount.
<i>Bypass / Un-Bypass Modulation Slot</i>	Bypasses or un-bypasses all modulation matrix entries using this parameter as a destination.
<i>Clear Modulation Slot</i>	Clears all entries in the modulation matrix that have this parameter as their destination.

Drag and Drop Controls

You can drag and drop controls onto the modulation matrix. When you drop the control, the control is added to the modulation matrix.

Computer Keyboard

You can select Presets and Banks using the computer keyboard. B.I.T.'s back panel is where you enable and disable this function. To access the back panel, click on the B.I.T. logo.

<i>Up Arrow key</i>	Previous Preset.
<i>Down Arrow key</i>	Next Preset.
<i>Right Arrow key</i>	Increase Preset number by 32 (useful in the Bank Manager)
<i>Left Arrow key</i>	Decrease Preset number by 32 (useful in the Bank Manager)
<i>Page Down key</i>	Next B.I.T. Bank
<i>Page Up key</i>	Previous B.I.T. Bank

Note: Rolling the mouse wheel up and down scrolls through the Presets

PRESETS and GLOBALS



B.I.T. uses a Preset/Bank model to select and manage Presets. Please note that this is in addition to the Bank Manager section in B.I.T., which is aimed at managing Presets in the context of Folders.

To select a Preset, click on the Preset display to open the Preset Menu. The top five entries in the menu give you access to the Presets in the current Folder. They are grouped in sub-menus of 50 entries each. To step through the Presets one by one, use the < and > keys. These will take you to, respectively, the previous or next Preset in the current Folder.

Please note: The Presets are stored as individual files on your drive. The Banks are represented as Folders on disk and the Presets are files within the Folders. You may store up to 256 Presets in a Folder but have an unlimited number of Folders.

Quick Browser

The Quick Browser shows all available Folders and their Presets. When you select a Preset, the Preset itself and its corresponding Folder will be loaded.

Recently Browsed

Recently Browsed displays a list of all recently used Presets. Selecting an entry loads that Preset. The Clear Recent function removes all entries from this menu.

Favorites

Favorites shows the list of Presets that were saved in the 001 Favorites Folder. Selecting a Preset immediately loads that Preset.

Save Current Preset in Favorites

This will save the current Preset to the 001 Favorites Bank Folder. The Favorites feature is used for collecting Presets that you use often. This Folder holds up to 256 Presets. If you have more than 256 Favorites, you will need to create a new Folder. You could create one called 001 Favorites 02 for instance.

Keep in mind that this new Folder will not be used with the Save Current Presets in Favorites function. This function is hard wired (connected) to the original Favorites Folder. You can use the Bank Manager to manage multiple Favorite Folders and copy Presets between them.

Please note: B.I.T. has a feature in the Bank Manager called Star. This allows you to highlight favorite Presets and work with them as if they resided within a single Folder. The Star function and Favorites Folder complement one another and allow you to work with your most cherished sounds.

Save Preset

Save Preset writes any changes you have made to the current Preset to disk, overwriting the old version.

Save Preset As

Save Preset As writes any changes you have made to the current Preset to disk with a new name. This Preset will be saved in the current Folder.

Save Preset in Folder

Save Preset in Folder writes any changes you have made to the current Preset to disk in a Folder other than the current Folder. B.I.T. will prompt you to select the Folder you want to use.

Rename Preset

Rename Preset asks you for a new Preset name. The Preset will be then saved with the new name. The older version of the Preset is deleted.

New Preset

New Preset creates a new Preset with default settings.

Load Preset

This function loads a Preset from disk or any other attached storage, including USB drives.

Revert to Original Preset / Revert to Edit Preset

The Revert function is the same function that you find as a button in the top section of B.I.T.. It allows you to toggle between, and compare, an edited Preset and the original version of the Preset.

Clear Preset

This function sets all parameters to their default values but leaves the Preset name unchanged.

Default Preset

This function sets all parameters to their default values and sets the Preset name to Default.

Bank

B.I.T. uses a Bank menu to select and manage Bank Folders. Please note that this is in addition to using Bank Manager section in B.I.T.. To select a Bank Folder, click on the Bank display to open the Bank Menu. To step through the Banks one by one, use the Page Up and Page Down keys. These will take you to the previous and next Bank Folder.

Create New Folder

This function creates a new Folder on your hard disk in the following location (by default)

- PC: Documents\Rob Papen\B.I.T.\Bank Folder\
- Mac: Applications\Rob Papen\B.I.T.\Bank Folder\

On a PC you can select any Folder to install the Banks to in the installer, though we recommend that you use the Documents Folder.

Edit / Orig

As soon as you start editing a Preset (i.e. change a B.I.T. control), the Edit button will light up. If you click on the Orig button it will return the Preset to its original settings (please note that your edited sound is still available!). To return to the edited Preset, click on the Edit button and it will reflect all changes that you have made previously. This function allows you to compare the original Preset with the edited one, to hear the differences and impact of any parameter changes.

External Controller Setup (ECS)

B.I.T. responds to external MIDI messages to change its sound parameters dynamically. The assignment of external MIDI messages to B.I.T. controls is defined in the ECS. ECS is short for External Controller Setup. It contains all assignments of MIDI controllers to B.I.T. controls that are being targeted for real time interaction. Remember, you set each individual MIDI controller assignment by using the right button (or control-click on a Mac) menu and selecting latch to MIDI. You may unlatch MIDI controls the same way or clear all MIDI control assignments. The ECS button allows you to load and save a complete external MIDI controller setup. Once set, it is shared by all Presets and all instances of B.I.T. that are loaded in your DAW.

<i>Load ECS</i>	Load ECS opens the Folder that holds ECS set-ups. The B.I.T. installer creates a Folder called ECS that holds all ECS files
<i>Save ECS</i>	Save ECS saves the MIDI set-up you created so you may use it in other songs. It is saved as an ECS file
<i>Reset all MIDI</i>	This clears all MIDI settings for B.I.T. Useful if you want to start from scratch

Direct Access Buttons

Across the Presets and Globals section you find four buttons that give you direct access to various B.I.T. functions. These are:

<i>Manager</i>	Click to open the Bank Manager
<i>Note (C3)</i>	Click to play a C3 note to audition the current Preset
<i>ECS</i>	Click to open the ECS menu
<i>Help</i>	Click to open the B.I.T. manual

B.I.T. Logo

A click on the B.I.T. logo takes you to the Back Panel. The Back Panel hosts several global settings and infrequently accessed controls.

OSCILLATOR SECTION



At the heart of B.I.T. you find two analogue modelled Oscillators and a noise generator. The two Oscillators are similar in setup. However, Oscillator 2 has additional controls related to cross modulation with Oscillator 1 and it has a Sub-Oscillator.

In the Oscillators section, you will find an Advanced switch. The Adv switch toggles between the Oscillator's graphic waveform oscilloscope display and the Advance panel.

The Advanced panel gives you access to dedicated LFOs and Envelopes for modulation purposes. In addition, Oscillator 2 delivers Phase Modulation (PM) / Frequency Modulation (FM) and Ring Modulation. These additional features in Oscillator 2 give B.I.T. sound sculpting opportunities that lie far beyond a basic Analogue modelled synthesizer!

Oscillator 2's Sub-Oscillator generates Sinus, Square and Sawtooth waveforms. So here too the RP Team has been thinking outside the box a bit. Each Oscillator generates White Noise, Pink Noise and even Tuned Noise. There is an additional separate Noise module that provides White and Pink Noise. B.I.T. has many sound sources that combine into a very powerful Oscillator section!

Oscillator On/Off

Clicking on the LED-style buttons next to the oscillator label turns the corresponding oscillator On and Off.

Free

The Free button is used to select the reset-behaviour of the oscillator. If Free is turned Off, the oscillator waveform is reset to its initial waveform (zero phase) position each time you play a note. When Free is turned On, the Oscillator phase continues in an uninterrupted cycle, regardless whether a key is played or not. It is free-running. This can be useful in pad sounds because it spreads the initial attack part of the sound to create a lush character.

Track

The Track switch enables and disables keyboard tracking. It controls whether the oscillator pitch follows the keyboard or is fixed regardless of the note played.

Waveform

The waveform selection sets the basic shape or harmonic content of the Oscillator. It is known as its Waveform. B.I.T. has a total of 11 Waveforms: 8 classic analogue waveforms plus White Noise, Pink Noise and Tuned Noise. Tuned Noise is White Noise passed through a Band Pass Filter that is tuned to the Oscillator's pitch.

Octave

The octave control sets the base pitch of the oscillator in octave increments. An octave is equivalent to 12 semitones. The range of this control is from -4 octaves to +4 octaves.

Semi

Semi sets the root note tuning of the oscillator in semitones. The range is from -48 semitones (-4 octaves) to +48 semitones (+4 octaves).

Fine

The Fine control, next to the Semi control sets the fine-tuning of the oscillator in cents, with a range from -100 cents to +100 cents.

Sym

Sym controls the symmetry of the Oscillator waveform. This is most commonly used with the Square waveform where it changes the Pulse Width. It is also applicable to other waveforms except Noise. Use the Sym control for subtle harmonic changes.

Note: For many waveforms, symmetry changes can be interesting. The Saw waveform is an exception. The Saw's sound quality may deteriorate with symmetry changes. To avoid unwanted side-effects (as possible with the Saw wave) the Symmetry parameter will reset to zero when you select a new waveform.

BW (Tuned Noise)

When using Tuned Noise, the Sym Dial label changes to BW (Bandwidth). This control now changes the Bandwidth of the Tuned Noise Bandpass Filter. The effect ranges from noisy (very wide) to almost tonal (very narrow bandwidth).

Feed

When not in PM/FM/Ring Mod mode, Feed controls the amount of self-modulation. The Oscillator signal is fed back into itself, creating a Phase Modulation effect. With a Sine Wave as the initial waveform, turning up Feed creates a Saw-like wave. In extreme settings this turns into a Noise-like sound with high levels of feedback of feedback. The Feedback control does not work with White / Pink / Tuned Noise.

>Filter

The >Filter switch determines whether the oscillator signal is passed on to the filter. When using an oscillator as a modulation source, you may want to exclude the oscillator from the sound signal path.

Note: When Oscillator 1 is used as a modulation source for Oscillator 2 and [1>2 PM], [1>2 FM] or [1>2 Ring] are active, the Oscillator 1 [>Filter] button turns Off by default. Oscillator 1 will not feed the Filter as it is being used as a modulation source rather than as a sound source You can at any time override this setting and feed Oscillator 1 to the Filter too.

Volume

The Volume control sets the level of the Oscillator before it enters the Filter section. In PM/FM/Ring Mod modes it affects the modulation amount.

These controls can be altered via the Oscillator LFO or Envelope in the Advanced screen. More details follow later in this chapter.

Oscillator 2 Controls

Oscillator 2 can be synchronized to or modulated by Oscillator 1. Each option comes with its own set of controls.

Sync To 1

The Sync control allows you to synchronize the pitch of Oscillator 2 to the pitch of Oscillator 1. The synchronized waveform is reset every time Oscillator 1 waveform ends its cycle. This essentially cuts off the synchronized waveform and resets it to zero, in sync with oscillator 1. The reset binds the Oscillator 2 frequency to the Oscillator 1 frequency. Because of the (forced) reset, the synced oscillator waveform will undergo abrupt changes in its shape. These abrupt changes are audible as additional overtones (harmonics). The Oscillator 2 pitch control now operates as a harmonics control. To demonstrate this effect, while in Sync mode, change the pitch and detune Oscillator 2.

Sync also works with the White / Pink Noise. It creates a repeated noise output which sounds more like a heavily digitized waveform. Sync does not work with Tuned Noise.

Note: The Sync feature will also work if Oscillator 1 is turned Off.

Modulation Mode Oscillator 2

B.I.T. has 3 Modulation Modes whereby Oscillator 1 modulates Oscillator 2. The Oscillator feedback control operates within a single Oscillator only. While in any of the PM / FM / Ring Mod modes, the Feed control label changes to Mod amount. In these cases the control sets the modulation amount.

Select the Modulation Mode via the [1>2 PM], [1>2 FM] and [1>2 Ring] buttons.

Note: When Oscillator 1 is used as a modulation source for Oscillator 2 and [1>2 PM], [1>2 FM] or [1>2 Ring] are active, the Oscillator 1 [>Filter] button turns Off by default. Oscillator 1 will not feed the Filter as it is being used as a modulation source rather than as a sound source You can at any time override this setting and feed Oscillator 1 to the Filter too.

1 > 2 PM

The output of Oscillator 1 changes the phase of Oscillator 2. This is also known as Phase Modulation (PM). The modulation adds overtones to the sound. The Mod control changes the modulation amount. Increased modulation means more and louder overtones for Oscillator 2. When in PM mode, the output of Oscillator 1 to the Filter is turned Off by default.

1 > 2 FM

The output of Oscillator 1 changes the frequency of Oscillator 2. This is also known as Frequency Modulation (FM). The modulation adds overtones to the Oscillator 2 waveform. The Mod control changes the modulation amount. Increased modulation means more and louder overtones for Oscillator 2. When in FM mode, the output of Oscillator 1 to the Filter is turned Off by default.

1 > 2 Ring

The outputs of Oscillator 1 and Oscillator 2 are multiplied. This is known as Ring Modulation (Ring Mod). Ring Modulation creates a metallic sound. The Mod control sets the mix between Oscillator 2 and the Ring Modulation Signal. When in Ring Modulation mode, the output of Oscillator 1 to the Filter is turned Off by default.

Sub-Oscillator

In addition to the two main Oscillators, B.I.T. has a Sub-Oscillator. The Sub-Oscillator is linked to Oscillator 2. It is tuned one octave below Oscillator 2. Available waveforms for the Sub-Oscillator are Off (none), Sine, Saw or Square. The Sub-Oscillator Volume has its own dedicated control.

Note: In the Modulation Matrix we have included Sub-Oscillator Pitch, Volume and Symmetry as possible modulation destinations

ADVANCED CONTROLS



Each Oscillator in B.I.T. has a dedicated Sine Wave LFO and Envelope. These can be used to control the Oscillator's parameters. You can access these modules by clicking on the ADV switch.

The advanced controls are available so that you can address some of the modulation for each oscillator without the need for the Modulation Matrix. It leaves the Modulation Matrix free for other creative connections and most of all keeps JoMal happy!

Note: When any of the Advanced amount controls are non-zero (i.e. they do something), the LED colour indicates that there is an active modulation path.

OSCILLATOR 1 LFO / OSCILLATOR 2 LFO

Speed

The Speed control sets the Oscillator LFO frequency. If the Sync button is On, speed follows the host tempo.

Sync

With the Sync switch On, the Oscillator LFO speed follows the host tempo. In Sync Mode, you can use the Speed parameter to select the desired beats / divisions setting.

Free

Normally the Oscillator LFO works in Poly mode, so each note has its own Oscillator LFO. In Free Mode the Oscillator LFO is free running. In this case all notes share the same Oscillator LFO. The LFO is running continuously and does not reset when you play a new note.

Destinations / Amount

Select the Oscillator LFO modulation amount for four different destinations:

<i>Volume</i>	Modulation amount for Oscillator Volume
<i>Tuning</i>	Pitch Modulation amount. The range is from -24 to +24 semitones
<i>Sym / BW</i>	For the first 8 Waveforms: Symmetry modulation amount. For instance, use Oscillator LFO – Square Wave combination to create Pulse Width Modulation. For Tuned Noise it controls Bandwidth modulation
<i>Feed / Mod</i>	When not in PM/FM/Ring Mod Mode, this sets the Feedback Modulation amount. When in PM/FM/Ring Mod Mode, this sets the Modulation amount

Note: When any of the Advanced amount controls are non-zero (i.e. they do something), the LED colour indicates that there is an active modulation path.

OSCILLATOR 1 ENVELOPE / OSCILLATOR 2 ENVELOPE

Each Oscillator has a dedicated Envelope with Attack, Decay and Sustain segments. This Envelope does not have a Release stage. When the Decay stage is complete, the envelope maintains a Sustain level.

Sync

Sync On synchronizes the Attack and Decay times to the host tempo.

Retrigger

The Retrigger option puts the Envelope in cycle mode. Upon completion of the Decay stage, the envelope jumps to the Attack phase at the Sustain level. With the Sustain level at 0, the outcome is blend of sawtooth – triangle - inverse sawtooth, depending on the actual Attack and Decay time settings. Use the sustain level to adjust the height or amplitude of the cycled phase of modulation signal.

Destinations / Amount

Select the Oscillator LFO modulation amount for four different destinations:

<i>Volume</i>	Modulation amount for Oscillator Volume
<i>Tuning</i>	Pitch Modulation amount. The range is from -24 to +24 semitones
<i>Sym / BW</i>	For the first 8 Waveforms: Symmetry modulation amount. For instance, use Oscillator LFO – Square Wave combination to create Pulse Width Modulation. For Tuned Noise it controls Bandwidth modulation
<i>Feed / Mod</i>	When not in PM/FM/Ring Mod Mode, this sets the Feedback Modulation amount. When in PM/FM/Ring Mod Mode, this sets the Modulation amount

Note: When any of the Advanced amount controls are non-zero (i.e. they do something), the LED colour indicates that there is an active modulation path.

Additional Modulation of the Oscillator section.

In addition to the controls available on screen, more Oscillator parameters are available in the Modulation Matrix as modulation sources and modulation destinations. These are listed below and further explained in the Modulation Matrix section.

Oscillator Modulation Destinations

- Oscillator 1 / 2 Phase – Phase of the Oscillators.
- Oscillator 1 / 2 LFO Phase – Phase of the Oscillator's LFO, so that the LFO can start a position other than zero.
- Sub-Oscillator Semi-tune, Symmetry and Phase – controls the Tuning, Symmetry (useful in combination with the Square wave for Pulse-Width Modulation) and phase of the Sub-Oscillator.

Oscillator Modulation Sources

- You can use the Oscillators LFO and Envelopes as modulation sources in the [Modulation Matrix].
- You can also use the LFOs and Envelopes multiplied together help craft more complex sources.
- You can also use the outputs of Oscillator 1, Oscillator 2, and Oscillator 1 + 2 as modulation sources, this allows the Oscillators to modulate their own (or the other Oscillator) parameters, plus anything else, for example the Filter Frequency. Here we start getting creative...

NOISE OSCILLATOR

B.I.T. incorporates a separate Noise Oscillator. Its controls are Noise Volume and Noise Type (White and Pink).

FILTER SECTION



B.I.T. includes two high quality analogue modelled filters that apply subtractive filtering to the soundwaves generated by the oscillators. The filters have their most used modulation parameters hard-wired in the B.I.T. structure, such as Envelope, Velocity and Modulation Wheel. The controls are the same for both Filter 1 and Filter 2. The Filters can be connected in several configurations. The Filter Mode defines how the filters are connected.

<i>Serial</i>	Oscillators 1 and 2 feed Filter 1. Filter 1 is followed by Filter 2 and the audio follows its path through the output stages from there.
<i>Split Osc</i>	<p>Oscillator 1 and the Noise Oscillator are the source for Filter 1. Oscillator 2 and again the Noise Oscillator make their way into Filter 2. A mix between the Filter 1 and Filter 2 outputs follows through the output stages (Amplifier and FX). The output volume of the Filters can be set by using Filter Volume as a modulation destination in the Modulation Matrix.</p> <p>Note: When [1>2 PM], [1>2 FM] or [1>2 Ring] are active, the Oscillator-1 [>Filter] button turns Off by default. The Oscillator 1 output is prevented from going into the Filter. It is only used for modulating Oscillator 2. You can undo this default setting at any time. If you don't hear any sound in Filter 1 from Oscillator 1, please check and see if the >Filter button is On.</p>
<i>Split Noise</i>	<p>Oscillator 1 and 2 are the source for Filter 1. The Noise Oscillator only makes its way into Filter 2. A mix between the Filter 1 and Filter 2 outputs follows through the output stages (Amplifier and FX). The output volume of the Filters can be set by using Filter Volume as a modulation destination in the Modulation Matrix.</p> <p>Note: When 1>2 PM, 1>2 FM or 1>2 Ring are active, the Oscillator 1 >Filter button turns Off by default. The Oscillator 1 output is prevented from going into the Filter. It is only used for modulating Oscillator 2. You can undo this default setting at any time. If you don't hear any sound in Filter 1 from Oscillator 1, please check and see if the >Filter button is On.</p>

FILTER CONTROLS

Frequency

The Cutoff Frequency sets the frequency above or below which the Filter begins to filter out frequencies. For instance, if you set the Cutoff to 2000Hz and use a 12dB Lowpass filter, it reduces any frequencies above 2000Hz, and frequencies at 4000Hz will be reduced by 12dB. The Cutoff frequency can be static at a single programmed frequency, but for more dynamic sounds, try modulating the Cutoff Frequency with the Filter Envelope, Keyboard tracking, Modulation Wheel and LFO.

Q (Resonance)

Q is the resonance level of the filter. Resonance emphasizes frequencies at and directly around the filter cutoff frequency and creates a peak in the frequency spectrum. As you increase the Resonance, the effect becomes more pronounced until the Filter self-oscillates. In the Comb Filter the Resonance controls the amount of feedback.

Filter Type

<i>Bypass</i>	The filter is in bypass mode and any sound passes through unaffected
<i>12dB LowPass</i>	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 12dB per octave.
<i>12dB HighPass</i>	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 12dB per octave. The filter is fully open if the Cutoff frequency control knob is turned fully counter-clockwise.
<i>12dB BandPass</i>	This Filter mode is a combination of 12dB Low Pass and 12dB High Pass Filters. Only those frequencies near the Filter Cutoff frequency pass through (a band of frequencies). The resonance (Q), controls the width of the band. Frequencies below and above the Cutoff frequency are filtered out.
<i>12dB Notch</i>	The band of frequencies around the Filter Cutoff frequency is reduced in volume (12dB / octave). The Resonance controls the width of the band. Frequencies below and above the Cutoff frequency are passed through unaffected.
<i>12dB LPZ</i>	The 12dB LPZ Filter is a zero delay, analog modelled 12 db Low Pass filter
<i>12dB HPZ</i>	The 12dB HPZ Filter is a zero delay, analog modelled 12 db High Pass filter

<i>12dB BPZ</i>	The 12dB BPZ Filter is a zero delay, analog modelled 12 db High Pass filter
<i>12dB NPZ</i>	The 12dB NPZ Filter is a zero delay, analog modelled 12 db Notch filter

<i>24dB LowPass I</i>	Low frequencies pass through this filter; those above the Cutoff frequency are reduced by 24dB per octave.
<i>24dB LowPass II</i>	This Filter operates in the same way as the 24db Lowpass Filter Type 1, but has a different tonal character.
<i>24dB HighPass</i>	High frequencies pass through this filter; those below the Cutoff frequency are reduced by 24dB per octave. The filter is fully open if the Cutoff frequency control knob is turned fully counter-clockwise.
<i>24dB BandPass</i>	This Filter mode is a combination of 24dB Lowpass and 24dB Highpass Filters. Only those frequencies near the Filter Cutoff frequency pass through (a band of frequencies). The resonance (Q), controls the width of the band. Frequencies below and above the Cutoff frequency are filtered out.
<i>24dB Notch</i>	The band of frequencies around the Filter Cutoff frequency is reduced in volume (24dB / octave). The Resonance controls the width of the band. Frequencies below and above the Cutoff frequency are passed through unaffected.

<i>24dB LPZ</i>	The 24dB LPZ Filter is a zero delay, analog modelled 24 db Low Pass filter
<i>24dB HPZ</i>	The 24dB HPZ Filter is a zero delay, analog modelled 24 db High Pass filter
<i>24dB BPZ</i>	The 24dB BPZ Filter is a zero delay, analog modelled 24 db High Pass filter
<i>24dB NPZ</i>	The 24dB NPZ Filter is a zero delay, analog modelled 24 db Notch filter

<i>Comb Positive</i>	This filter type is based on a very short delay. It emphasizes the comb filter frequency. The Cutoff frequency controls the length of the delay. Resonance (Q) controls the feedback of the filter.
<i>Vowel</i>	The Vowel Filter creates a voice-like character. The Vowel control (repurposed Q control) morphs the vowel from a, via e-i-o to u.

Cutoff Frequency Modulation

Velocity (Vel)

Velocity modulation changes the Filter 1/2 Frequency based on how hard you strike the keys (its velocity). If B.I.T. is in Arp mode, any Arpeggiator velocity settings will change the Filter 1/2 Frequency.

Key Track

Key tracking affects Cutoff Frequency modulation based on note position. Typically, the Cutoff frequency increases, i.e. the Filter opens, with notes played higher on the keyboard. When you use negative modulation values, the Filter 1/2 Frequency decreases with increased pitch.

LFO

The LFO amount controls how much the Free LFO changes the Cutoff frequency. It can be used with positive or negative modulation amounts. The centre position represents no modulation.

Modulation Wheel

The Mod Wheel control sets the level of Cutoff modulation by the Modulation Wheel. It is a hard-wired modulation path.

Filter Pan

The Filter Pan controls set the panning position the Filters. In serial mode, only Filter 2 has a Pan control because that is the only Filter hooked into the output sections. In Split Osc and Split Noise modes both filters have a pan control as both Filters feed the output independently.

Filter Envelope

Each Filter has its own Envelope section. The Filter Envelope appears below the other filter controls.

The Filter Envelope Amount controls how much the Filter Envelope alters the Filter Cutoff Frequency.

An Envelope is a time-based modulation section in a synthesizer. When you play a key, the Envelope moves from 0% to 100% and back to 0% when you release the key. The Envelope is made up of five segments. The first part is known as the Attack. The Attack control represents the time it takes to reach 100%. The second part is known as the Decay and controls the time it takes to reach the Sustain level. The Sustain level is the level maintained while the key is being held. Finally, when you release the key, the Release segment sets the time for the Envelope level to return to 0%.

An additional Envelope feature of B.I.T. is Fade. Fade operates as a second Attack or Decay stage and starts as soon as the Decay reaches the Sustain level. Positive values take the Envelope from the Sustain level up to 100%. Negative values take the Envelope from the Sustain level down to 0%.

To hear the full effect of the Filter Envelope you should open the Env amount, which you can find in the Filter section.

Attack

An Envelope rises from 0 to 100% and back to 0% when the key is released. Attack controls how quickly it rises to 100%. The further you open the Attack control, the longer it takes to reach 100%. An Attack time of 0 start the Envelope instantly at full level (100%).

Decay

After the Attack stage, with the Envelope at 100%, the Decay stage begins. Decay reduces the Envelope level to the Sustain level over a set time. If you use a long Decay, it takes longer to reach the Sustain level. If the Sustain level is 100% the Decay stage plays no role as the Sustain level is reached immediately after the Attack stage.

Sustain

Sustain is a level control. After the Attack and Decay stage, the Envelope reaches the Sustain level and remains at this level while you hold the key. Sustain level in the Filter Envelope represents the Cutoff Frequency while you hold the key(s).

Sustain Fade

If the Fade is set to 0 (Off), the Sustain works as a classic Sustain. If you open the Fade amount clockwise it creates a second Attack stage. In this case when the Decay reaches the Sustain level, the Envelope level starts to rise to 100% in the time set by the Fade control. If you turn the Fade control counter-clockwise it creates a second Decay. In this case, when the Decay reaches the Sustain level, the Envelope level starts to fall to 0% in the time set by the Fade control.

Release

When you release a key (note), the Release stage starts. The Envelope drops from its current level to 0%, in a time set by the Release control.

Env mode Normal/Inverted

Normal mode for the Envelope is default. The Envelope has a positive movement/modulation of the Filter Cutoff Frequency. The Inverted mode moves the Filter Cutoff Frequency in the opposite direction. The result of this is that the Attack behaves sound-wise as a Decay and the Decay becomes an upwards movement. The symbols used next to the button indicate this. Normal mode is the most commonly used, however you will find that many a classic synth employ an inverted filter envelope.

Sync

The Sync switch (in the On position) synchronizes the Filter Envelope Attack, Decay, Fade and Release times to the tempo of the host.

AMPLIFIER



While the oscillator section controls the pitch and the filter section the timbre, the amplifier section is responsible for the volume. It amplifies the signal and controls the volume.

Note that since B.I.T. is a virtual synthesizer, the amplification of the Filter signal is not really happening/needed. For a good understanding of the signal flow however, and the general naming conventions used in

subtractive synthesis, we still refer to the Amplifier Section.

A very nice feature is the distortion control in the AMP section. The distortion operates on a per voice level. This means that each voice (B.I.T. is capable of playing 16 voices simultaneously) has its own distortion. It ensures that the level of distortion is controlled, programmable and predicatable, even when playing polyphonically.

An important component of the amplifier section is the Volume Envelope. The envelope defines the loudness contour. The amplifier section also contains the velocity control. This sets the response of B.I.T. to the velocity information.

Volume

The Volume sets the overall volume of the Presets. Use this control to adjust the relative volumes between Presets in a Bank.

Distortion

The Amplifier incorporates a Distortion section. In practice, it increases the volume of the signal and adds distortion (additional overtones) to the signal. The Amount control sets the level of distortion.

What makes it special is that it gives each B.I.T. voice its own distortion! When you play multiple notes, each note maintains its own Distortion effect. This gives you more control over the overall sound compared to having all voices going through a single distortion unit.

Velocity (Vel)

The Velocity control determines how the volume responds to changes in note velocity. It applies to notes played on a keyboard and those triggered by the B.I.T. arpeggiator.

AMP Volume Envelope

An Envelope generates a time-based modulation signal. When triggered – typically by playing a note – it moves from 0% up to 100% and back to 0% when you release the key. The Volume Envelope determines the volume contour of a sound.

Attack

The first part is known as the Attack stage. It represents the time it takes for the Envelope to reach 100%. If you open the Attack knob, it takes longer to go from 0 to 100%. With Attack closed, the Envelope starts at 100%.

Decay

After the Attack stage, with the Envelope at 100%, the Decay stage starts. The Decay stage brings the volume down to the Sustain level. If the Sustain is set to 50 %, the Decay brings the Volume down to 50% and stays there for as long as the key is held. If you use a high Decay settings, it will take a longer time to reach the Sustain level. This is useful for evolving pad sounds. Short Decay times are a good ingredient for percussive sounds. If the Sustain level is 100% the impact of the Decay stage is effectively eliminated.

The Sustain stage is characterized by a (Sustain) level setting. After the Attack and Decay stage, the Envelope reaches the sustain stage and remains here for as long as you hold a key. The sustain level is the volume of this sustain stage and as such is main control for the perceived volume of a sound.

Release

The Envelope Release stage starts when you release a key. The Envelope fades out from the sustain level to 0% in the time set by the Release control.

PLAY MODE



The Play Mode section contains controls to set the Play settings for B.I.T.. It defines how B.I.T. responds to notes played, either polyphonic / monophonic or by passing them on to the Arpeggiator

Play Mode

<i>Poly</i>	Multiple notes (up to 16) can be played at the same time. B.I.T. is polyphonic
<i>Mono</i>	Only a single note can be played at a time. Any new note will stop the previous note.
<i>Mono Hi</i>	Mono Hi plays like Mono Mode but only notes above any held note are played
<i>Mono Lo</i>	Mono Lo plays like Mono Mode but only notes lower than any held note are played
<i>Legato</i>	Legato mode is similar to mono mode and plays a single note at a time. If you play overlapping notes, the Envelopes and LFOs will not retrigger for the new note. The pitch is the only thing that changes.
<i>Legato Hi</i>	Legato Hi plays like Legato Mode but only notes above any held note are played
<i>Legato Lo</i>	Legato Lo plays like Legato Mode but only notes lower than any held note are played
<i>Arpeggiator</i>	The Arpeggiator is active and is triggered by the first note played. Please see the Arpeggiator Chapter for details on all the Arpeggiator settings.

Port Mode

Portamento creates a glide effect whereby the pitch change between notes is a gradual one. The Portamento Speed defines the time it takes to transition from one note's pitch to another.

Portamento operates in the following modes:

<i>None</i>	No portamento.
<i>Constant Rate</i>	The note pitch changes at a constant rate from one note to the next. Larger note intervals take a longer time.
<i>Constant Time</i>	The note pitch changes between notes always take the same time, regardless of the note interval.
<i>Held Rate</i>	The Held Rate mode works the same as Constant Rate, but only affects overlapping notes (legato style)
<i>Held Time</i>	The Held Time mode works the same as Constant Time, but only affects overlapping notes (legato style)

(Portamento) Amount

The Amount control sets the rate or time for the portamento effect.

Unison

In Unison mode, B.I.T. plays up-to 4 unison voices, for each note played. This works at an Oscillator / Filter level, so you can still play up to 16 voices in poly mode.

The Unison detune parameter changes the pitch slightly for all these voices. This gives you an extremely rich sounding stack of voices. The Unison parameters are an excellent tool for creating fat lead sounds or pads.

B.I.T.'s Unison can also be used to play chords, so you can press a single note and a chord is played. This is especially creative when used in the Arpeggiator, since you can set each step to play a different Unison mode / chord!

And each Unison voice can have Pitch, Volume, Pan and Filter Frequency as a modulation destination, giving you great control over the Unison voices. You will need to program this in the MOD (modulation) section of B.I.T.

The table below lists the Unison modes:

<i>Unison 2 – 4</i>	This combines multiple voices for each note played. If you use the Unison detune all voices are detuned resulting in a fatter sound.
<i>2 Octave</i>	Plays 2 voices for each note played. B.I.T. at normal pitch, the other one octave up. Unison detune has no effect in this Unison mode.
<i>3 Octave</i>	Plays 3 voices for each note played. B.I.T. at normal pitch, a second one octave down and the third one, one octave up. Unison detune has no effect in this Unison mode.
<i>2 SP</i>	Plays the original note plus an additional note one octave below. Both will play in Unison 2 mode, so a total of 4 voices will play for each note that is played.
<i>Major to Diminished 7th</i>	Plays the selected chord instead of playing the voices in unison. With the pressed note as the base note. For instance, Major will play the base note, then the 2 nd voice 4 semitones up from the base note, and the 3 rd voice 7 semitones up from the base note. The chords added are 3 or 4 voice chords. Note: the Unison detune parameter has no effect in this Unison modes.

Detune Amount

Unison Detune Amount controls the level of detuning between the stacked voices in Unison 2/3/4 play modes. It creates a natural chorus effect.

Note: With Major up to Diminished 7th chord settings, detune is deactivated.

Stereo Spread

Stereo spread places the unison voices in a stereo image, and in doing so widens the sound and creates a spatial effect. In modes with 2 unison voices they are panned left and right, in those with 3 unison voices they are panned left, panned right and centred.

Pitch Bend Up / Down

The maximum range for the Pitch Bend wheel is defined through separate Up and Down amounts. The unit used is semitones.

Drift

When the Drift switch is engaged, the Oscillators exhibit Analog Drift as experienced with early analogue synthesizers. It results in a very slight and slow shift in tuning over time. For continuous rock-solid tuning, keep Drift Off.

PITCH LFO



The Pitch LFO is a dedicated sinus LFO which is used for vibrato-effects. Its workings are similar to the other LFOs in B.I.T. It is a global module, so all voices use the same Pitch LFO.

Speed parameter.

Speed sets the Pitch LFO frequency. It determines speed of the vibrato effect.

Sync

If you turn Sync On, the speed of the Pitch LFO will be based on the tempo of the host DAW. This enables it to synchronize with the song tempo. To find the right setting manually you need to adjust the Speed parameter.

Amount

The Amount parameter controls the depth (strength) of the vibrato effect. At the maximum setting, the pitch goes up and down by one semitone.

Amount Control and Modulation Source

This is where you can adjust how much the Pitch LFO Amount value is changed by the modulation source and which modulation source is used. It can be a positive or a negative amount and thus lets you increase the modulation or decrease the modulation.

ARPEGGIATOR



B.I.T. incorporates a classic style Arpeggiator. If you select the Sequencer mode, it works as a classic analogue style sequencer.

An Arpeggiator (Arp) plays a chord as individual notes in sequence. For example, if you play a C-major chord, the Arpeggiator will first play the C, then the E and finally the G. Depending on the Arpeggiator mode, it will then cycle through these notes again and again, up and down until you release the notes. The Arpeggiator has controls for making rhythmic patterns, and offers Tune, Tie, Velocity and a Free parameter for each step. The Free row can be used in the Modulation Matrix to control the other B.I.T. parameters.

Other features of B.I.T.s Arpeggiator include Sequencer Mode and Modulation Mode. The latter may be used in the Non-Arpeggiator Play modes Poly, Mono and Legato. The Arpeggiator becomes a Modulation Source.

To turn on the arpeggiator, select arpeggiator (Arp) in the Play Mode section or click the On button in the Arpeggiator screen.

Arpeggiator Screen

The Arpeggiator has up to 16 steps. Per step you can set the following values:

<i>Step Number</i>	Click on a Step Number to Mute/ Unmute it
<i>Tie</i>	Tie links the step to the previous steps and as such extends the note lengths.
<i>Slide</i>	Slides the pitch from one step to the next. The slide rate is set by the Slide control.
<i>Tune</i>	Each step has a range of -3 octaves to +3 octaves in semitones.
<i>Vel</i>	Vel defines the Velocity value of the step.
<i>Free</i>	The Free property can be used in the Modulation Matrix as a modulation source.

What follows is a listing of Arpeggiator controls that affect the Arpeggiator as a whole and that apply to all steps

Steps

The number of steps in the arpeggiator ranges from 1 – 16.

Speed

This control sets the speed of the arpeggiator relative to the speed of your DAW, for example 2 x tempo or ¼ x tempo.

Arp Mode

The arpeggiator mode controls the order in which the arpeggiator plays its notes

<i>Up</i>	The notes are played from low to high
<i>Down</i>	The notes are played from high to low
<i>Up/Down</i>	The notes are played from low to high followed by from high to low
<i>Down/Up</i>	The notes are played from high to low followed by from low to high
<i>Random</i>	The notes are played in random order
<i>Ordered</i>	The notes are played in the order in which they were triggered, i.e. first note played first, and last note played last
<i>Rev. Ordered</i>	The notes are played in the reverse order in which they were triggered, i.e. last note played first, and first note played last
<i>Ordered Up/Down</i>	The notes are played from first to last followed by last to first
<i>Ordered Down/Up</i>	The notes are played from last to first followed by first to last
<i>Chord</i>	The arpeggiator plays all notes as chord in a rhythmic pattern
<i>Mod Source</i>	<p>The Arpeggiator can be used as a modulator. This is to be used if the Play mode is Poly, Mono or Legato.</p> <p>Note: the Arpeggiator switches to Off the moment you select Modulator as mode. However, it will still run through its steps for modulation purposes.</p>
<i>Sequencer</i>	<p><i>In this mode the Arpeggiator acts as a sequencer and plays the programmed pitches relative to the played note. It continues playing in sequence with every new note played.</i></p> <p><i>Note: The Octave setting remains active, which allows you to create more complex sequences.</i></p>
<i>Sequencer Reset</i>	<p>In this mode the Arpeggiator acts as a sequencer and plays the programmed pitches relative to the played note. The Sequencer Resets to step 1 with every new note played.</p> <p>Note: The Octave setting remains active, which allows you to create more complex sequences.</p>

Octave

The octave setting gives you the option to play the arpeggiated notes in multiple octaves, relative to the original notes. For example, an octave setting of 2 means that the original notes will play first, followed by the same notes one octave higher.

Note: The [Octave] setting remains active also if the [Sequencer] or the [Sequencer Reset] mode is active.

Tie Mode

Tied mode lets you select whether tied steps use their own programmed values for Tuning, Velocity etc or use the values of the step they are tied to. The options are:

<i>Normal</i>	Tied steps do not have individual slide, tune, velocity and free settings.
<i>Special</i>	Tied steps do have still individual slide, tune, velocity and free settings.
<i>Toggle 1</i>	The Arpeggiator alternates between Special Mode and Normal Mode (Special Mode on the first cycle).
<i>Toggle 2</i>	The Arpeggiator alternates between Normal Mode and Special Mode (Normal Mode on the first cycle).

Lock Mode

Lock Mode locks the current Arpeggiator sequence. It keeps it going even when you change Presets. There are 3 modes:

<i>Off</i>	Lock is turned Off.
<i>On</i>	Lock is turned On. The Arpeggiator sequence carries over between a change of Presets, but it can't be modified. It will not change the new Preset.
<i>Set</i>	The current (locked) Arpeggiator sequence is saved with the new Preset. Locking is turned off in the new Preset.

Swing

Swing is a control that allows you to change the rhythmic feel of the arpeggiator. It does this by slightly moving every other note relative a fixed timing grid. Whether it suits your work depends very much of the musical piece you are working on, so you we encourage you to experiment with different values here.

Slide

Slide works as an intra-sequence portamento. It sets the time it takes for the pitch to change from the selected step to the next.

Vel / Key

The velocity of the steps in the arpeggiator sequence can be controlled by their programmed values, by the velocity of the key played that is used to trigger the arpeggiator or a combination of both. The Vel / Key control sets the balance between these.

Host Sync

The Host Sync switch synchronises the arpeggiator with your DAW's tempo. It will start on a quarter beat and is On by default.

Latch

Latch frees your hands. When latch is turned on you don't need to keep holding notes for the arpeggiator to continue playing. Tip: you can use also the sustain pedal to latch and unlatch the arpeggiator.

Key Entry

This switch enables keyboard entry of the notes in the Arpeggiator sequencer. A value of 0 is used as middle C.

Arpeggiator Command Menu

The Arpeggiator command menu allows you to Edit, Copy, Paste, Clear, Save and Load Arpeggiator settings. A right click in the Arpeggiator or the Command menu button activates this menu.

LFO



B.I.T. has an LFO that generates modulation signals that can be used as a source in the Modulation Matrix. The LFO also has hardwired connections to Filter 1 and Filter 2.

Mode

The Mode setting determines the running and reset behavior of the LFO in relation to key triggers.

<i>Poly</i>	In poly mode, each note played has its own LFO.
<i>Free</i>	The LFO is free running and all the notes share the same LFO. The LFO is always running and does not reset when you play a new note.
<i>Mono</i>	Similar to free mode. All notes share the same LFO. However, for every new note in Mono mode, the LFO is reset to its initial phase (start position)

Waveform type

The available waveforms are Sine, Triangle, Saw Up, Saw Down, Square and S&H. The waveform determines the modulation pattern of the LFO. Sinus and Triangle are often used because these move the LFO up and down in a smooth fashion. The other waveforms are more suitable for a more pronounced impact or special effects.

Phase

The Phase sets the starting point of the LFO waveform. It is measured in degrees, where 0 equals the start of the wave, 90 is a quarter in, 180 is the halfway point and 270 is 3 quarters through. In practice, this lets you choose the start level of the Oscillator. The actual level depends on the selected waveform.

LFO Speed

The speed control determines how fast the LFO cycles through its selected waveform. It is measured either in hertz (cycles per second) (Sync Off) or note lengths (Sync On).

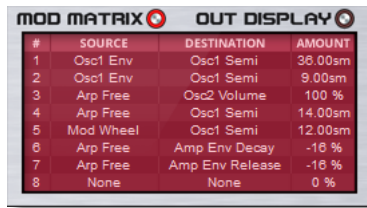
LFO Sync Off / On

If you turn Sync On, the Speed of the LFO will follow your DAW. It will synchronise with the song tempo. In Sync Mode, please use the Speed parameter to select the desired beats / divisions setting.

Modulation Controls

As well as the Free LFO visible controls, you can also change the LFO Shape / Symmetry (this is useful for changing the pulse-width of the Square LFO wave) and the smooth the LFO output via the modulation matrix.

MODULATION MATRIX / OUTPUT DISPLAY



#	SOURCE	DESTINATION	AMOUNT
1	Osc1 Env	Osc1 Semi	36.00sm
2	Osc1 Env	Osc1 Semi	9.00sm
3	Arp Free	Osc2 Volume	100 %
4	Arp Free	Osc1 Semi	14.00sm
5	Mod Wheel	Osc1 Semi	12.00sm
6	Arp Free	Amp Env Decay	-16 %
7	Arp Free	Amp Env Release	-16 %
8	None	None	0 %

The Modulation Matrix allows you to dynamically alter B.I.T.'s parameters. As modulation sources you can apply internal modules such as Envelopes and LFOs, and external MIDI Controllers such as Pitch Bend, Aftertouch and other control messages defined in the MIDI-standard.

Note: In this section you can also select OUT DISPLAY as an alternative view. It displays, in real time, the waveform of the main output of B.I.T.

The last selected view, being MOD MATRIX or OUT DISPLAY will also remain active if you change between presets.

By default, B.I.T. will start up with the OUT DISPLAY selected.

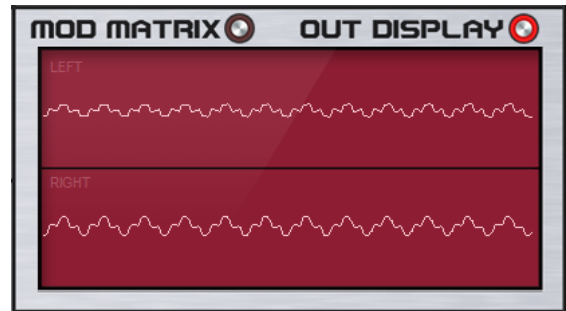
There are eight separate Modulation Matrix slots.

The Bypass / Slot column enables you to turn individual modulation paths On and Off by clicking on the number. When in bypass-mode, the modulation slot is shown in grey.

The Source column gives you access to all modulation sources.

The Destination column lists all possible modulation destinations.

In the Amount column, you define the modulation strength for each modulation slot. It sets the level of impact that the modulation source has on its destination or target. It speaks for itself that depending on the selected source and the amount the effect ranges from subtle variations to outrageous manipulation. The amount control displays its value relative to its destination as a percentage. As an example, a modulation amount of 25% represents a quarter of the total parameter range, in a positive direction.



FX SECTION



B.I.T. features 4 FX units. First comes the Chorus unit, followed by either a Flanger or a Phaser effect. Next comes a Delay, with a Reverb at the end of the chain.

Each of these FX can be turned On and Off individually. You have to make a choice between using a Flanger or Phaser effect.

The effect units are connected in series: The signal flow is:

Chorus → Flanger / Phaser → Delay → Reverb

The All FX Bypass button switches all FX units in bypass mode.

The Mix control sets the balance between the input signal and the processed signal. In the fully counter-clockwise position you'll hear the unprocessed signal only. In the fully clockwise position only the effect signal can be heard.

Chorus

The chorus effect combines the original signal with one or more copies of the input. All copies are slightly delayed. The effect simulates multiple players playing the same music. In practice, it creates a richer sound. An LFO is used to modulate the delay time(s)

<i>Length</i>	Length sets the delay time used to create the Chorus effect
<i>Width</i>	Width sets the maximum modulation amount of the delay time (length)
<i>Speed</i>	Speed sets the frequency of the LFO that drives the delay time modulation.
<i>LP Filter</i>	LP Filter sets the low pass filter frequency applied to the chorus effect.
<i>HP Filter</i>	HP Filter sets the high pass filter frequency applied to the chorus effect.

Flanger / Phaser

B.I.T. has two modulation effects, the Flanger and the Phaser. Select between them using the Flanger / Phaser button. There is dedicated button to turn the modulation effect unit On and Off On / Off.

Flanger

The Flanger effect is created by creating two copies of the sound source with one of these subject to a very short modulated delay. In contrast with the chorus effect, the delay time is even shorter. The result is an enriched signal with comb filter characteristics. It is sometimes described as a whooshing sound.

<i>Length</i>	Length sets the delay time used to create the flanger effect
<i>Width</i>	Width sets the maximum modulation amount of the delay time (length)
<i>Speed</i>	Speed sets the frequency of the LFO that drives the delay time modulation.
<i>Feedback</i>	Feedback determines how much of the delayed signal is fed back to its input. In the context of the Flanger effect, increased feedback creates a more pronounced effect with a high level of resonance peaks.
<i>Pan Mod</i>	Pan sets the amount of panning modulation

Phaser

A phaser uses several comb filters that create moving peaks and troughs in the frequency spectrum. It gives the effect of continuous movement in the sound.

<i>Pitch</i>	Pitch sets the initial frequency of the comb filters
<i>Feedback</i>	Feedback determines how much of the phased signal is fed back to its input
<i>Width</i>	Width sets the maximum amount of modulation of the filters
<i>Speed</i>	Speed determines how fast the filters move through the frequency spectrum
<i>Pan Mod</i>	Pan sets the amount of panning modulation

Delay / Reverb

B.I.T. incorporates Delay and Reverb effects that can be used simultaneously. The signal flows through the Delay first, and then moves on to the Reverb. The controls on display are selected by the Delay / Reverb button. The effects can be turned On / Off individually.

Delay

The stereo delay is made up of two tempo-based delays. Each of the audio channels (Left and Right) uses its own delay line. This effect type is useful for making deep pad sounds if you use different delay times for left and right, e.g. 1/8* (Left) and 1/4 (right).

<i>Left Delay</i>	Left Delay sets the delay time for the left channel.
<i>Right Delay</i>	Right Delay sets the delay time for the right channel.
<i>Sync</i>	When Sync is turned On, the length of the delays (in quarter beats) is synced to the tempo of the host. When it is Off the delay time is set in milliseconds.
<i>Feedback</i>	Feedback determines how much of the delayed signal is fed back to its input. It is useful for creating dense delay patterns.
<i>LP Filter</i>	The LP Filter applies a low-pass filter to the delayed signal. The control sets the filter frequency. Use it in combination with the feedback control
<i>HP Filter</i>	The HP Filter reduces the low frequency content in the delayed signal. The control sets the filter frequency. Use it to take out some of the woolliness of the delayed signal.

Reverb

This effect reproduces the sound of acoustics in rooms using different sizes and reflections.

<i>Pre-Delay</i>	Pre-delay determines the time it takes for the first reverb reflections to appear
<i>Size</i>	The Size control represents the size of the reverberation room.
<i>Length</i>	Length sets the duration of the reverb
<i>Damp</i>	The Damping control sets the amount of low-pass filtering applied to the early reflections of the reverb signal
<i>HP Filter</i>	The high pass filter is applied to the overall reverb signal. The HP Filter control sets the HP Filter Frequency. Use it when the input signal contains many low frequencies and the reverb signal becomes boomy.

BANK and PRESET MANAGEMENT



In the Manager Section, you find and organize your Presets and Banks. A click on the Manager button opens the Preset Manager page. Click on it once more to return to the Main page.

There are four sections: Presets, Find, Search Category and Set Category. For each section, the Banks are visible on the right-hand side.

PRESET MANAGER

Click on the Preset button to open the Preset screen. This lists the Presets in the current Folder (Bank). Presets in B.I.T. are single.fxp files stored in Folders (Banks), you can have up-to 256 Presets in a single Folder.

In the Preset screen, the current Preset is highlighted in red, and clicking on a Preset will load it. Shift - clicking allows you to select a range of Presets and Ctrl - clicking allows you to select non-consecutive Presets. A right click on a Preset, previews it.

Star Presets

While in the Preset screen in the Bank Manager you can mark any Preset with a Star if you like the Preset. The Star appears after each Preset name and can be checked and unchecked with a mouse click. With so many Presets available in B.I.T., the Star system helps you to recall favourite Presets that you encountered in previous B.I.T. sessions.

To filter on Star-marked Presets, click on the Star symbol adjacent to the Preset button. B.I.T. will only display Star Presets.

Behind the scenes, B.I.T. builds a file that contains all the Star Presets. This can be found in your documents Folder (see below). Use this file to back-up your Star settings or to use your Preset selection on a 2nd computer system.

The file that holds the Star info is called Star.txt. It can be found here in the following locations:

- PC: Documents\Rob Papen\B.I.T.\Bank Folder\Star.txt
- Mac: Applications\Rob Papen\B.I.T.\Bank Folder\Star.txt

We recommend to backup this file regularly and copy it over to a 2nd system if you have B.I.T. installed there too.

Preset Commands

<i>Select All</i>	Selects all Presets.
<i>Unselect All</i>	Deselects all Presets.
<i>Load</i>	Loads a Preset using a file dialog screen. B.I.T. will attempt to move to the current Folder for this Preset. If it can't then it will put it in the 98 Unsaved Preset Folder.
<i>Save</i>	Overwrites the current Preset with any changes you have made to it.
<i>Save As</i>	Saves the current Preset with a different name, the original Preset still exists.
<i>Copy</i>	Copies the current or selected Presets.
<i>Cut</i>	Copies the current or selected Presets, but when you paste them the original Preset(s) are deleted.
<i>Paste</i>	Pastes the last copied Presets. This is primary used for copying Presets from one Folder to another.
<i>New</i>	Creates a new Preset with default settings.
<i>Delete</i>	Deletes the current or selected Presets. When a Preset is deleted, the extension of its name is changed to.~fx from.fxp, so you can recover it manually.
<i>Rename</i>	Renames the current Preset. This means that the original version is deleted (its extension is changed from to.~fx), and the Preset is saved with the new name.

If in doing any of the above you create too many Presets for that Folder (I.e. over 256), then the Preset is moved to the 98 Overflow Preset Folder.

Find



Clicking on the Find button shows the Find Preset screen. This allows you to search through all the Banks for Presets that are named in the search for text box.

To search for the text “Seq”, for instance you enter “Seq” in the “Search For” box, and then press “Find”, and all Presets that contain the string “Seq” will be listed”. Presets are displayed in the format B[Bank no][Preset no]Name of Presets, and Presets in the current Bank are shown against an aqua background. The current Preset is highlighted in red.

Clicking on a found Preset will load it. Unless you have saved the current Preset, any changes will be lost. Right Clicking on a found Preset will preview it. Clicking on Clear will clear the search.

Search Category

The screenshot displays the 'SEARCH CATEGORY' screen in the B.I.T. software. At the top, there are controls for 'PRESET' (Default) and 'BANK' (00 Introduction), along with 'EDIT', 'ECS', 'Search Tags in Presets Screen', and 'MANAGER' buttons. The 'B.I.T.' logo and 'Rob Papen' signature are visible in the top right. The main interface is divided into sections: 'PRESET MANAGER', 'FIND PRESET', 'SEARCH CATEGORY', 'SET CATEGORY', and 'BANK MANAGER'. The 'SEARCH CATEGORY' section is active, showing a grid of preset categories and their associated tags. The categories are 'TYPE', 'PERCUSSION', 'TEMPO / FEEL', and 'TIMBRE'. The 'TYPE' column lists various instrument types like Lead, Bass, Synth, etc. The 'PERCUSSION' column lists sounds like Percussion, Melodic Percussion, Brass, etc. The 'TEMPO / FEEL' column lists characteristics like Tempo Synced, Slow, Fast, etc. The 'TIMBRE' column lists sound qualities like Dark, Bright, Distorted, etc. Below the grid is a 'CLEAR' button. The bottom of the screen has a toolbar with buttons for 'SELECT ALL', 'UNSELECT ALL', 'LOAD', 'SAVE', 'SAVE AS', 'COPY', 'CUT', 'PASTE', 'NEW', 'DELETE', 'RENAME', 'COPY', 'RENAME', 'NEW', 'DELETE', and 'UPDATE'. The 'BANK MANAGER' section on the right shows a list of banks and folders, with '00 Introduction' selected.

Clicking on the Search Category button opens the category search screen. In B.I.T., Presets can have tags in the categories Type, Tempo/Feel and Timbre. Clicking on a tag in a category will toggle that tag. The Preset section will show all Presets with a matching tag.

As with Find, Presets are listed in the format B[Bank no][Preset no]Name of Presets. Presets in the current Bank are highlighted with a light red background. The current Preset is also highlighted in red. Clicking on a found Preset will load it. Unless you have saved the current Preset, any changes will be lost. Right Clicking on a found Preset will preview it.

Clicking on Clear will clear the current search tags.

Set Category



Clicking on the Set Category button displays the Set Category screen. Here you can set the tags for the Presets in the current Bank, clicking on a tag will toggle it On / Off. You can select Presets and set their tags. These tags will be saved with this Preset when you click on Apply and Save.

You can select ranges of Presets with shift + left click (for continuous ranges) or ctrl + left click for non-continuous sets of Presets. Select All selects all Presets in the current Folder and Unselect will deselect all Presets in the current Folder. In these ranges all tags are visible. If all selected Presets share a tag, their background is highlighted in light red. If the Presets do not share the tag, the tag is shown against a darker red background.

Clicking on Clear will clear all tags for the selected Presets.

Clicking on Set to Current, will set the tags for all the selected Presets to the tags for the current Preset.

Clicking on Combine Selected will set the tags for the selected Presets to be the combination of the individual Presets tags. For example, if you have two Presets selected and one Preset has the tag “Bass”, and other the tag “Dark”, after pressing Combine Selected, both Presets will have both tags i.e. “Bass” & “Dark”.

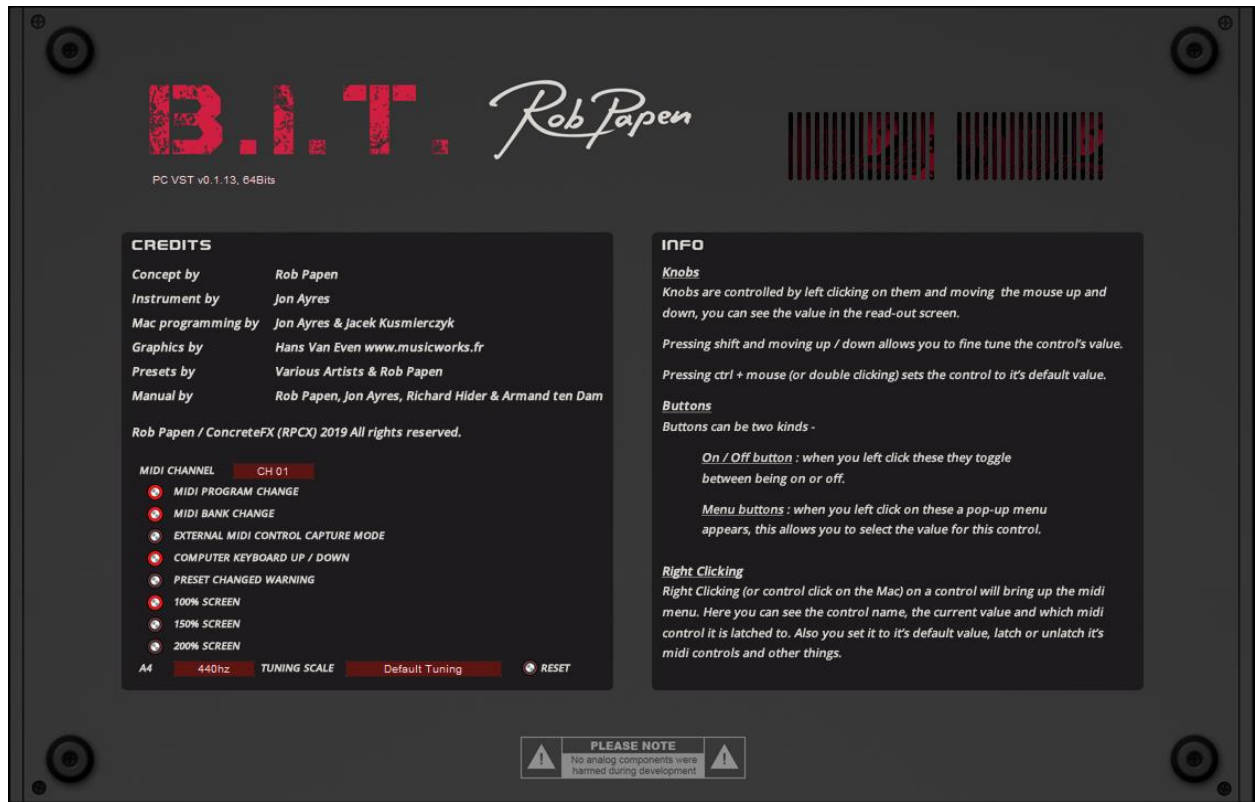
BANK MANAGER

The Banks are always visible on the right side of the Manager screen. In B.I.T., Banks are Folders on your hard drive in which Presets are stored. In the Bank Screen, the current Bank is highlighted in red. A click on a Bank loads it and moving the scroll bar on the right scrolls through available Banks.

Bank Commands

<i>Copy</i>	Copies the current Folder; all the Presets in that Folder are copied to this new Folder.
<i>New</i>	Creates a new Folder.
<i>Delete</i>	Deletes the current Folder, by renaming it to ~[original name of Folder]. For example, deleting the Bass Folder will cause it to be renamed as ~Bass, so you can recover it later if you need to.
<i>Rename</i>	Renames the current Folder, deleting the original Folder (by renaming it with a ~ as explained above).
<i>Update</i>	Rebuilds B.I.T.'s Folder and Preset structure. You may do this if you have changed B.I.T. Presets or Folders outside of B.I.T..

BACK PANEL



A click on the B.I.T. logo reveals the back panel. The back panel contains several global controls that affect all instances of B.I.T.. Typically, the settings you make here are of the type Set-and-Forget; i.e. you only need to do it once right after installation of the plug-in. Think of these as a collection of preferences.

MIDI Channel

The MIDI Channel setting selects the MIDI channel to which B.I.T. will respond. The Omni-setting means that B.I.T. responds to messages on any MIDI-channel.

MIDI Program / Bank Change

These switches enable B.I.T. to respond to MIDI Bank Select and MIDI Program Change commands to select Banks and Presets. If set to Off, B.I.T. will ignore any Program Change and Bank Select commands received over MIDI.

External MIDI Control Capture Mode

The Capture Mode switch, when enabled, ignores incoming MIDI controller messages that are latched to a B.I.T. control, until the value of the MIDI controller matches that of the value of the B.I.T. control. It prevents sudden jumps in parameter values that otherwise may occur as soon as you touch a latched external MIDI controller.

Computer Keyboard on/off

When enabled, you can leaf through the Presets and Banks using the computer-keyboard. The assigned keys are:

<i>Up Arrow Button</i>	Previous Preset
<i>Down Arrow Button</i>	Next Preset
<i>Left Arrow Button</i>	Decrease Preset number by 32
<i>Right Arrow Button</i>	Increase Preset number by 32
<i>Page Up</i>	Previous B.I.T. Bank
<i>Page Down</i>	Next B.I.T. Bank

Preset Changed Warning

With the Warning button turned On, B.I.T. will warn you when you try to change Presets and your current Preset has not been saved yet.

Screen Options

The B.I.T. plugin can work in various screen size options. Choose between 100%, 150% and 200% size. Depending on the host (DAW), you may need to close and re-open B.I.T., or close and re-open the project for the changes to take effect. You can also select the size options in the Preset menu.

A4

A4 sets the reference tuning for B.I.T.. The default frequency is A4 440 Hz.

Tuning

It is possible to work with alternative tuning scales. B.I.T. comes with several tuning definition tables upon installation. These are accessible through a drop-down menu. Click on the current tuning name to display all the available tuning scales. Simply select the required scale from the menu. Be aware that this setting affects all instances and sounds of B.I.T.. Click on the Reset label to revert to Standard Tuning.

APPENDIX 1 – MODULATION SOURCES

None

MIDI Source Modulations
Mod Wheel
Mod/After - Modulation-wheel or aftertouch
Channel After – Channel Aftertouch
Poly After – Poly Aftertouch
Velocity
Pitch Bend
Breath
Foot
Expression
CC16
CC17
CC18
CC19
CC20
CC21
CC84
CC85
CC86
CC87
CC88
CC89
CC90
Note – Modulation value from 0% (MIDI Note 0) to 100% (MIDI Note 127)
Centre Note – Modulation value centred at MIDI Note 57, going up an Octave increases it by 100%, down by 100%.
Note Random 1 – Random value generated when note pressed from -100 to +100%
Note Random 2

UniPolar Note Random 1 – Random value generated when note pressed from 0 to +100%

UniPolar Note Random 2

Osc 1 Modulation Sources

Osc 1 LFO – Polar Oscillator 1 LFO output from -100% to +100%

Unipolar Osc 1 LFO – Unipolar Oscillator 1 LFO output from 0 to +100%

Osc 1 Envelope

Osc 1 Envelope x Osc 1 LFO – Oscillator 1 LFO multiplied by envelope

Osc 2 Modulation Sources

Osc 2 LFO – Polar Oscillator 2 LFO output from -100 to +100%

Unipolar Osc 2 LFO – Unipolar Oscillator 2 LFO output from 0 to +100%

Osc 1 x 2 – Oscillator 1 LFO multiplied by Oscillator 2 LFO

Unipolar Osc 1 x 2 – Unipolar Oscillator 1 LFO multiplied by Oscillator 2 LFO

Osc 2 Envelope

Osc 2 Envelope x Osc 2 LFO – Oscillator 2 LFO multiplied by envelope

Osc 1 x 2 Envelope – Oscillator 1 Envelope multiplied by Oscillator 2 Envelope

<i>Modulation Mod Sources</i>
<i>Pitch LFO</i>
<i>UniPolar Pitch LFO</i>
<i>Free LFO</i>
<i>UniPolar Free LFO</i>
<i>Filter 1 Envelope</i>
<i>Filter 2 Envelope</i>
<i>Arp Velocity</i>
<i>Arp Free</i>

<i>Output Mod Sources</i>
<i>Oscillator 1 Output</i>
<i>Oscillator 2 Output</i>
<i>Oscillator 1 + 2 Output</i>
<i>Filter 1 Output</i>
<i>Filter 2 Output</i>
<i>Output</i>
<i>Offset – Constant 100% value</i>
<i>White Noise</i>
<i>UniPolar White Noise</i>
<i>Pink Noise</i>
<i>UniPolar Pink Noise</i>

Note: UniPolar LFO / Noise modulation sources range from 0 to 100%. The regular LFO / Noise modulation sources range from -100% to 100%

APPENDIX 2 – MODULATION DESTINATIONS

None

Global – Main Control destinations

Portamento Amount

Global Semi-Tune

Global Fine-Tune

Arp Speed

Arp Swing

Arp Velocity/Key

Pitch LFO Speed

Pitch LFO Amount

Unison – these destinations allow you to control each of the 4 unison voices individually

Unison Detune

Unison Stereo Spread

Unison Semi-Tune 2-4

Unison Semi-Tune 2

Unison Semi-Tune 3

Unison Semi-Tune 4

Unison Fine-Tune 2-4

Unison Fine-Tune 2

Unison Fine-Tune 3

Unison Fine-Tune 4

Unison Volume 2-4

Unison Volume 2

Unison Volume 3

Unison Volume 4

Unison Pan 2-4

Unison Pan 2

Unison Pan 3

Unison Pan 4

Unison 2 -4

Unison Filter 2

Unison Filter 3

Unison Filter 4

Oscillator 1 – Oscillator 1 destinations

Osc 1 Volume

Osc 1 Semi-Tune

Osc 1 Fine-Tune

Osc 1 Sym/BW

Osc 1 Feed

Osc 1 Phase

Osc 1 LFO Speed

Osc 1 LFO Phase

Osc 1 LFO > Volume

Osc 1 LFO > Tune

Osc 1 LFO > Sym/BW

Osc 1 LFO > Feed

Osc 1 Envelope Speed

Osc 1 Envelope Attack

Osc 1 Envelope Decay

Osc 1 Envelope Sustain

Osc 1 Envelope > Volume

Osc 1 Envelope > Tune

Osc 1 Envelope > Sym/BW

Osc 1 Envelope > Feed

Oscillator 2 – Oscillator 2 destinations*Osc 2 Volume**Osc 2 Semi-Tune**Osc 2 Fine-Tune**Osc 2 Sym/BW**Osc 2 Feed/Mod**Osc 2 Phase**Osc 2 LFO Speed**Osc 2 LFO Phase**Osc 2 LFO > Volume**Osc 2 LFO > Tune**Osc 2 LFO > Sym/BW**Osc 2 LFO > Feed/Mod**Osc 2 Envelope Speed**Osc 2 Envelope Attack**Osc 2 Envelope Decay**Osc 2 Envelope Sustain**Osc 2 Envelope > Volume**Osc 2 Envelope > Tune**Osc 2 Envelope > Sym/BW**Osc 2 Envelope > Feed/Mod***Sub-Osc + Noise – Sub-Oscillator & Noise Oscillator destinations***Sub-Osc Volume**Sub-Osc Semi-Tune**Sub-Osc Symmetry**Sub-Osc Phase**Noise Osc Volume***Filter 1***Filter 1 Frequency**Filter 1 Q**LFO > Filter 1 Frequency**Filter 1 Envelope Amount**Filter 1 Envelope Speed**Filter 1 Envelope Attack**Filter 1 Envelope Decay**Filter 1 Envelope Sustain**Filter 1 Envelope Fade**Filter 1 Envelope Release**Filter 1 Output**Filter 1 Pan***Filter 2***Filter 2 Frequency**Filter 2 Q**LFO > Filter 2 Frequency**Filter 2 Envelope Amount**Filter 2 Envelope Speed**Filter 2 Envelope Attack**Filter 2 Envelope Decay**Filter 2 Envelope Sustain**Filter 2 Envelope Fade**Filter 2 Envelope Release**Filter 2 Output**Filter 2 Pan*

Amp – Amp destinations

Main Volume

Distort Amount

Main Pan

LFO > Volume

Amp Envelope Speed

Amp Envelope Attack

Amp Envelope Decay

Amp Envelope Sustain

Amp Envelope Release

Mod – LFO / Modulation Matrix destinations

Free LFO Speed

Free LFO Phase

Free LFO Shape

Free LFO Phase

Mod 1 Amount

Mod 2 Amount

Mod 3 Amount

Mod 4 Amount

Mod 5 Amount

Mod 6 Amount

Mod 7 Amount

Mod 8 Amount

FX – Destination for the Chorus, Phaser / Flanger, Delay & Reverb.

Chorus Length

Chorus Width

Chorus Speed

Chorus LP

Chorus HP

Chorus Mix

Flanger Length

Flanger Width

Flanger Speed

Flanger Feedback

Flanger Pan Mod

Flanger Mix

Phaser Pitch

Phaser Feedback

Phaser Width

Phaser Speed

Phaser Pan Mod

Phaser Mix

Delay Left Length

Delay Right Length

Delay Length

Delay Fine Length

Delay Feedback

Delay LP

Delay HP

Delay Mix

Reverb Pre-Delay

Reverb Size

Reverb Length

Reverb Damp

Reverb HighPass

Reverb Mix