

# discoDSP Discovery Pro

Users Manual

Virtual Analog + Wave + PAD Synthesizer

<http://www.discodsp.com/>

## Description

Discovery Pro is a virtual analog synthesizer emulation for Audio Units and VST hosts featuring multi-layering, parameter morphing, high-quality sound, WAV and SF2 support, PAD re-synthesis and straightforward interface.



## Installation

- **Apple OS X**

Run the installer and follow the instructions.

- **Microsoft Windows**

Run the installer and follow the instructions.

- **Linux**

Run install.sh with Terminal or

Place **discoDSP** folder at **/home/username/Documents/**

Place DiscoveryPro(64).so at your VST folder, usually **/home/username/.vst/**

**Demo version** can load banks, but the host will be unable to store any current synth state or save banks.

## Features

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Discovery boasts the following powerful feature set:

- 128 Patch Memories per bank.
- Parameter Morphing using Modulation Wheel or MIDI velocity.
- 2x oversampling / 2x oversampled distortions.
- Bank browser (by clicking arrows in display led and bank name).
- More than 2.500 presets in 45 banks (including a percussion one).
- Nord Lead 2 and 2X patch import and export.
- 4 Layers per Patch, each with:
  - 2 Oscillators (Sine, Saw, Triangle, PWM, Square, Parabolic, White and Pink Noise) with Ring modulation, Sync and Frequency Modulation.
  - 1 Wave Oscillator. Can load WAV and SoundFont 2 (SF2) files using high quality interpolation with PAD re-synthesis generation. User banks are easily added using **EDIT > File**.
  - Resonant Filters (LowPass, HighPass, BandPass, BandReject, Formant, 8 taps phaser, X 12/24 dB and Y 12/24 dB are Moog modeled).
  - ADSR for Amp & Filter. Amplitude envelope can switch between linear and exponential curves.
  - 2 LFOs.
  - Modulation Envelope.
  - Graphical Modulation Envelope.
  - Arpeggiator.
  - Built-in Unison, Chorus, Phaser, Panning Delay and Gate effects.
  - Symmetric, Asymmetric and Asymmetric 2 Distortions.
  - Limiter.
  - Poly/Mono/Legato modes.
- MIDI CC control.

## Basic Concepts

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### Channel Limiting and Oversampling

You may now determine the number of channels used in the instrument by left-clicking the "voices" LED or at **EDIT > Config**.

A dialog box will appear with the number of voices you wish to enable. Select the desired voice number.



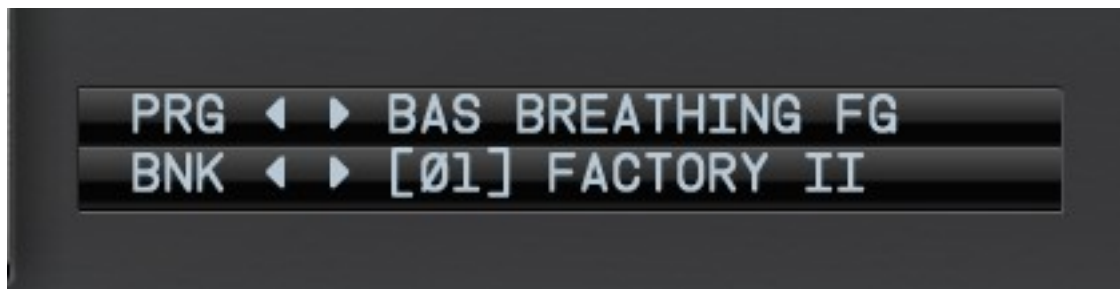
You can also select the oversampling mode. 2X will make Discovery work internally at 88 KHz when your host is set to 44.1 KHz. 2X oversampling is highly recommended, however it will require double the CPU processing power. It will affect all active Discovery instances.

HQ Distortion will duplicate distortion's internal frequency rate, depending of the oversampling mode mode and resulting into 4X in case a global 2X has been configured.

### Quick program select

Left-click program LCD panel to see a list of available patches.

### Bank browser




You are able to browse all the FXB banks by clicking the arrows in the status LCD or clicking the bank name to display a drop-down menu. All banks are located at **Documents > discoDSP > Discovery Pro > Bank** folder. You can add your own banks using **EDIT > File > Import Bank** function.

For easier preset and banks management, **EDIT > File > Open** functions will bring a Finder or Explorer window.

There is a subfolder called **User.dwb** where WAV files can be copied and recognized instantly after each menu drop-down click, providing better workflow. There is a quick access for this folder using **EDIT > File > Open Data Folder**.


WAV files can also be imported using **EDIT > File > Import Wave** function.

## Morphing state knob editing

In normal mode, holding **Ctrl** /  while moving the knob will modify **morph sensibility**. Behavior will be backwards when Morph mode is on.

## MIDI Aftertouch knob editing


MIDI Aftertouch can be assigned to any knob. Useful to control LFO speed, filter cutoff, resulting in more expressive sounds. In R5.4, aftertouch can be switched to Foot (CC# 4), Expression (CC# 11) and Breathe (CC# 2) using **EDIT > Switch > Aftertouch To** function.

To access Aftertouch mode simply hold  key while pressing **A, B, C or D** button. Layer led will start blinking. To go back to normal editing, press again the **Layer button**.



There is a secondary access located at **EDIT > Switch > Aftertouch mode**.

## Fine tune knob editing

To have more detailed parameter adjustments, hold  key while moving the knob to edit both states. Shift and Ctrl keys can be used at once too.

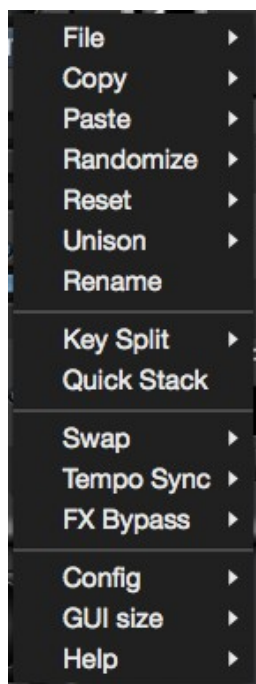
## LFO Sync to host tempo

Discovery's LFO1, LFO2 / Arpeggiator, Delay and Panning LFO can be synced your host tempo. To enable it, just click the led located next to the LFO knob or Delay amount.



## Edit operations

There are a set of editing operations, clicking EDIT button on your Discovery GUI offers the following options:



- **File:** Imports or exports Clavia's Nord Lead patches, FXB preset bank to exchange between several projects or users. Open folders for quick bank, SF2 and PAD SFZ cache files.  
  
Also opens **Data**, **Presets folder** and **Unison** configuration for quick access.
- **Copy, Paste, Randomize, Reset:** Allows to do simple editing operations over the current layer, preset, or even selected sections from the current preset, like LFO1, LFO2, ADSR and other ones.
- **Unison:** Applies values from text file unison.cfg located at **Documents > discoDSP > Discovery Pro > Config** from first layer to the other ones. For details refer to Unison edit at the end of this manual.
- **Rename:** Renames current program name.

- **Key Split:**
  - **Off:** Set layers to be played all at once.
  - **AB/CD:** Plays layers A/B from C0 to B3 and C/D from C4 to B9.
  - **Custom:** Plays a custom note range from from C0 to B9 for each layer.
- **Quick Stack:** Allows active layer to navigate thru other presets and banks without leaving the current program, loading first layer from others. To exit this mode, click any layer button. Flashing **red** and **blue** LED will stop indicating operation mode is back to normal.
- **Swap:** Enable or disables MIDI Velocity to Program Morphing, FX section or use the classic chorus. Enters Aftertouch MIDI editing mode and assignment. Switches between classic Discovery filter and new R6 Nord Lead modeled Zero Delay Feedback filters or from Chorus to Unison for the full bank.
- **Tempo Sync:** Quickly sync to host tempo LFO1, LFO2, Panning, Delay sections or all of them at once.
- **FX Bypass:** Disables individual or all effects even after changing presets.
- **Config:** Selects global plugin polyphony, oversampling or high-quality distortion. More polyphony, higher oversampling can result in a CPU hit. It's recommended to use higher choices when a project is going to be bounced. MIDI CC button mode allows to use alternate MIDI CC map found at EDIT > Help.
- **GUI size:** Switches window and all their elements between 3 sizes: 1x (400p), 1.5x (600p) and 2x (800p).
- **Help:** Opens tutorials, manual and MIDI CC tables. Also displays Release number.

## Zone presets

Zone presets has been introduced with Release 4. It allows each section to have their own presets based on the current state, so they can be stored for later use, allowing quicker preset design and getting better overall workflow.



They are stored at **Documents > discoDSP > Discovery Pro > Presets** folder using a standard XML format. Such files can be shared without the need of importing or exporting, just copying them to their current folder.



## Layers

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Discovery Pro can hold 128 patches at any one time. Each patch may contain up to 4 layers. Combining layers can be used to create complex sounds that simple subtractive synthesis cannot achieve.



Discovery Pro supports up to 128 polyphonic voices. If all 4 layers are enabled, a single note will count as 4 individual voices, reducing the actual polyphony to 8 in these instances. Fortunately, these are 8 extremely powerful sounds.

To select a layer, simply left-click the A, B, C, D buttons below the Program and Voice number LEDs.

A is the default layer. When a layer is active the BUTTON directly above it turns **highlighted**. Select any layer (B, C, D) to activate it.

When a program includes 2 or more layers, the selected layer button turns **highlighted** and other active layers turn **blue**. If you wish to disable a layer simply left-click it twice, or left-click the **blue** LED directly.

Discovery Pro allows you to copy and paste between layers or programs by using EDIT menu.

The following documentation applies to a **single layer** unless otherwise noted. This means feature (LFO's, Envelopes, Oscillators) are potentially quadrupled for each Discovery patch.

## Parameter Morphing

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Each layer contains two internal states: morph **source** and morph **sensibility**. Each state contains a unique set of all values. **Morphing** allows you to easily glide between these values.

Morph sensibility state is seen using alpha blend, and can be modified by using **Ctrl** key while adjusting the knob. A 32-bit video mode is required to display this transparency.


You can easily toggle between both morph states by left-clicking the ASSIGN button, located in the top left of Discovery Pro under the "Morph" label. When the ASSIGN led is active, all parameter modifications are being made to the MORPH state.

Once both states have been defined, you can easily morph between them by assigning the Wheel MOD to MORPH mode. Once set, moving your mode wheel will morph between both states.



**EDIT > Reset > Layer Morphing** sets all layer MORPH sensibility state to zero.

### TIPS

- MIDI velocity to Morph can be disabled by clicking the led above modulation wheel or using **EDIT > Swap > MIDI Velocity To Morph**.
- Knobs from four layers at once can be moved using **Alt** /  + drag on Windows / Mac or **Right Click** + drag on Linux.

## Global Layer Options

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- **Oct Shift:** Shifts pitch in octaves of the layer.
- **Pitch Bend:** Pitch bender allows you to drastically change the pitch of the current patch in real-time. You can modify the pitch bend range from 1 to 48 semitones by clicking the LCD arrows or clicking numbers for a drop-down menu.
- **Modulation Wheel:** Can be assigned to modulate the following parameters:
  - **FLTR:** Filter cutoff frequency.
  - **FM:** OSC2 to OSC1 frequency modulation amount.
  - **OSC2:** OSC2 pitch.
  - **LFO1:** LFO1 amount.
  - **MORPH:** Morph between source and destination morphing states.
- **CHR:** Left-click the **CHR** button to enable Chorus, Phaser or both modes at once.
- **UNI:** Enables Unison. 2 voices are used on **POLY** mode and 4 on **LEGA/MONO**.
- **Play Modes:**
  - **MONO:** Only 1 voice of the synthesizer is used for the layer. In this mode any note played will discontinue the previous note.
  - **LEGATO:** A monophonic mode in which envelopes are not restarted when new keys are played.
  - **POLY:** Polyphonic mode allows multiple notes to be played at once.
- **Portamento:** Portamento glides the pitch between the current note and a newly played note. The higher the value, the slower the transition progresses.
  - **Auto:** When enabled, glide/portamento will be only applied if overlapping notes are played (legato).

## Oscillator Section

Oscillators are the basis of sound generation in subtractive synthesis. Discovery includes two primary oscillators, each with various modes and waveform types.



**Waveforms** available in Discovery Pro are:

Wave Type	Useful for creating...
Sine	FM, Leads, Percussion, Organs.
Triangle	FM, Smooth Sounds, Bass, Flutes.
Square	Smooth Bases, Leads, Synced Waves.
Parabolic	Smooth Sounds, Pads.
Noise	Ambient FX, Percussion.
Saw	Rough Bass, Edgy Leads.
Pulse	Vintage Synths, Pads.

## Oscillator 1 (OSC1)

OSC1 is the primary sound source in Discovery. This oscillator uses the pitch of the incoming note and plays it in the specified waveform type. OSC1 can be one any of the following waveform types (shown from the top down):

- Sine.
- Triangle.
- Saw tooth.
- Parabolic (Saw tooth with **red** led).
- PWM (Pulse Width Mod).
- Square.



You can quickly switch between any waveform by simply left-clicking the button below the waveform list. A **blue** or **RED** LED indicates the currently enabled waveform.

**Frequency Modulation:** Discovery features a true frequency modulation (FM) engine, allowing the OSC1 carrier wave to be modulated by frequency of the OSC2 output.

**FM Amount:** Sets the amount of FM used to modulate OSC1 frequency.

## Oscillator 2 (OSC2)

Discovery offers a second oscillator, which adds additional sound design capabilities to your patches.



The second oscillator may be used in various ways such as mixing with, or modulating the frequency of OSC1.

OSC2 can be set to any of the following waveforms:

- Triangle.
- Saw.
- Parabolic (when Saw led is **red**).
- PWM (Pulse).
- White Noise.
- Pink Noise (Noise with **red** led).
- Square.

Controls for oscillator 2 are:

- **Semitones:** This knob allows you to shift the pitch of OSC2 from -60 to +60 semitones. The following features apply:
  - When in use, a **blue** LED will activate at full scale values:  
-60, -48, -36, -24, -12, 0, 12, 24, 36, 48, 60
  - When OSC SYNC mode is active OSC2 will reset each time OSC1 finishes a cycle. (Explained below).
  - When noise wave is selected, this control is used to determine the frequency range of the noise (from low frequency to high frequency noise).

If noise wave is selected and OSC SYNC mode is active, the semitones control is a digital noise wave selector, from a table of 8 different random sound shapes.

- **Fine Tune:** Fine-tuning of OSC2 from a range of -0.5 to +0.5 semitones.
- **KBD Track switch:** When on, the OSC2 will track pitch of incoming note.

## Oscillator Modes

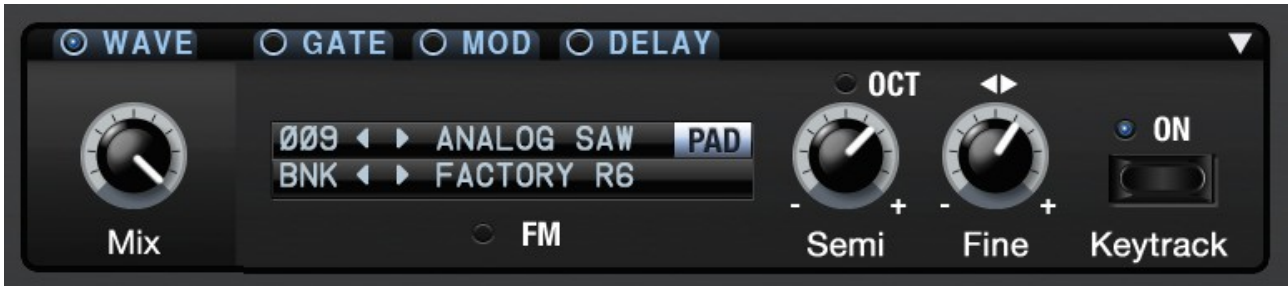
- **Pulse Width:** Determines the de-phasing amount between the two saw tooth waves that build up the Pulse wave. This results in the pulse width of BOTH oscillator pulse wave shapes (only works for PWM).

Lesser values (turned left) result in a square formed PWM. Higher values result in a train of small pulses.

- **OSC SYNC:** OSC2 phase will reset each time OSC1 completes a cycle, giving harsh and fuzzy effects on the OSC2 sound. In this mode the OSC2 semitone control will not determine the pitch shift, but rather the harmonic content of the wave that will modify the pitch of the OSC1.
- **RING MOD:** OSC1 output will multiply the OSC2 output. When this mode is turned on, the FM control in the OSC1 will work as pitch tune (in the range of 0 to +12 semitones) for the OSC1. This mode can be used for special effects and ambience sound shapes.
- **OSC MIX:** Used to mix both oscillators output. Knob values follow:
  - **Left:** 100% OSC1 Signal.
  - **Middle:** 50% OSC1 Signal, 50% OSC2 Signal.
  - **Right:** 100% OSC2 Signal.

## Wave Oscillator (WAVE)

Discovery Pro offers a third oscillator, which adds dramatic sound design capabilities to your patches.



Wave oscillator can be edited by clicking the LED located at the right of WAVE label. Sound banks and waves can be selected by clicking < and > controls or clicking at the LED area to display a drop-down menu.

To add your own sound banks just zip a set of WAV files and use .dwb extension, or select a SoundFont 2 (SF2) file. Then place it on **Documents > discoDSP > Discovery Pro > Waves** folder and they will appear next time Bank LCD is clicked.

Controls for Wave oscillator are:

- **PAD Button:** For any active wave, Discovery Pro will render a new waveform set using PAD synthesis. It will generate a perfectly looped and beautiful set of sounds, no matter what the source is.

Since it's a very complex method, it will generate a cache file in SFZ + 20 WAV files (or 1 WAV when ECO mode, displaying a green button) per sound at **Discovery Pro Data/PADCache** or **Discovery Pro Data/PADCacheEco** folder.

Next time PAD is active, it will read the file from cache, resulting in fast loading time.

- **Semitones:** This knob allows you to shift the pitch of Waveforms from a wide range of semitones. The following features apply:
  - When in use, a **blue** LED will activate at full scale values:  
-60 / -48 / -36 / -24 / -12 / 0 / 12 / 24 / 36 / 48 / 60
  - When **Keytrack** is selected, pitch changes will be applied across the keyboard.
- **Fine Tune:** Fine-tuning of loaded Waveforms from a range of semitones.



## TIPS

- **OSC1** and **OSC2** can be **disabled** by clicking the **blue** led located at the left of OSCILLATORS label.



- Full **octave switching** can be easily performed by clicking **+** and **-** labels.



## Filter Section

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Once oscillators are mixed, sound is next routed through the Discovery filter section. This section will transform the frequency response of the signal.



A filter is a unit that changes the magnitude of a range of frequencies of the sound, boosting or cutting these frequency values.

### Basic Filter controls

The two most common filter parameters are the Frequency and Resonance controls.

- **Frequency:** or 'cutoff' point. This value sets the frequency point affected by the filter response.
- **Resonance:** This value determines the amount of amplification of the range of frequencies surrounding the frequency (cutoff) point.

## Filter Types

Discovery Pro has 12 filter types. You may toggle through these types using the buttons below the LCD Filter Type section or by clicking filter name LED to make a drop down menu appear. The active filter is also showed in the display.

Available filter types follow:

- **LowPass 12db:** This 2 pole Lowpass filter will cut all spectrum range above the Cutoff frequency, with a rolloff of -12dB per octave.
- **BndRjct 24:** The Notch filter will cut the frequency range surrounding the Cutoff point, and will be processed thru the 24dB Lowpass filter explained above, but using a slightly shifted Cutoff frequency. Using this with high Resonance amounts will result in interesting vocal formants effects.
- **LowPass 24db:** A 4 pole Lowpass Filter with -24dB per octave rolloff. This functions similar to the LP 12db, but with a steeper frequency curve response.
- **BndPass 24:** A Bandpass Filter, which allows only the frequency range surrounding cutoff point to pass through. Resonance controls the size of this bandwidth.
- **HghPass 24:** The opposite of the Lowpass filters, the Highpass will pass frequencies above the cutoff point and will cut all range below. This filter type has a rolloff of -24dB per octave.
- **HghPass 12:** Will pass frequencies above the cutoff point and will cut all range below. This filter type has a rolloff of -12dB per octave.
- **Formant:** 2 bandpass parallel filters tuned in vocal formant frequency range. Resonance modifies both filters resonance.
- **X 12:** A Moog modeled 2 pole Lowpass Filter with -12dB per octave rolloff.
- **X 24:** A Moog modeled 4 pole Lowpass Filter with -24 dB per octave rolloff. It functions similar to X 12db, but with a steeper frequency curve response..
- **Y 12:** Another Moog modeled 2 pole Lowpass Filter with -12dB per octave rolloff.
- **Y 24:** Another Moog modeled 4 pole Lowpass Filter with -24 dB per octave rolloff. It functions similar to Y 12db, but with a steeper frequency curve response.

## Filter Envelope

The Filter Envelope allows easy ADSR (**A**ttack, **D**ecay, **S**ustain, **R**elease) envelope based modulation of the filter Cutoff control.

- **Attack:** Controls for the time in which the filter envelope moves from 0 (note play) to full filter (based on the Envelope Amount, below).
- **Decay:** Controls the time length between the end of attack and the sustain level.
- **Sustain:** Sets the filter point at which envelope stays while note is continually pressed, once attack and decay have completed.
- **Release:** Begins once the note is released, controlling the time the gain will fall from current envelope point (Sustain) until complete.
- **Env Amount:** The Envelope Amount option controls the amount of the Filter envelope applied to the Cutoff frequency.
- **Vel:** When enabled, the Envelope Amount will be scaled with the incoming note based on velocity. This results in more dramatic envelopes for harder hit notes.

## Additional Filter Options

- **Keytrack:** When active, Keyboard Tracking will increase the filter cutoff frequency based on incoming note pitch. Higher notes will add higher frequencies to the current filter cutoff point.

Tracking can be 1/2 (minor), 2/3, or Full (very drastic).

- **DIST:** Distortion effect with dual modes.
  - **Asymmetric Distortion:** This will apply saturation to the negative field of the signal. This will generate side harmonics, useful for tube distortion effects.
  - **Symmetric Distortion:** Saturation will be applied symmetrically, resulting in odd harmonics, useful for grunge or distortion effects.
  - **Asymmetric Distortion 2:** A variation of first asymmetric distortion.

2X oversampled distortion can be enabled at **EDIT > Config > HQ Distortion**.

## Modulation Section

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### Low Frequency Oscillator 1 (LFO1)



Discovery Pro includes two LFO's (**L**ow **F**requency **O**scillators), a Modulation Envelope (with 2 stages and state variable amount control) and a Graphic Envelope Generator. LFO oscillators operate much like the basic Discovery oscillators, only at much slower speeds

**Rate:** This control sets the speed (frequency) of LFO1. Smaller values result in slower oscillations, larger values in faster oscillations.

LFO1 can use various waveforms (from top to bottom):

- **Lowpass Random:** Like random waveform, but the value is a smooth curve.
- **Square:** If LFO1 phase is above the half of the period length, the LFO will take the highest value, otherwise the lowest.
- **Triangle:** Also a ramp, but moves down to up, then back to down in a single cycle. Primarily used for sweep effects.
- **Saw Tooth:** Ramp shape; will move up to down, then instantaneously up when cycle is completed.
- **Random:** Each time LFO1 completes a cycle, it will select a new random value.

**Re-triggered LFOs:** By cycling through LFO waveform options a second time you can enable Re-triggered LFO's. This means LFO will be restarted each time a note is played. Re-triggered LFO's are indicated by **red** LEDs.

**Destination:** To the left of the waveform selector is the LFO1 Destination selector. This feature allows you to choose which control(s) this LFO will modulate. The following LFO1 modulation destinations are available:

- **FM:** OSC2 to OSC1 FM (Frequency Modulation) amount.
- **FILTER:** Filter cutoff frequency.
- **OSC2:** OSC2 pitch.
- **OSC1+2:** Both OSC1 and OSC2 pitch.
- **PW:** Width of the pulse of PWM waveforms.

**Amount:** LFO1 Amount control determines the amount of LFO output to use on the destination control(s). Higher values will result in a more dramatic modulation.

## Low Frequency Oscillator 2 (LFO2) and Arpeggiator (ARP)



Second LFO operates much like the first, yet without a selectable waveform. LFO2 is always a pure **sine** wave. In addition LFO2 has a powerful Arpeggiator (explained below).

**Rate:** Controls the speed (frequency) of LFO2.

**Destination:** The following destinations are available to LFO2:

- **OSC1+2:** Both OSC1 and OSC2 pitch.
- **AMP:** Amplitude (Creates a Tremolo effect).
- **FILTER:** Filter cutoff frequency.

**Amount:** LFO2 Amount control determines the amount of LFO output to use on the destination control(s). Higher values will result in a more dramatic modulation.

## LFO2 Arpeggiator

**ARP:** You can enable Discovery's Arpeggiator by left-clicking the **ARP** button in the LFO2 section. When active, LFO2 operates in ARP (Arpeggiator) mode.

An Arpeggiator is basically a simple sequencer which continually plays notes automatically as a note or notes are held. The notes played depend of the keys currently pressed and the arpeggiator range.

**Rate:** When in ARP mode, the Rate control sets the arpeggiator tempo. Faster values may be achieved with greater values (turning the knob to the right).

**Destination:** In Arp mode, direction in which the Arpeggiator will play notes. They can be:

- **DWN:** Plays notes from highest to lowest, then restarts.
- **U&D:** Repeats playing highest lowest, then back from lowest to highest.
- **UP:** Plays lowest to highest, restarts.
- **RND:** Plays any random note from the arpeggiator range.
- **RND2:** Play to the next or the prior note in the arpeggiator range randomly.

**Arp Rng:** Sets range in octaves for the arpeggiator, from 1 to 5 octaves.

## Modulation Envelope

Modulation envelope is a simple envelope which includes 2 stages, attack and decay.



**Attack:** Changes the value of the destination (based on the **Amount**) from the time a key is pressed until its highest point.

**Decay:** Changes the value of a destination (based on the **Amount**) from the highest point until the sustain level is reached.

**Destination:** The following destinations are available to the Mod Envelope:

- **FM:** Frequency Modulation Amount.
- **PW:** Pulse Waveform Width.
- **OSC2:** OSC2 Pitch.
- **O2+W:** OSC2 and WAVE pitch.

**Amount:** Sets modulation. This modulation can be positive, negative, or anything in between. Three basic settings include:

- **Negative:** All the way to the left, reduces the destination.
- **No Amount:** Center, disabled.
- **Positive:** All the way to the right, increases the destination.

## Graphic Envelope Modulation



Graphic Envelope modulation is located between GATE and WAVE sections. Just left-click the **blue** LED close to MOD label for easy panel access.

Configuration is done in the same fashion as Gate, left-clicking the bars with your mouse in order, with the only difference of being able to set individual amounts for each one. Clicking and holding your mouse button will allow to easily draw custom modulations.

**Destination:** This feature allows you to choose which control(s) this envelope will modulate. The following graphic envelope modulation destinations are available:

- **OSC2:** OSC2 pitch.
- **FM:** OSC2 → OSC1 FM (Frequency Modulation) amount.
- **PW:** Width of the pulse of PWM waveforms.
- **FILTER:** Filter cutoff frequency.



# Amplifier

Discovery's amplifier applies an envelope to the output gain of the current layer of sound. This is the final stage of synthesis. The following controls apply:



- **Attack:** Controls for the time that envelope moves from note press (0) to full volume. (Does not apply to legato mode).
- **Decay:** This knob controls the time length between envelope gain goes from upper point (end of Attack) to Sustain level.
- **Sustain:** Sets the point at which the envelope stays while note is held. This state is held until the note is release.
- **Release:** Once the note is released, this knob will control the time in which the gain will fall from current envelope point (Sustain) into complete silence, finishing the voice use.

Longer releases can result in many simultaneous voices, resulting in high CPU usage.

- **Gain:** Adjusts the overall volume for the current layer. Use morphing to add dynamics.
- **Limiter:** Applies a compressor with  $-\infty:1$  ratio for the current layer.



Discovery Pro can also switch from default **linear envelope** behavior to **exponential**, which is usually better for pads, by clicking the LED next to each knob.

Once LED is enabled, that particular envelope stage will use exponential values instead linear.

## Panning, Delay/Echo and Gate

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Discovery has built in stereo delay, panning and gate effect units.

### Panning



This effect can be used to widen a sound or give it interesting panning effects per layer. You can sync Mod Rate to host tempo by clicking the led located next to Mod Rate knob.

- **Position:** Position in the stereo field.
- **Modulation Rate:** Controls the rate of the stereo modulation.
- **Modulation Amount:** Controls the depth of the stereo modulation.

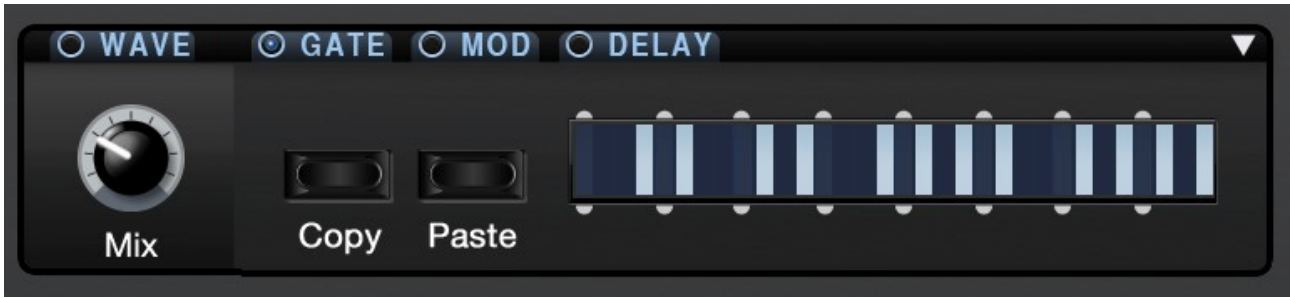
## Delay/Echo

This effect can be used to add spacey echo effect, or widen a sound. You can sync Left/Right Delay to host tempo by clicking the led located between Left and Right knobs.



- **Level:** Controls the amount of the delay effect. No Level value (knob turned completely to the left) will disable the delay effect. This control is morphable as well.
- **Left / Right Delay:** Controls the delay time of the unit for each channel.
- **Left / Right Feedback:** Controls the time of the delay tail. Moving this knob to the right will increase the tail.
- **Cross switch:** Adds a cross-feed to the feedback output. This will result in a stereo bouncing delay, useful for 3d-alike effects.

## Gate



To enable Gate page effect, do so by clicking the small **blue** led next to GATE.

**NOTE:** You can enable and disable multiple gate steps by left clicking and dragging the mouse while moving on the pattern.

- **Level:** Controls the amount of the gate floor effect. No Level value (knob turned completely to the right) will disable gapper effect.

This control is morphable and layer independent, suitable for complex sound textures.

- **Copy:** Copies the current gate pattern to memory.
- **Paste:** Dumps the gate pattern on memory to current gate.
- **Gate pattern:** Controls the gate triggering.

## Importing and Exporting SysEx

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Discovery can import or export SysEx patch dumps from software able to record MIDI SysEx data dumps.

On Discovery GUI, press **EDIT > File > Import / Export Nord Lead 2 SysEx**

Keep in mind **full bank** patch imports will be placed into current selected layer. Also, imported Nord Lead 2 sounds may sound slightly different. Performance and Percussion Kits dumps are not supported.

## Unison Edit

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Unison is a pretty simple edition command, able to be customized. It takes the values from the first layer (A) and applies it over all of them (A, B, C and/or D) depending of the preset.

If we open unison.txt located at **Documents > discoDSP > Discovery Pro > Config** using **Edit > File > Open Unison** we can see a list of default presets and the way how new ones can be made. Let's take a look at the first one: Double, which is the name displayed.

Double    1 1 0 0    0.5 0.5 0 0    0.2 0.8 0 0    0 0 0 0    0.3 0.7 0 0

- **First four values** mean that only Layers A and B will be affected 1 1 0 0 where A (1) B (1) C (0) D (0).
- **Second values** are gain. 0.5 in a 1 to 0 range means Layers A and B will have 50% gain each.
- **Third values are panning**. Layer A will be panned about 25% Left and Layer B 25% right.
- **Fourth values are osc2 octave pitch shift**. Since values are 0 they will all remain in the same octave.
- **Fifth values are the osc2 fine-tune**. As we can see Layer A and B will be detuned about 25% up and down respectively.

Adding and removing presets is as simple as removing or copy/paste a line and saving.

Edited Unison presets will take effect next time Discovery is instanced.

## Version History

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### Release 6.9

- Code signed files ready for macOS Catalina.
- Rewritten multichannel bus configuration.
- Windows and Linux standalone.
- Linux standalone JACK support.
- New 128 presets bank by Thomas Hook.
- Major framework upgrade for enhanced compatibility and stability.
- Compiled with XCode 10.3, VS 2019 and Ubuntu 18.

### Release 6.8.1

- Fixed ADR LCD values in Windows build.

### Release 6.8

- Drag and drop support for FXP / FXB / SYSEX / WAV / SF2 / DWB files.
- Gate and Modulation mouseover displays values.
- Modulation envelopes scroll wheel support.
- Removed OSC2 / WAVE semitone decimals from LCD display.
- Dynamic display for ADSR time values.
- Aftertouch displays amount in % and + - correctly.
- Fixed pitch bend issue importing Discovery banks.
- Fixed Quick Stack Master volume issues.
- Fixed MIDI to Velocity swap tick.

### Release 6.7.1

- Fixed Phaser Filter issues.

### Release 6.7

- Layer solo: Use Alt + click on slot / button to solo / unsolo layer.
- EDIT > File > Save Program to Active Bank.
- EDIT > Paste > Morph to all layers.
- EDIT > Paste > Pitch to all layers.
- Bank change controller 0 support.
- Fixed macOS bank change controller crash.
- Fixed Aftertouch mode not refreshing correctly.
- Fixed WAVE font size LCD.
- Fixed Empty WAVE Program/Bank display.
- Removed License.dat check.

## Release 6.6

- Mac (x32/x64) / Windows (x32/x64) VST3 support.
- Multi-channel support.
- Mac standalone.
- Added 1.5x GUI size for Retina displays.
- GUI fixes and speed up by disabling image caching.

## Release 6.5.1

- Fixed Cubase issues.
- Updated framework for better stability and performance.
- OS X: Compiled with Xcode 7.3. OS X 10.6 or higher is required.

## Release 6.5.0

- Added Retina GUI support for Hi-DPI displays including minor enhancements.
- Added 15 new banks and thousands of new waveforms. 10 banks reworked.
- Added **License.dat** copy protection. This file is provided at discoDSP Members Area or new purchases. It has to be placed at **Documents > discoDSP > Discovery Pro** folder to make the plug-in run.
- Added EDIT > Config > MIDI Out option.
- Added flat popup active option color.
- Fixed hanging notes issue.
- Fixed Linux file menu issues.
- Fixed Linux bank import.
- Increased performance and stability.
- Data folder location changed to **Documents > discoDSP > Discovery Pro**.
- OS X: Compiled with Xcode 6.4. OS X 10.6 or higher is required.

## Release 6.4.6

- Fixed portamento behavior where only first unison voice was affected.
- Fixed delay copy/paste function.

## Release 6.4.5

- OS X: Compiled with Xcode 5.1.1.
- Added shared memory to copy/paste layers/programs between Discovery Pro instances.
- Fixed inverse program change bug.
- Fixed OSC 2 noise to LFO1/2/MOD ENVELOPE - OSC 2 / OSC 1+2 rates behavior.

## Release 6.4.4

- Fixed BandReject filter behavior.

## Release 6.4.3

- Enhanced unison tuning.
- Fixed swapping programs voice channel management.

## Release 6.4.2

- Auto-loop for single cycle waveforms with less than 2048 samples.
- Auto-tune for unlooped waveforms.
- Enhanced voice stealing algorithm.
- Wave oscillator .wav fine-tune support.

## Release 6.4.1

- Double clicking a knob resets to original position.
- Mod amount now reflects mouse values and OCT range correctly.
- Drop down menu from KeySplit hides after switching presets if it's displayed.
- Enhanced LCD fonts.
- Filter Attack MIDI CC changed to 38 (like NL2) on all platforms. 89 remains for FL Studio due compatibility issues.

## Release 6.4

- New Nord Lead 2 modeled Unison.
- SysEx import now supports .MID files.
- Enhanced SysEx Import.
- Edit > Swap > Bank > Chorus to Unison.
- Edit > File > Export Nord Lead 2 SysEx Bank.
- 1.5x / 2.0x GUI graphic fixes.
- Unison CC 16 / Phaser Chorus CC 50.
- Updated Help > MIDI CC.
- Banks 11 to 45 Chorus effect switched to Unison for better sound quality.

## Release 6.3.1

- Fixed Graphic Modulation Envelope erratic behavior.
- Fixed PAD ECO button graphics.
- Fixed LCD Bank cell display graphics.

## Release 6.3

- EDIT > GUI Size (1 / 1.5 / 2x) up to 1780x800 size.
- Full GUI code re-write. Faster, smoother, remarkable CPU usage reduction.
- Major internal structure re-write and clean up.
- Linux VST support.
- Revised manual.



## Release 6.2

- New 128 voices polyphony option.
- Export program enabled in demo.
- SysEx export Nord Lead compatible.
- Reorganized and streamlined EDIT, preset menus and dialog windows.
- Morphing values shown if different from zero only.
- Broader bank/program LCD text.
- Midi CC # / Disabled added to EDIT > Swap > Aftertouch To.
- PADsynth button displays green if ECO mode is enabled.
- Fixed missing Wave.dat dialog hang.
- Fixed GUI background gradient misplacement.
- Fixed Quick Stack using Keysplit behavior.
- Fixed OSC 2 octave display LED bug.

## Release 6.1

- EDIT > Quick Stack. Navigate thru any banks and presets without leaving current program.
- DWB 2.0 supporting embedded SF2 and Corona Wave Expansion DWB files.
- Multi-out per layer (VST only).
- EDIT > Paste > Layer to copies values from active layer instead memory.
- EDIT > Key Split > Custom. Configures A/B/C/D at any key range independently.
- Key Split GUI graphics display on current mode (off / dual / custom).
- Key Split Custom drop down menu switch / hide button (x).
- Revised manual.
- Bug fixes.

## Release 6.0

- New Nord Lead 2 modeled filters using Zero Delay Feedback technology.
- Data folder now placed at **Documents > discoDSP > Discovery Pro 6**.
- EDIT > Reset > Bank / Program / Layer will get values from **Documents > discoDSP > Discovery Pro 6 > Presets > Default.fxp** file.
- EDIT > Paste > Layer to > All / A / B / C / D / A+B / C+D.
- EDIT > Switch > PadSynth Eco Mode. Re-synthesizes a single octave instead.
- EDIT > Key Split. Play Layers A/B from C0 to B3 and C/D from C4 to B9.
- Revised and tweaked 45 banks also updated to ZDF filters.
- Revised manual.

## Release 5.6

- OS X 64-bit VST .
- Data folder moved to **Documents > discoDSP > Discovery Pro** with categorized folders.
- EDIT > Reset > Program and Layer read the settings from Documents > discoDSP > Discovery Pro > Presets > Default.fxp file now.
- EDIT > File > Import WAVE automatically places WAV files at discoDSP > Discovery Pro > Waves > User.dwb
- EDIT > Reset > Program Undo will revert back to the original preset located on the current bank.
- EDIT menu restyled to white text over black background.
- Added Paste to All, A, B, C, D at Zone Preset drop down menu.
- Enhanced Morph values. Tick values are show when synced to tempo.
- Bug fixes.
- Manual revision.

## Release 5.5

- Better FXP preset export compatibility.
- Renaming a preset shows the original name instead blank.
- Overwrite warning when a bank file already exist.
- File dialog boxes now remember last opened locations.
- Banks located at Data folder refresh autocratically.
- Small EDIT menu fine-tune.
- Manual revision.

## Release 5.4

- 64 Bit Audio Units for Mac.
- 64 Bit VST for Windows.
- PAD resynthesized waves now render correctly under x64 OSes.
- Pitch and Mod Wheel events now recordable from GUI.
- MOD value mouse range behaves correctly now.
- Corrected arpeggio with MIDI Sustain behavior.
- EDIT > Reset > Layer Aftertouch.
- EDIT > Reset > Program Aftertouch.
- EDIT > Reset > Program Morphing
- EDIT > Bank import. Places FXB+DWB files at Discovery Pro Data folder.
- EDIT > Help > Release number added.
- EDIT > Switch > Aftertouch to > Aftertouch, Foot (CC# 4), Expression (CC# 11) and Breathe (CC# 2).
- Bug fixes.

## Release 5.3

- Aftertouch support. EDIT > Switch > Aftertouch mode or Shift + Click ABCD button.
- Faster Sine Wave VA oscillator.
- MIDI CC Switch to edit Layers A-D using #63.
- EDIT > Help > Open HTML Manual.
- EDIT > File > Open Presets Folder.
- Drop down preset zone menus are alphabetically sorted now.
- Drop down presets available for WAVE zone.
- Wave OSC tabs order changed to WAVE DELAY GATE MOD.
- Bigger click area for Wave tabs.
- Optimized Program and Bank LCD display names.
- Small GUI restyling.
- Revised Manual.
- Bug fixes.

## Release 5.2

- WAVE LCD display now shows waveform numbers.
- Fixed clicks with Factory and Classics wave banks.

## Release 5.1

- VST panel displays correctly in Cubase OS X.
- Better preset name handling in Zone Presets.
- Better behavior using Reaper.

## Release 5

- WAVE PAD Synthesis Button. Re-synthesis of any active Wave using PAD algorithm, generating a SFZ file (Data Folder/PAD Cache).
- New Classic.dwb WAVE bank, including over 250 popular synthesizer waveforms.
- New voice stealing algorithm.
- 24-bit wave files support for User Bank (Data Folder/User.dwb).
- Help > Tutorials screen shots, MIDI CCs and Manual access.
- Edit > Smart Randomization.
- File > Nord Lead 2 SysEx Export.
- File > Open Data Folder.
- File > Open Unison Configuration.
- Edit > Config > MIDI CC Buttons switch.
- WAVE Active file is now marked in the drop down menu.

## Release 4

- Zone presets. Each section can save individual presets based on the current state. It's available by clicking the white small drop down menu icon located at the top left corner.
- Gate values are now displayed at the LCD when mouse is over.
- Engine fixes.
- Host compatibility fixes.
- Manual revision.
- Mac DMG image now includes alias to Audio Units, VST, RTAS and Plug-Ins folders for a easier installation.
- Apple GarageBand 09 and Logic 9 compatibility.
- RTAS version.

## Release 1

- Initial Release.

## Copyright

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