

# Noah Profit 5

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# Introduction

## Structure and Overview

From today's perspective the structure of the Profit 5 could be called "classic". For sound production it features two multi-function oscillators capable of producing multiple waveforms – simultaneously! The oscillator signals are combined with white noise or an external signal in the mixer section and then sent to a 24dB lowpass filter with resonance, and finally to an amplifier. Two envelope generators, each with adjustable attack, decay, sustain and release, are available to modulate both the filter and the amplifier. A modulation matrix lets you interconnect the filter envelope, oscillator B, and the LFO to achieve a wide range of modulation effects. The combinations of modulation sources and targets available through the selector switches rank this capability as one of the Profit 5's notable highlights.

Expanding upon the original instrument, the Profit 5 also features an effects section with chorus/flanger and delay, MIDI clock sync capability and Key After-touch response.

Through the use of special *Circuit Modeling procedures* the audio signal is rendered faithful to the original – completely free of aliasing. And those familiar with the concept of aliasing know how unnatural it sounds when recreating an analog signal. The various possibilities for modulation and the resulting sounds benefit from this procedure.

Wild modulations can produce signals, such as the distortions and sidebands that develop from frequency modulation, that can easily fill the full range of the audio spectrum. Signal rendition free of aliasing is absolutely essential for reproducing such spectra.

Other components of the synthesizer also profit from circuit modeling. Because the oscillators produce the full bandwidth, they produce more highs. The floating

effect when oscillators are slightly detuned has even more vitality when more highs are available. You can also use filter resonance to produce distortions; filter FM (frequency modulation) is possible thanks to the high-quality algorithms. The analog character of the original is captured completely.

Although being true to the original design was the highest goal during the development of the Profit 5, we couldn't help adding a few enhancements. The levels and times of the envelope generators of the plug-in can be modulated by MIDI velocity.

Our love of detail is also expressed in the graphic control surface. All controls were specifically designed to maintain a correspondence with the positions of the original controls. If you still have original patch sheets you can transfer them to the plug-in's graphic surface and then (finally) save the settings as presets!

## Operation

The Pro One features a work surface consisting of three switchable views (pages) – **Main**, **Additional** and **Effects**. The surface is divided into individual sections. The layout of the sections corresponds not exactly to the original but is still very close to the original and will therefore let experienced Profit 5 users immediately feel at home. The **Main** view contains the oscillators, the mixer section, the filter with envelope generator, and the amplifier with envelope generator. The **Add** page contains additional parameters for aftertouch modulation, time velocity and further less often used parameters. The effect parameters for Chorus and Delay can be found on the effects page.

The three switches located to the right of the modulation wheel switch between the views.



In the upper right corner of the graphic surface you'll find a display for selection of the MIDI channel, the effects bypass switch, and an icon to open the *Preset List*. The *On Top* and *Close* buttons for the surface are also located here.



Enabling *On Top* keeps the work surface visibly in the foreground. The *Close* button removes the surface, and the Preset List, if open, from the screen.

## Oscillator A, B

Except for a few differences, oscillators A and B are identical. Selector switches for each oscillator enable or disable the various waveforms. For oscillator A the available waveshapes are sawtooth and pulse; for oscillator B, sawtooth, triangle, and pulse. Because all waveforms can be enabled simultaneously, a mixture of all five oscillator waveshapes is possible. Pulse width can be adjusted manually, or modulated by another signal. If using oscillator B as a modulation source, it is disconnected from keyboard frequency control. Oscillator B can also be switched to operate at low frequencies to serve as an LFO. Oscillator A can be synchronized to oscillator B.



**Frequency:** Use this control to detune the oscillators. Mixing the two oscillator signals will produce a livelier sound. The range extends to an octave.

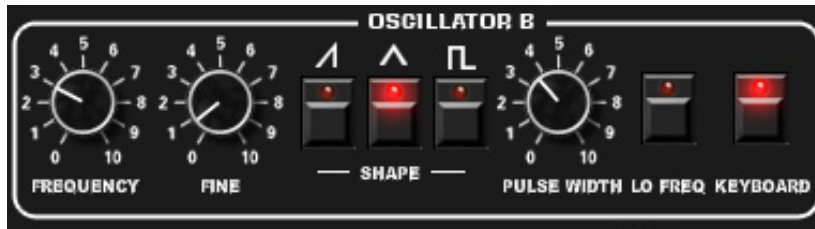
**Sawtooth On/Off:** Switches the sawtooth wave shape on or off.

**Pulse On/Off:** Switches the pulse wave shape on or off.

**Triangle On/Off:** Because oscillator B can also be used as an LFO, it provides a triangle wave (especially useful in a LFO). This button switches the triangle wave on or off.

**Pulse Width:** Manual adjustment of the pulse width. To hear the effect, the pulse waveshape must be switched on. The range extends from approximately 5% to 100% of the total period. See the Modulation section for information on pulse width modulation.

**Sync On/Off:** Enables or disables hard sync of oscillator A to oscillator B. Hard sync restarts oscillator A's waveform at the beginning of each cycle of oscillator B. In effect, this transfers the pitch of oscillator B to oscillator A. Depending on the octave, frequency setting, and frequency modulation of oscillator A various spectral effects can be produced.



**Lofreq/Normal:** Scales the frequency range of oscillator B. When set to Lofreq, the oscillator cycles much more slowly, below the audio range, allowing it to serve as an additional LFO in the modulation matrix.

**Keyboard:** Disconnects oscillator B from keyboard control. The oscillator no longer follows the keyboard, but operates at the frequency fixed by the Octave, Frequency and Lofreq controls. This allows it to be used as, for example, a modulation source with adjustable frequency.

## Audio Mixer

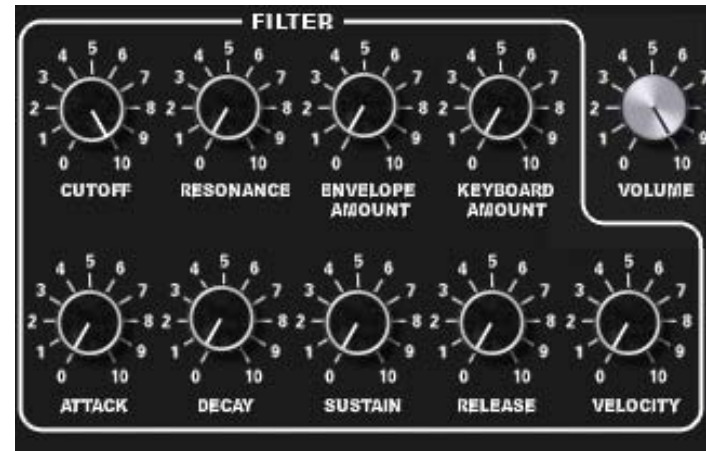
Here the audio signals are mixed before going to the filter. Oscillators A and B each have their own volume controls, while a third controls the level of the *noise* signal. The noise signal is always „white“ noise.



## Filter Section

The filter section consists of a modifiable low-pass filter with resonance that can be tuned to the point of oscillation. Together with the envelope generator and other modulation sources, it provides dynamic low-pass filtering. The filter has a slope of 24dB/octave. Frequencies below the cutoff frequency remain unaffected, hence the designation „low-pass“. Frequencies lying above the cutoff are attenuated at a slope of 24dB/octave.

Resonance is implemented by feeding the filter's output back into the input, reinforcing the frequencies surrounding the cutoff frequency. Thanks to the *Circuit Modeling process* the filter duplicates the peculiarities of the original. The cutoff settings and resonance behavior display the typical Pro One character. For modulation, the filter uses its own envelope generator, the keyboard, and sources configured in the modulation matrix.



**Cutoff:** The Cutoff Frequency is the frequency above which the audio spectrum is attenuated, reducing the strength of the overtones. This control provides a manual adjustment of the base Cutoff Frequency.

**Resonance:** Resonance results from feeding the filter's output back into the input, thereby reinforcing the frequencies lying near the cutoff frequency. At full resonance, the filter oscillates, producing a sine wave at the cutoff frequency. For this reason, the filter can also be used as another sound source.

**Envelope Amount:** The intensity of the envelope signal. The cutoff follows the changing envelope level according to the adjusted intensity. The beginning and end points of the envelope lie at the adjusted base cutoff frequency.

**Keyboard Amount:** Controls the influence of the keyboard position over the cutoff frequency. With Keyboard Amount set to 7, the influence over the frequency is 100% - that is, the cutoff frequency doubles with each octave increase in key position.



**Attack:** The duration of the first envelope segment. The envelope level rises to its maximum value during the time adjusted here. The intensity of the effect is governed by the Envelope Amount parameter. The actual maximum is determined by the Cutoff frequency and Envelope Amount settings.

**Decay:** The duration of the second envelope segment. In the decay phase the envelope falls to the Sustain level during the time adjusted here.

**Sustain:** The third segment of the envelope. This is the level the envelope holds after the decay phase.

**Release:** During the release phase the envelope falls to its minimum level. This value is the amount of time it takes to fall to minimum. The actual level it falls to is the adjusted base cutoff frequency.

**Velocity:** The amount of modulation of all envelope levels through keystroke intensity. The levels of the envelope are modulated between minimum and maximum according to the adjusted modulation strength. This influences the tone quality through keyboard activity.

## Voltage Controlled Amplifier

With the help of an envelope generator, the amplifier determines the changing level of the volume of the audio signal. An ADSR envelope generator is provided to modulate the amplifier. A Volume control is also a component of this section.



**Attack:** The duration of the first envelope segment. The volume level rises to its maximum value during the time adjusted here.

**Decay:** The duration of the second envelope segment. In the decay phase the envelope falls to the Sustain level during the time adjusted here.

**Sustain:** The third segment of the envelope. This is the volume level held after the decay phase.

**Release:** The fourth envelope segment, active only if the Decay switch is On. The envelope falls back to minimum during the release phase. This control adjusts the amount of time it takes to fall to zero.

**Velocity:** The amount of modulation of all envelope levels through keystroke intensity. The levels of the envelope are modulated between minimum and maximum according to the modulation strength.

### Options for amp and filter envelope

**ADR:** Activate this option to set the sustain level to 0. This enables you to switch fast between percussive and sustained sounds without having to change the sustain level.

**Release:** Activate this option to set the release time to 0.

**Volume:** The synthesizer's overall volume level. The silver colored potentiometer right to the filter section controls the volume before the effects. Volume can also be used for controlling effects levels - for example, to avoid distortion in the flanger when using a high feedback setting.

## LFO/Clock

Like oscillator B, the Profit 5's LFO provides three waveforms selectable via three switches. All, or any combination of the three waveforms can be active simultaneously leading to some very interesting results. The target and intensity of the LFO is configured in the modulation matrix. Some extensions to the original functionality are available on the **Add** page. Here you can synchronize the LFO to MIDI clock, or enable the keyboard to restart the LFO in phase with each key struck.



**LFO Freq:** Adjusts the frequency of the LFO.

**Sawtooth On/Off:** Switches the sawtooth wave on or off.

**Pulse On/Off:** Switches the pulse wave on or off.

**Triangle On/Off:** Switches the triangle wave on or off.

## LFO Settings



**Retrig:** Select between *Retrig* and *Free Run* modes. In the Free Run mode, the LFO runs continuously. In Restart mode, the LFO resyncs to the waveform phase position (restarted) whenever a key is struck on the MIDI keyboard.

**Phase:** Adjusts the phase position at which the LFO resyncs when a key is struck and the LFO is in Retrig mode.

**MIDI:** Selects between manual or MIDI control of the LFO frequency. If MIDI is enabled, a drop-down list containing a selection of note lengths is available on the Main page. The length of the note corresponds to a single period of the LFO.



## Modulation

The Profit 5 has three modulation sources – filter envelope, oscillator B, and LFO – and five modulatable targets – oscillator A, oscillator B, oscillator A pulse width, oscillator B pulse width, and filter cutoff frequency. You can connect the modulation sources to the targets directly, or route them through the modulation wheel. The basic intensity of the modulation is adjusted at each source. If the modulation involves the modulation wheel, then the wheel also influences the final modulation depth. The filter envelope generator and oscillator B are polyphonic modulation sources; they operate per voice. The LFOs are monophonic; they operate on the overall sound (all voices simultaneously).

## Poly Mod

Adjust in this section the intensities for the modulation sources Filter Env and Osc B and activate one or more modulation destinations.



### Source Amount

**Filter Env:** Sets the modulation depth of the filter envelope for all selected targets.

**OSC B:** Sets the modulation depth of oscillator B for all selected targets.

**LFO Amount:** Sets the modulation depth of the LFO for all selected targets.

### Destination

**Freq A:** Activate this option to route the modulation signal to the frequency of oscillator A.

**Freq B:** Activate this option to route the modulation signal to the frequency of oscillator B.

**PW A:** Activate this option to route the modulation signal to the pulse width of oscillator A.

**PW B:** Activate this option to route the modulation signal to the pulse width of oscillator B.

**Filter:** Activate this option to route the modulation signal to the filter cutoff frequency.

## Wheel Modulation

The intensity of the modulation signal in the Wheel bus is controlled by the modulation wheel. In the original synth, this was the only control over this bus. In our version we added modulation intensity and offset for even more control. The pitch intensity through the Bender is similarly adjustable (see the **Add** page).



**Source Mix:** As an additional modulation signal white noise can be added.

### Destination

**Freq A:** Activates the modulation signal for the frequency modulation of oscillator A.

**Freq B:** Activates the modulation signal for the frequency modulation of oscillator B.

**PW A:** Activates the modulation signal for the puls width modulation of oscillator A.

**PW B:** Activates the modulation signal for the puls width modulation of oscillator B.

**Filter:** Activates the modulation signal for the filter modulation.

**Modulation Intensity:** Sets the maximum intensity of the modulation signal for the wheel bus. This is the intensity produced when the wheel is fully open.



*Add-Page*

**Modulation Offset:** Fundamental intensity of the modulation signal for the wheel bus (with wheel at the 0 position). The modulation wheel increases the modulation beyond the basic level depending on the offset and intensity settings.

**Bend Range:** Adjusts the maximum pitch deflection of the Pitchbend wheel in semitones. The range is from 0 to 24 semitones.

## Glide

With Glide enabled the pitch glides from one note to the next at a preset rate.



**Glide:** The time it takes for the pitch to glide from one note to the next. The Glide function does not have to be specifically activated – it is only necessary to enter a glide rate to enable it. Glide is off when the rate is 0.

## Unisono

**Unison:** With unison active you play more than one voice together with the same key. The sound gets more powerful. To adjust the sound settings look also for Detune and Voices Parameter on the Add-Page.

**Voices:** Number of unisono voices.

**Detune:** Detune amount of the unisono voices.



*Add-Page*

## Keyboard Mode

**Retrig/Normal:** Establishes the trigger behavior. In Normal mode the envelope is not re-started when stealing voices. This means that legato passages, in which the envelope is not triggered with each new note, is possible. In *Retrig mode* the envelope re-starts regardless of voice-stealing. This mode is appropriate for percussive sounds, for example, in which each new note retains its attack whether played legato or not.



**Low Note/Last Note:** Switches between low-note and last-note priority. When set to low-note priority, high notes will be 'stolen' before lower notes when maximum polyphony is exceeded. When set to last-note priority, notes played earlier will be turned off in favor of the notes played later. Interesting effects develop through the interaction of voice stealing with envelope triggering as configured by the trigger modes on the **Main** page.

**Single On:** Enables correct single voice administration regardless of how many voices are active. This ensures the correct production of sounds when using solo and/or glide.

## Aftertouch

The original Pro One filter had only a CV (control voltage) In for external control of the filter. This modulation is now controlled by MIDI aftertouch. The pitches of the oscillators can also be modulated by aftertouch. The intensity of aftertouch is individually adjustable for each target.

**Pitch Osc A/B:** Intensity and polarity of the pitch modulation of the oscillators by aftertouch. This lets you control pitchbend with key pressure. Selector switches direct the modulation to oscillator A, oscillator B, or both.

**Freq A:** Activates Oszillator A modulation.



**Freq B:** Activates Oszillator B modulation.

**PW:** Intensity and direction of pulsewidth modulation.

**PW A:** Activates Oszillator A modulation.

**PW B:** Activates Oszillator B modulation.

**Filter:** Intensity and polarity of the filter cutoff frequency modulation by aftertouch. This lets you apply filter sweeps using key pressure (aftertouch).

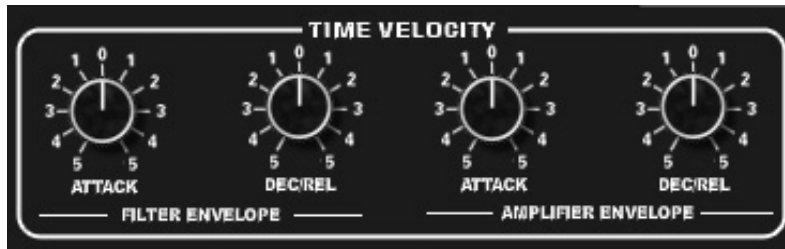
**Amp:** Intensity and direction of volume modulation.

**MW Amt:** Intensity and direction of Modulation wheel modulation.

**LFO Freq:** Intensity and direction of LFO frequency modulation.

## Time Velocity

The original Profit 5 didn't know the time velocity parameters. They can be used to modulate the envelope times via velocity.



### Filter Envelope

**Attack:** Sets the intensity and direction of the attack time modulation by the velocity.

**Dec/Rel:** Sets the intensity and direction of the decay/release time modulation by the velocity.

### Amplifier Envelope

**Attack:** Sets the intensity and direction of the attack time modulation by the velocity.

**Dec/Rel:** Sets the intensity and direction of the decay/release time modulation by the velocity.

## MIDI Clock Settings

Here you can adjust the MIDI tempo and select between the internal MIDI clock and an external one as the synchronization source.

**External:** Switches the MIDI clock between internal and external synchronization.

**Coarse/Fine:** Display and modification of the tempo is done via two text fields: the leftmost of the two fields displays a whole-BPM tempo value, while the field directly to its right displays an additional hundredths-BPM value.





# Controller Table

CC	Ctrl Range	Parameter	Param. Range			
0	0 - 127	Bank Select	0 - 127	35	0 - 127	Aftertouch MW Amt 0 - 127
1	0 - 127	Modulation	0 - 127	36	0 - 127	External Volume 0 - 127
2	0 - 127	Unison voices	0 - 12	37	0/64	Aftertouch Dest PW A Off/On
3	0 - 127	Unison Detune	0 - 127	38	0/64	Aftertouch Dest PW B Off/On
4		Foot Pedal		39	0 - 127	Keyboard Amount 0 - 127
5	0 - 127	Glide Time	0 - 127	40	0 - 127	Cutoff 0 - 127
6	0 - 127	Data Entry	0 - 127	41	0 - 127	Resonance 0 - 127
7	0 - 127	Volume	0 - 127	42	0 - 127	Envelope Amount 0 - 127
8	0/64	LFO Settings Retrig	Off/On	43	0 - 127	Filter Env Attack 0 - 127
9	0 - 127	LFO Settings Phase	0 - 127	44	0 - 127	Filter Env Decay 0 - 127
10	0/64	LFO Settings MIDI	Off/On	45	0 - 127	Filter Env Sustain 0 - 127
11	0 - 127	Device Volume	0 - 127	46	0 - 127	Filter Env Velocity 0 - 127
12	0 - 127	Osc A Frequency	0 - 127	47	0 - 127	Filter Release 0 - 127
13	0/64	Osc A Shape Saw	Off/On	48	0 - 127	Aftertouch LFO Freq 0 - 127
14	0/64	Osc A Shape Pulse	Off/On	49	0/64	Release Off/On
15	0 - 127	Osc A Pulse Width	0 - 127	50	0 - 127	Aftertouch Filter 0 - 127
16	0/64	Osc A Sync	Off/On	51	0 - 127	Aftertouch Amp 0 - 127
17	0 - 127	Osc B Frequency	0 - 127	52	0 - 127	Amp Env Attack 0 - 127
18	0 - 127	Osc B Fine	0 - 127	53	0 - 127	Amp Env Decay 0 - 127
19	0/64	Osc B Shape Saw	Off/On	54	0 - 127	Amp Env Sustain 0 - 127
20	0/64	Osc B Shape Triangle	Off/On	55	0 - 127	Amp Env Velocity 0 - 127
21	0 - 127	Master Tune	0 - 127	56	0 - 127	MW Intensity 0 - 127
22	0/64	Osc B Shape Pulse	Off/On	57	0 - 127	MW Offset 0 - 127
23	0 - 127	Aftertouch Pitch	0 - 127	58	0 - 127	Poly Mod OSC B 0 - 127
24	0,6,11,...	Bend Range	0-24	59	0/64	ADR Off/On
25	0 - 127	Osc A Volume	0 - 127	60	0/64	Keyb Mode Retrig Off/On
26	0 - 127	Osc B Volume	0 - 127	61	0/64	Low Note Off/On
27	0 - 127	Osc B Pulse Width	0 - 127	62	0 - 127	Amp Env Release 0 - 127
28	0/64	Osc B Lo Freq	Off/On	63	0 - 127	Poly Mod Filter Env 0 - 127
29	0/64	Osc B Keyboard	Off/On	64		Sustain Pedal
30	0/64	Aftertouch Dest Freq A	Off/On	65		
31	0/64	Aftertouch Dest Freq B	Off/On	66		Sostenuto
32	0 - 127	Bank Select	0 - 127	67		Soft Pedal
33	0 - 127	Noise Volume	0 - 127	68	0/64	Single Mode Off/On
34	0 - 127	Aftertouch PW	0 - 127	69	0/64	Unison Off/On

70			
71			
72			
73			
74			
75	0/64	Poly Mod Destination Freq A	Off/On
76	0/64	Poly Mod Destination Freq B	Off/On
77	0/64	Poly Mod Destination PW A	Off/On
78	0/64	Poly Mod Destination PW B	Off/On
79	0/64	Poly Mod Destination Filter	Off/On
80			
81			
82			
83			
84			
85			
86			
87	0/64	LFO Shape Saw	Off/On
88	0/64	LFO Shape Triangle	Off/On
89	0/64	LFO Shape Pulse	Off/On
90			
91			
92			
93			
94			
95			
96			
97	0 - 127	LFO Frequency	0 - 127
98			
99			
100			
101			
102	0/64	Wheel Mod Freq A	Off/On
103	0/64	Wheel Mod Freq B	Off/On
104	0/64	Wheel Mod PW A	Off/On

105	0/64	Wheel Mod PW B	Off/On
106	0/64	Wheel Mod Filter	Off/On
107			
108	0 - 127	Wheel Mod Source Mix	0 - 127
109	0 - 127	External Source	0 - 127
110			
111			
112			
113	0 - 127	Time Velocity Attack Filter Env	0 - 127
114	0 - 127	Time Velocity Dec/Rel Filter Env	0 - 127
115	0 - 127	Time Velocity Attack Amp Env	0 - 127
116	0 - 127	Time Velocity Dec/Rel Amp Env	0 - 127
117			
118			
119			
120		All Sounds Off	
121			
122		Local Control Off	
123		All Notes Off	
124		Omni Off	
125		Omni On	
126		Mono On	
127		Poly On	

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