

SB 404

Realtime Step Sequencer Bass

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Forward

Congratulations on your purchase of the SB 404! You now own a highly flexible monophonic synthesizer which, especially with its integrated realtime Step Sequencer, is well suited not only for studio work, but for live performance as well. With 32 keyboard addressable patterns available, it's easy to create variations of performances on the fly. You can also synchronize the SB 404 to any external sequencer with an external MIDI clock.

In designing this synthesizer, we made sure that all important tempo-dependent parameters remain synchronized when using MIDI Clock sync. Therefore, not only is the rate of the sequencer controlled, so are the delay times and the frequencies of filter LFOs. Modulations and delays always remain in sync with the tempo.

The range of sounds you can create with the SB 404 is very wide and not limited to bass sounds as the name perhaps suggests. The 'Bass' implied in the name refers to the conceptual origin of this synthesizer which, among others, is its godfather - the TB 303. The tone generators, filter section and integrated sequencer have been greatly extended to make the SB 404 an ideal general purpose monophonic synth. By using the onboard effects, combined with the delays and sequencer programming, you can create sounds that are hard to believe are monophonic.

From the beginning, the SB 404 was designed to be a high performance instrument in which the tone generation and sequencer are very closely related. It is not so much intended to be used 'manually' - with the sequencer turned off. Of course, this is possible, but you will have to forgo all the modulation possibilities the sequencer offers.

Overview of Tone Production in the SB 404

The SB 404 features 2 oscillators and a noise generator. The two oscillators differ in the waveforms they can produce. The first can generate waveforms from sine to sawtooth, while the second generates sine, rectangle, and pulse waves. Each oscillator is infinitely variable between the sine and sawtooth or rectangle waveforms. The rectangle oscillator has an adjustable pulse width, so it is capable of producing pulse waveforms. The pulse width can be modulated by external sources. Finally, the noise generator produces white noise.

These three signals are mixed and sent to the filters. The filters are connected in series, and can be activated and adjusted independently. The signal passes first through a comb filter, and then a 24 dB low pass filter. Each filter has a resonance parameter that can be modulated by several sources.

Modulation sources include a filter envelope in the form of an AHD curve, a synchronizable LFO, and the Step Sequencer. The filters can also be influenced by the current note in play (key follow).

After the filter stage, the signal arrives at the amplifier (VCA) which is also controlled by an AHD envelope generator. In both the filter and the amplitude envelopes the decay times can be controlled dynamically by the sequencer. Therefore, notes of different lengths can be sequenced.

Still downstream from the amplifier lies the effect section. Here the signal first passes through the effect processor (which can be deactivated) and then to a freely adjustable single band parametric equalizer. The special feature of this EQ is that the filter frequency can be modulated by the filter LFO.

The last two processors the signal has yet to pass through are the Chorus and finally a Stereo Delay. These can be switched on or off and adjusted independently. The delay responds to changes in tempo, as it is synchronized to the MIDI clock (internal or external). For this reason delay times are set as note values, and not in milliseconds.

Overview of the Integrated Sequencer

Probably the SB 404's most powerful source of modulation is the integrated Step Sequencer. It's four 'tracks' enable modulation of all the SB 404's most interesting sound control parameters.

On Track 1 you determine at each step whether a note is to be played or not.

Track 2 is reserved for pitch modulation only. You can use this track to create complex tone sequences. The pitch on this track is not specified in fixed note values, but in relative offsets (distance from the basic pitch). This track automatically adjusts the pitch of the current note.

Track 3 is assigned to control the frequencies of the comb and low-pass filters when desired. It can also modulate the pan, decay times of the AHD envelopes, and the volume. You can choose which to enable using the switches above their respective controllers.

Track 4 can also be used as an alternative to control pan, the decay of the AHD envelopes, and the volume.

By combining the options of tracks 3 and 4 you can create a multiplicity of different rhythms and accents. For example, you could extend the decay time of an AHD envelope whenever the filter is opened, or you could pan the signal to the right on accented steps. Or, you could simulate a guitar by shortening the decay times of the filter envelope for all unaccented 16th notes. The possibilities are endless for creating almost any style you can imagine.

Managing Presets in the SB 404

Like all CreamWare devices, the SB 404 offers a Preset capability. Your sonic creations can be stored and reloaded later.

The Step Editor features its own preset handler so you can load and store patterns separately from sound settings. Of course, not all patterns will be appropriate for all sounds. This is because usually the patterns were designed in coordination with the sound parameter adjustments. For example - a pattern contains a track to open a filter, and it works fine with the original sound. It's possible that, due to the setting of a modulation intensity control (e.g. off) a newly loaded sound will not respond at all. For this reason, the step sequencer parameters are stored with an SB 404 preset. This way, each sound preset can have its own 32 patterns.

If you want to combine a new sound with the sequences of another, store the other sound's pattern as a preset, load the new sound, and then load the stored sequencer preset into it. Now the 32 patterns are available to you in the new sound preset. If there are certain sequences that you will want to use with several sound presets, store them as independent sequences, and name them in such a way as to make their identification meaningful as general sequences.

If you want to transfer only a single pattern into a new sound, use the Copy/Paste buttons below the Pattern Select buttons. First select the sound that contains the sequence with the desired pattern, then select the desired pattern and click on Copy. The pattern is now stored in a temporary buffer. Now load the desired sound preset and select the pattern you want to replace, and click on Paste to copy the contents of the buffer to the new location.

Each of the two previously described activities will affect the entire current preset, and will be written along with it if you store it. Yet it is also possible to 'try out' a few sounds with a particular pattern. To do this, enable the Freeze Preset option next to the Preset button on the Step Sequencer. Now you can load SB404 presets without transferring their associated patterns. Be careful to remember that if you overwrite the preset by storing it, you will lose the patterns you replaced. To avoid this and protect existing combinations, store the preset under a different name.

Tone Generation

The Oscillator Stage

The SB 404 features two oscillators and a noise generator. The sum of these three signals is mixed and passed through to the processing stages.

Adjustable parameters in detail:

Saw Level: Adjusts the level of the sawtooth oscillator. To help with level adjustments, the levels of the two oscillators are dependent on each other. Whether you are using one or two oscillators, the signal level passed to the filter section will be at 0 dB at full volume. When adjusted to full volume, each oscillator is attenuated by about 6 dB to avoid overloading (digital clipping).

Coarse: Sets the coarse tuning of the sawtooth or pulse oscillators in semitones. The range is +/- 24 semitones.



Fine: Adjusts the fine tuning of the sawtooth or pulse oscillators in cents. The range is +/- 50 Cents.

Sine-Saw: The oscillator can output a continuously variable waveform. The shape is infinitely variable from sine to sawtooth.

Pulse Level: Adjusts the level of the Pulse oscillator. To help with level adjustments, the levels of the two oscillators are dependent on each other. Whether you are using one or two oscillators, the signal level passed to the filter section will be at 0 dB at full volume. When adjusted to full volume, each oscillator is attenuated by about 6 dB to avoid overloading (digital clipping).

Sine-Rect: The oscillator can output a continuously variable waveform. The shape is infinitely variable from sine to rectangle.

PW: Adjusts the pulse width of the Pulse oscillator. Hard left produces a rectangle wave; hard right a pulse.

Filter LFO: Controls the modulation intensity of the filter LFOs on the pulse width.

Filter Env: Controls the modulation intensity of the filter envelope on the pulse width.



Noise Level: In addition to the two oscillators, a white noise signal is also available. This signal level is independent of the two oscillators, and maximum volume is delivered to the filter stage at 0 dB. If the oscillators are at full volume, and you add a high volume of noise, distortion will result. Lower the oscillator volumes to rectify this.

Oscillator Options

Click on the Options button to make additional optional settings.

Coarse Tune Saw/Pulse: These two text fields display the coarse tuning of the two oscillators numerically. These are normally adjusted on the main panel, but you can input them here directly in numerical format.

Pitch Mod Filter Env: Adjust the intensity of the influence of the filter envelope on the pitch of the oscillators.

MIDI Trans: Sets the overall transposition of the MIDI note number in the range of +/- 24 semitones.



The Filter Stage

The SB 404 features two filters which can be used simultaneously in series. The first filter is a comb filter. This filter is most effective on a rich audio spectrum. Signals too close to a pure, sine waveform will not reveal the effect very much.

The comb filter is especially effective at higher resonance settings. At lower settings it is rather subdued. Since the comb filter can magnify certain frequencies strongly, the level must be reduced to avoid distortion - but you don't have to worry about this. The level is reduced automatically when the filter is engaged. Note that the signal will be attenuated somewhat in this case.

Downstream from the comb filter is the 24 dB low-pass filter. This filter, too, produces little of an effect on a signal too near a sine wave. It needs a broad spectrum so it has something to filter out! Enrich the oscillator signals by adjusting them away from the sine waveform.

Adjustable Parameters in Detail:

On/Off: Switch over or under the filter name enables or disables the respective filter. If the filter is disabled, it uses no DSP resources.

Cutoff: Controls the frequency at which the signal will begin to be attenuated.

Res: Adjusts the resonance settings of the two filters. The two filters respond very differently to this setting. Whereas with the comb filter high resonance settings are required to create a strong effect, the effect is audible in the low-pass filter at much lower settings.

Env: Controls the intensity of the filter envelope on the modulation of the filter frequency.



Seq Mod: Controls the intensity of the sequencer on the modulation of the filter frequency.

LFO Mod: Controls the intensity of the filter LFO on the modulation of the filter frequency.

Key Follow: Enable Key Follow if you want the filter frequency to respond to the keyboard position (See 'Filter Key Follow' below).

The Filter Envelope

The SB 404 features an AHD envelope which can be used to modulate the filter frequencies. AHD signifies that the filter uses three stages - Attack, Hold and Decay. The attack stage will always reach the maximum level of amplitude, at which point it is held for the time specified in the Hold parameter. After that, the decay stage starts to dampen the signal to 0 according to the decay time.

Attack: Sets the time it takes for the amplitude to reach maximum level.

S: Adjusts the slope characteristic of the Attack phase. It can be adjusted from linear to exponential.

Hold: Sets the length of time at which the note will be held at maximum level.

Decay: Sets the time it takes for the signal amplitude to fall to 0 after the Hold stage.

S: Adjusts the slope characteristic of the Decay phase. It can be adjusted from linear to exponential.



Seq Decay: Sets the intensity of the sequencer over the Decay time modulation. The modulation can be adjusted positively or negatively. When the sequencer transmits values above 0 the decay time will be shortened or lengthened according to the value.

Track Selector: Selects one of two sequencer tracks to be used as a modulation source. The yellow switch on the left is for the filter-dedicated track. The blue switch on the right is for the Free track.

Filter Key Follow

The two frequencies of the filters in the SB 404 can be modified by the pitch. This takes place in the filter section, and the following parameters control the response.



Note: Sets the note which will not influence the frequency set in the filter section for Key Follow. Depending on the setting of the Amount controller, the filter frequency will be increased or decreased for notes above or below this setting.

Amount: Adjusts the degree to which the filter frequency will be modulated by the keyboard position. Positive values increase the amount of modulation - higher for keys above the **Note** setting, and lower for notes lying below. Negative values imply the opposite. A value of 100% means that the filter frequency is adjusted one octave for each octave in the keyboard position.

Filter-LFO

The Filter LFO is a Clock synchronous LFO used to modulate the filter frequencies. You can also use it to control the frequency of the equalizer, and the pulse width of the pulse oscillator. Refer to the relevant sections for information on setting the intensity of the modulation.

The LFO generates a triangle wave with a variable start phase. The following parameters can be adjusted:

Phase: Sets the start phase of the LFO. The range is $\pm 180^\circ$. For example, you could set the LFO to start on either a rising or a falling slope. This setting is meaningful only if the **Retrigger** option is enabled.

Bars: Adjusts the 'frequency' of the LFO. Since the LFO frequency is coupled to the tempo (clock), the rate is adjusted in terms of 'clocks' consisting of the 16 steps in a 'Bar'. (Note that if you reduce the length of a pattern, the LFO speed does not change). You can adjust the range of the LFO from 0.5 to 8 clocks.



Fade In: Determines the amount of time it takes the modulation output to reach full amplitude. The signal can be set to fade in for up to two seconds. Fade In is only effective if Retrigger is enabled.

Retrigger: Enable this option if you want to have the LFO start at its adjusted phase position each time a key is pressed. The retriggering occurs only if the previous note was released before the new note starts. If you play legato, letting the tones overlap, the LFO will not retrigger. You can use this effectively to change the pitch or the pattern while the modulation remains uninfluenced by the clock - and thus obtain very long modulations.

The Amplitude Stage

The amplitude of the SB 404 can be further modified by both the AHD envelope and the step sequencer. Among other things, this allows you to set up accented beats.



Parameters in Detail:

Attack: Sets the time it takes for the envelope to reach maximum level.

S: Adjusts the slope characteristic of the Attack phase. It can be adjusted from linear to exponential.

Hold: Sets the length of time at which the envelope will be held at maximum level.

Decay: Sets the time it takes for the envelope to fall to 0 after the Hold stage.

S: Adjusts the slope characteristic of the Decay phase. It can be adjusted from linear to exponential.

Seq Decay: Sets the intensity of the sequencer modulation over the Decay time. The modulation can be adjusted positively or negatively. When the sequencer transmits values above 0 the decay time will be shortened or lengthened according to the value.

Track Selector: Selects one of two sequencer tracks to be used as a modulation source. The yellow switch on the left is for the Filter Track. The blue switch on the right is for the Free Track.

SeqVel: Sets the intensity of the step sequencer modulation on the volume. At the leftmost setting, all notes are played at the same volume. At maximum, only the strongest signals will be played.

The Effect Stage

The SB 404 provides a suite of integrated effects to enhance the basic synthesizer sounds. The order in which the effects are processed is as follows:

- Distortion
- Equalizer
- Panorama
- Chorus
- Delay

Use the Option switch to add further options to the Chorus and Delay effects.



Distortion

The Distortion effect provides a simple distortion processor with only a single parameter control. Note that high distortion values lead to an increase in level, and the inputs of subsequent effects may need to be adjusted to avoid overloading. If you do not need the effect, you can disable it with the Dist button. In this case, the effect uses no DSP power.



Dist. Level: Adjusts the intensity of the distortion. You may choose to limit the frequency spectrum of the input signal using the low-pass filter, or Saw/Pulse Sine control as this process can produce significant additional overtones.

Equalizer

The effect stage offers a single band parametric equalizer with a frequency that can be modulated by a filter LFO.

EQ InGain: If the input signal is already quite high, and you wish to process it in a way that will increase the volume (i.e. increase the distortion) you must adjust the input gain first to create the necessary headroom. To reduce the signal by about 12 dB, adjust the control to around the two o'clock position. The center position adjusts the signal to about -16 dB. Use the Clip LED to the right of the gain control to help with the adjustment. This displays overflows at the output of the EQ which can help you find the appropriate input sensitivity.

Freq.: Adjusts the value of the center frequency you want to cut or boost. You can also enter the value numerically in the text field under the controller.

LFO: Sets the intensity of the frequency modulation of the filter LFO signal.



Q: Sets the 'quality' of the filter. This narrows or widens the range of frequencies around the center frequency that will be affected by the EQ.

Gain: The gain control adjusts the cut or boost by a maximum of about 12 dB. At high boost levels it may be necessary to reduce the input gain in order to avoid overloading.

Panorama-Modulation

The SB 404's signal can be pan modulated by the Step Sequencer. You can use either the Filter track, or the Free track.

SeqPan: Adjusts the intensity of the pan modulation. With the control set to the left, there is no modulation, and the sound will be centered in the stereo field. When set fully to the right, the pan will shift from a maximum of hard left to hard right depending on left/right values in the sequencer.

Track Selector: Selects one of two sequencer tracks to be used as a modulation source. The yellow switch on the left is for the Filter Track. The blue switch on the right is for the Free Track.



Stereo Chorus

The second to last effect is the Chorus - used to enrich the sound. This effect features extra, optional parameters you can enable through the Options button in the Effect section. You can disable the Chorus using the switch to the right of the name. When disabled, the effect uses no DSP power.

Depth: Sets the modulation depth of the Chorus effect.

Level: Adjusts the level of the effect portion of the signal. Occasionally it may be necessary to reduce the level of the dry signal to avoid distortion. This setting is made in the effect Options.

Stereo Delay

The last effect in the chain is the Stereo Delay, with two delay lines. The delay times are coupled with the overall timing of the system. This means that if you increase the tempo, the delay times will be reduced accordingly.

You can disable the effect using the switch to the right. As usual, when the effect is disabled, it uses no DSP resources.

Level: Sets the level of the effect portion to be mixed into the signal.

Feedback: This control effectively sets the number of repetitions of the echo.

Additional parameters for the Delay are found in the Effect Options.

Important note: The delay does not immediately adjust itself to tempo changes, but only when a new key is played and the previous key is not hold. It is not possible to follow tempo changes of a MIDI clock continuously.

Effect Options

To keep the user interface clean and simple, some of the less frequently used parameter settings have been placed together in Effect Options. Here you will find additional settings for the Chorus and Delay.



Chorus Options

Dry: Adjust the level of the dry signal here. In some cases it may be necessary to reduce this level to avoid distortion. In other cases you may want to reduce the dry signal to favor the effect signal in the output.

Rate: Controls the speed of the modulation of the Chorus.

Phase: You can adjust a phase offset between the left and right channels here. The adjustable rate is from -180° to $+180^\circ$.

Delay Options

Tap1/2: Here you adjust the delay times for the two delay lines. Since times are relative to the tempo, note values are used rather than time values. The following values are allowed:

1/1

1/2p, 1/2, 1/2T

1/4p, 1/4, 1/4T

1/8p, 1/8, 1/8T

1/16p, 1/16

('p' stands for 'dotted', and 'T' stands for 'triplet')

The Wheel Section

ModWheel: The SB 404 features a Modwheel controller on its front panel which is connected to Controller 1 as per the MIDI standard. Controller 1 transmits data from external hardware modwheels which can be used to control SB 404 ModWheels. ModWheels control the amplitude of inserted ModWheel LFOs.

Settings: Click on this button to display additional Modulation Wheel LFO settings.



ModWheel/PitchWheel Settings

This insert LFO is used only for controlling pitch modulation and can be adjusting using the following parameters:

LFO Freq: Adjusts the frequency of the LFO.

Mod Depth: Sets the maximum degree of modulation which is reached when the Modwheel is fully open.

PitchWheel Range: Sets the maximum pitch deviation producible by the pitch wheel on an attached keyboard. The adjustable range is +/- 24 semitones.



Sequencer Main Panel Controls

The integrated Step Sequencer has its own interface, as it has a significant number of parameters to administer. Some of the important information and control elements are also found on the main panel of the SB 404 so they can be quickly adjusted from there.

Split: Enable this option if you want to use a section of your keyboard for pattern selection. In this range, notes will not be played. The key assignment can be freely assigned. More about this in the Key Settings section.

BPM: Adjust the tempo (speed) of the internal MIDI clock here. The tempo will be stored with the preset. If an external MIDI clock is in use, this will display the speed of the master clock. The value displayed may vary or change according to the external clock.

Pattern: The current pattern number is displayed here. You can also set the pattern here. Click on the text field and move the mouse up or down while pressing the left mouse button.



Edit: Opens the Step Editor.

Active: When this switch is engaged (red) the sequencer is active and will start as soon as a key is pressed. You can deactivate the sequencer when you want to play the SB 404 as a normal synth from an external keyboard. Naturally, none of the many modulation possibilities of the sequencer are available when it is deactivated.

Step Counter: This displays the number of steps being played. If a sequence isn't playing as expected you might find by checking this number that it is playing only 8 of the steps, for example.

Progress Indicator: The Progress Indicator serves on the one hand to show that the sequencer is running, and on the other as a helpful display when deciding when to make a pattern change. It is possible that a pattern will not change as desired if you release the key too late. This happens especially at very high speeds. In principal it is easy to make clean pattern changes, as the new pattern will not start until the current pattern has played to the end.

The Step Editor

You modify and create patterns and sequences to control the SB 404 in the Step Editor. The Step Editor provides a large number of adjustable parameters, but you should not let this intimidate you. The operation is probably easier than you think, and the pleasure you will get out of using it justifies reading this chapter.



Global Parameters

The Global Parameters are located in the upper left area of the Step Editor. All adjustments made here are independent of the pattern, and are valid for all patterns. This applies to the Rate (BPM), the Clock selection, the Divider, and the Loop on/off button. The Swing factor is adjustable per pattern.



Functions in Detail:

Internal Clock: Enable this option to use the Step Sequencer independent from an external source of synchronization. This parameter is device-global and is not saved in the presets. The internal clock can be set to a minimum of 60 BPM.

External Clock: Enable this option when you want to synchronize the Step Sequencer to the MIDI clock of an external device or other software. The clock signal must be available at the Click input of the SB 404. This parameter is device-global and is not saved in the presets.

If you use an external clock and the tempo is less than 60 BPM, the Step Sequencer will work. However, very long delays may not behave properly, as they cannot extend beyond a certain maximum length. This is the reason the internal clock is limited to a minimum of 60 BPM.

If you want to operate two clock-synchronous SB 440s, use the Click In and Outputs. These inputs and outputs were added so that two could synchronize together, yet retain individual control. For example, this could be used to allow two musicians to operate and maintain control over an SB 404 each, while the SB 404s remain perfectly synchronized. Each musician can independently select the patterns to be played, making for some very interesting jamming possibilities. If you want to use MIDI clock and note information over the same line, connect the MIDI source to the MIDI input.

BPM: Here you can adjust the tempo of the internal sequencer in BPM and 1/100 BPM. If you have selected the option External Clock, the tempo of the incoming MIDI clock is displayed here.

Divider: This parameter serves to transform the MIDI clock synchronization signal to musically meaningful rates. The standard setting is 16, in which a step corresponds to a 16th note. Setting the value to 8, for example, would set the steps to half the speed, representing 8th notes. Or, if you want a nice swingy 8th triplet feel, set the divider to 8, and increase the swing value. The range of possible values is quite large, and allows for some rather experimental values. Usually this value would remain at 16.

Swing: Controls the degree of swing feel. When swing is on, odd numbered steps are shifted back in time.

Loop: Enable this option if you want the Step Sequencer to repeat the pattern as long as the key is pressed. When disabled, the loop will play once and then stop.

The following parameters are global and are *not* saved with presets:



Freeze Preset: Enable this option if you want to load a sound preset into the SB 404 without changing the Step Sequencer patterns.

Preset: Opens the Step Editor's preset list. Each preset contains the information for 32 patterns. Changing the preset will not change the tone generation adjustments. Note that not all sound presets work well with all sequences, as the various modulation settings are usually made with respect to a particular sound/sequence pair.

Minimize: Minimizes the Step Editor interface.

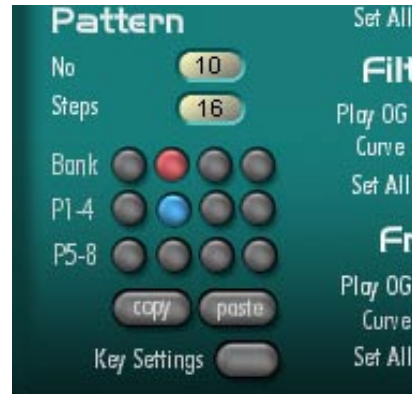
Close: Closes the Step Editor.

The Pattern Selector Block

There are several ways to select a pattern. You can select it on the main panel using the Pattern textfader, the appropriate textfader in the Step Editor, or you can use the Pattern Selector. This offers 4 banks of 8 patterns for a total of 32. You can also select patterns from another application, or remotely via the external keyboard (if configured for it).

No.: Displays the number of the current pattern. Since this field is a textfader, you can directly adjust the number with the mouse.

Steps: Each pattern can be adjusted to a variable number steps here. Note that, depending on the rate, fewer than 4 steps may not stay in time.



Copying Patterns

If you want to create a variation of a sequence, or start a new one with some basic patterns but not from scratch, you can copy a pattern from another location. Do this using presets. It works like this: call a preset, copy it into a temporary buffer (clipboard), change to the target preset, and paste the contents of the buffer into it.

Copy: Select a bank and a pattern and click on Copy to copy the preset into a temporary buffer.

Paste: Select a bank and the pattern which you want to replace with the contents of the buffer and click on Paste.

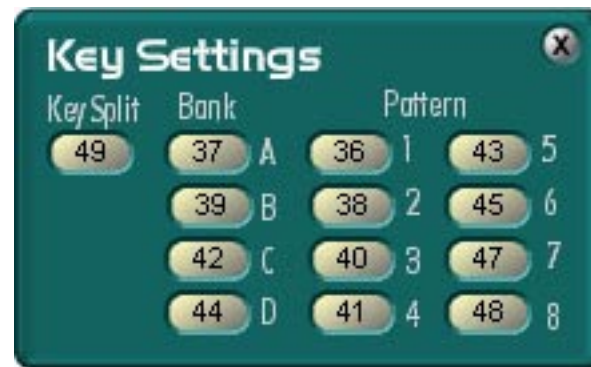
Pattern Selection by Keyboard

If the Split option is enabled on the SB 404's main panel you can use the key Settings to adjust the key range to be used for pattern selection. You can also set which keys will be used for Bank selection, and which for Pattern selection.

Key Split: Sets the point at which your keyboard is divided into a control range and a playable range. Keys below the dividing point are reserved for pattern selection, and those above for musical performance.

Bank A-D: Select the keys to be used for the selection of Banks A-D.

Pattern 1-8: Select the keys to be used for the selection of Patterns 1-8.



The Sequencer Tracks

The Step Sequencer features four tracks, each reserved to provide different control signals and modulations to specific destinations.



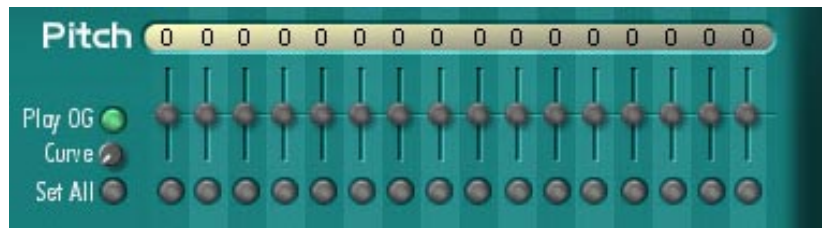
The Gate Track

The 16 switches on the Gate track determine which steps will or will not output the gate signal. With each gate sent, both envelopes will be triggered, and the complete sound will be played.

The LED chain always shows the current step in play. With higher loads on the computer from other activities (such as dragging a window) the indicators may temporarily not agree completely with the acoustic result. However, the actual musical timing of the sequencer will not be influenced.

The Pitch Track

The Pitch Track controls the relative offset of the note in play at each step. For example, if a C4 is set to play at a particular step, and the offset at that step is set to 5, the note produced will be an F4 (5 semitones up from C4). The maximum offset is +/- 24 semitones, or one octave up or down. Adjust the setting using either the fader or the right/left arrow keys on the computer keyboard (after first selecting the fader to adjust).



Slide: Below the Fader is a switch with which you can enable the slide function, so that a note glides in pitch from one step to the next. The switch can be set to the colors gray, red, and yellow:

Gray: Slide is disabled.

Red: The note will glide to the next one using an exponential pitch curve.

Yellow: The note will glide to the next one using a logarithmic pitch curve.

For exponential and logarithmic curves you can also specify a common intensity factor for the track to adjust the depth of the curve from Min (linear) to Max in 16 discrete steps. Within a track you can mix different pitch curves. In general we recommend that for pitch slides you use logarithmic curves at the maximum depth, but, of course, this is entirely up to you.



Play OG: Enable this option (Play Off Gates) when you want to continue sending controller values even for steps that are not played (gate is off). This is desirable, for example, when a note holds over several steps, and you want to continue to modify the filter settings. The default status is Disabled, and controller values are transmitted only when the gate is set.

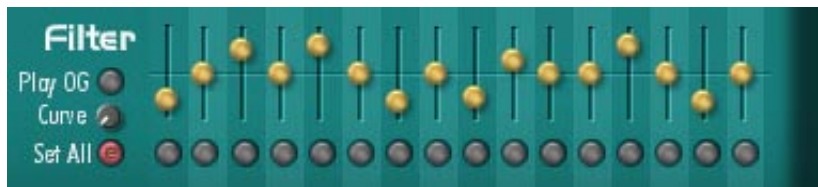
Curve: Adjusts the depth factor of the pitch change curve in 16 steps (Min = linear, Max = maximum logarithmic/exponential).

Set All: Click this button to enable all the Slide switches.

The Filter Track

The sequencer's Filter track is directly routed to the filter frequencies of the comb and low-pass filters. The signal can also be used to modulate the filter envelope decay, the amplitude envelope decay, the amplitude velocity, and the pan.

Set the positive or negative modulation offset with the faders. You can also use the left and right arrow keys to adjust a selected fader.



Slide: Below the Fader is a switch with which you can enable the slide function, so that a filter value at one step slides to the value at the next. For more information, see 'Slide' in 'The Pitch Track' section.

In contrast to the advice with regard to sliding between pitches, filter values should generally slide exponentially. Again though, do not limit your imagination by treating this as a rule!

Play OG: (See the function of the same name in the Pitch Track section)

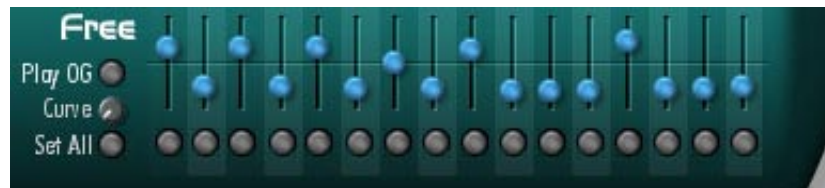
Curve: (See the function of the same name in the Pitch Track section)

Set All: (See the function of the same name in the Pitch Track section)

The Free Track

The Free Track can be used as a modulation source for the filter envelope decay, the amplitude envelope decay, the amplitude velocity, and the pan.

Set the positive or negative modulation offset with the faders. You can also use the left and right arrow keys to adjust a selected fader.



Slide: Below the Fader is a switch with which you can enable the slide function, so that a filter value at one step slides to the value at the next. For more information, see 'Slide' in 'The Pitch Track' section.

Note that enabling the slide function for decay times will produce no effect since the time is determined only once (when the envelope starts).

Play OG: (See the function of the same name in the Pitch Track section)

Curve: (See the function of the same name in the Pitch Track section)

Set All: (See the function of the same name in the Pitch Track section)

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