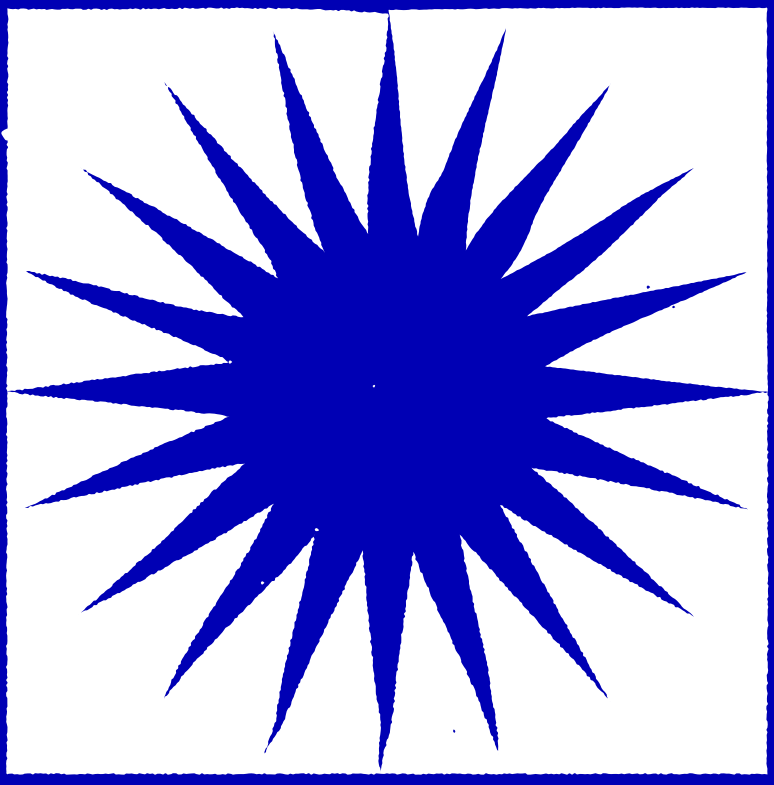
12 VOICE BINAURAL
ANALOG-HYBRID SYNTHESIZER

UDO SUPER 6 — OWNER'S MANUAL

VERSION 2.0 · AUGUST 2020



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12 VOICE POLYPHONIC BINAURAL ANALOG-HYBRID
SYNTHESIZER WITH SUPER-WAVE TECHNOLOGY

SUPER 6

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VERSION 2.0 · AUGUST 2020

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IMPORTANT SAFETY INSTRUCTIONS

WARNING: WHEN USING ELECTRIC PRODUCTS, THESE BASIC PRECAUTIONS SHOULD ALWAYS BE FOLLOWED.

1. Read all the instructions before using the product.
2. Do not use this product near water.
3. Do not operate for a long period of time at a high-volume level or at a volume level that is uncomfortable. Amplification of this product with for example, speakers or headphones, may produce sound levels that could cause permanent hearing loss.
4. The product should be positioned so as to allow proper ventilation.
5. Do not operate near heat sources such as radiators, fan heaters, or other products that produce heat. Do not operate in direct sunlight or near naked flames such as lighters or candles.
6. The product should only be connected to a power supply as specified in the operating instructions or as marked on the product.
7. Unplug the power supply from the outlet when left unused for long periods of time or during lightning storms.

Note

This device has been tested and complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference
2. This device must accept any interference received, including interference that may cause undesired operation.

Caution

This product is not user serviceable. All servicing should be carried out by qualified personnel only. Please note that any changes or modifications made to this product not expressly approved by UDO Audio Ltd. could void the user's authority granted by the FCC to operate the equipment.

ACKNOWLEDGEMENTS

Axel Hartmann, Frank Rüffel, Mike Hiegemann, Dan Parks, Jasmine Butt, Ayumu Suzuki, Gaz Williams, Chloe Smith.

The UDO Team

George Hearn, Magnus Hearn, Will Plowman, Anthony Gillan, Kester Limb.

INTRODUCTION

Hello and welcome to your new UDO synthesizer! I'm honoured to have been able to craft this instrument and place it in your hands. Synthesizers have been a love and passion in my life since a young age. It has always been a dream of mine to produce an instrument like the Super 6 and it has been realised by an international collaboration of talented musicians, engineers, designers and people like yourself who have supported this venture.

The Super 6 is a result of years of hard work and many iterations of development. My mission with the Super 6 has been to harmonise what I love about archetypal electronic instrument design with modern, novel synthesis technologies that excel at generating spatially dynamic results.

The architecture leverages the vibrancy of a true-stereo analog signal path, driving it with extremely high sample rate, spectrally versatile, digital audio and presents you with straightforward, expressive controls of superior mechanical build quality.

I would love to see this instrument with the wear and tear of many years of use. Do not be afraid to use it for what it was made for. Experiment, play, take it with you, learn it and hopefully love it like we do.

UDO are dedicated to making powerful and accessible musical instruments, and we hope you'll take much simple joy from the Super 6. We have brought it to you, and now the most significant part of the journey is in your hands.

George Hearn,
Director UDO Audio Ltd

The UDO Super 6 is a 12-voice polyphonic analog and digital hybrid synthesizer. By combining characteristics of the best of vintage-era classic synths and state-of-the-art modern synthesis technology (more about that below), it was designed to be a flexible, powerful and immediate instrument that provides you with a gorgeous sound.

DDS Oscillators

Direct Digital Synthesis is the signal generation method employed by both oscillator cores of the Super 6. At its centre is a clock signal – three orders of magnitude higher than typical audio sample rates. The clock signal increments a counter through thousands of indices in your choice of waveform, selecting the appropriate sample to output every twenty-billionths of a second with interpolation filling in the gaps between samples at different oscillator frequencies. The samples produced by our numerically-controlled oscillators are then transformed to analog voltages by a DAC, one for each oscillator, which operates at the same clock rate before being filtered by a preliminary analog low-pass filtering stage.

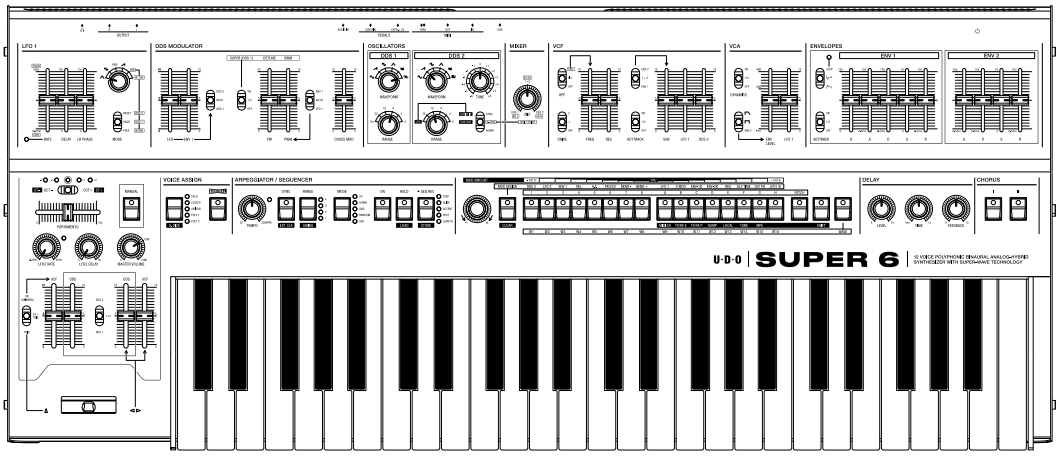
The extremely high sample rate to output frequency ratio provides DDS oscillators with the advantage of superior phase precision and natural sounding frequency modulation. It also, importantly, precludes us from needing to deploy the severe band-limiting that is necessitated by aliasing constraints of typical lower frequency digital methods. Thus our oscillators are comfortably capable of generating frequency content far above the upper-frequency limits of the human auditory system as is the norm with analog oscillator synthesis.

What is Binaural Synthesis?

In Binaural mode, the Super 6 features a true stereo signal path in which its twelve voices are twinned to form six stereo ‘Super’ voices. Consequently, the left and right channels, and each your ears, are assigned a complete synthesizer voice. Starting with the stereo oscillators, parameters of both channels of each Super voice may be independently controlled, facilitating you the player to create gorgeous stereo images. The effect on the sound ranges from subtle to extreme stereo movement and an enhanced sense of spatial positioning relative to conventional monaural signal-chains.

QUICK START

The Super 6 has been designed for hands-on performance and experimentation. Not only do we feel it is a great sounding instrument, but also that it provides you with a pleasing immediacy in how you interact with the sound. All of the Super 6's primary controls are directly accessible from the front panel making it an incredibly intuitive and fun instrument to play.

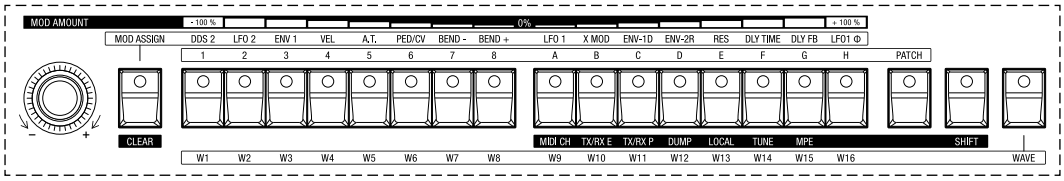


The Super 6 front panel.

Exploration and experimentation are downright encouraged, so feel free to dive straight in and start creating your sounds. The best way to learn about how the Super 6 works is to get involved! You can always come back later and read more about each of the Super 6's sound shaping tools in the subsequent sections of this manual. We hope you enjoy playing and tweaking the Super 6 as much as we do!

Patches

128 patches are accessible from the front panel of the Super 6. You can edit these patches or use the memory slots to create, store and recall your own sounds.



The patch and bank select buttons – also used to enter the modulation matrix or to access user waves and global parameters.

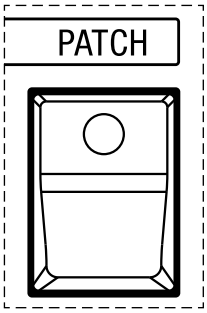
Note: *Further patches can be stored on a computer via the USB connection on the rear side (see page 87 – 88 and page 91).*

The patch and bank select buttons consist of two rows of eight numbered patch select buttons on the left (**1-8**) and lettered bank select buttons on the right (**A-H**). In addition to patch selection, these buttons serve a couple of other purposes: They also allow you to:

1. Assign modulation sources to destinations and vice versa (see pages 67 – 71).
2. Load alternative waveforms (see page 26).
3. Access the global parameters, such as MIDI channel settings or MPE control enable (see pages 83 – 85).
4. Program the sequencer (see pages 77 – 81).

Selecting a Patch

Firstly, make sure you are in patch mode. The Super 6 defaults to this mode when you first turn it on but otherwise patch mode is accessed by pressing the button marked **PATCH** and ensuring its LED is lit.



The patch mode button.

Each lettered bank select button (**A**-**H**) gives you access to 2 banks, and each bank contains 8 patches. Banks accessible by each bank select button are referred to by the bank letter and the number in their pair. For example, bank **A1** is one bank accessible by bank select button **A** and bank **A2** is the other bank accessible by bank select button **A**.

To switch between bank pairs, press the bank select button corresponding to a pair. For example, switching between bank **A1** and bank **A2** is achieved by pressing bank select button **A**. Note that the first of the two banks accessible by each button (bank **A1** in our example) is the bank you will enter by default. To indicate that you are accessing the first bank in each pair, the LED of the bank select button corresponding to the pair will stay solidly lit. To indicate that you are accessing the second bank in each pair, the LED of the bank select button corresponding to the pair will flash.

Each numbered patch select button (**1**-**8**) gives you access to 8 patches within a selected bank. Patches in the selected bank accessible by each patch select button are referred to as **p1**-**p8** for patches 1 to 8 in the selected bank.

When a patch is selected, the LED of a numbered patch select button (**1**-**8**) corresponding to the number of that patch in the selected bank will be lit. The combination of bank and patch select button LEDs denotes which patch is currently selected. If patch select button **2** is lit and bank select button **C** is flashing, for example, then the selected patch is **p2** in bank **C2**. Note that when changing banks, the LED of the patch select button you last selected will extinguish indicating that the current patch is not part of the newly selected bank. Simply switching banks will not launch a new patch. You have to confirm a patch selection by pressing one of the numbered buttons after a new bank is selected.

Selecting a Different Patch

Let's say you'd like to select patch **p8** in bank **B1**:

1. Make sure that the **PATCH** button's LED is lit. If not then press **PATCH**.

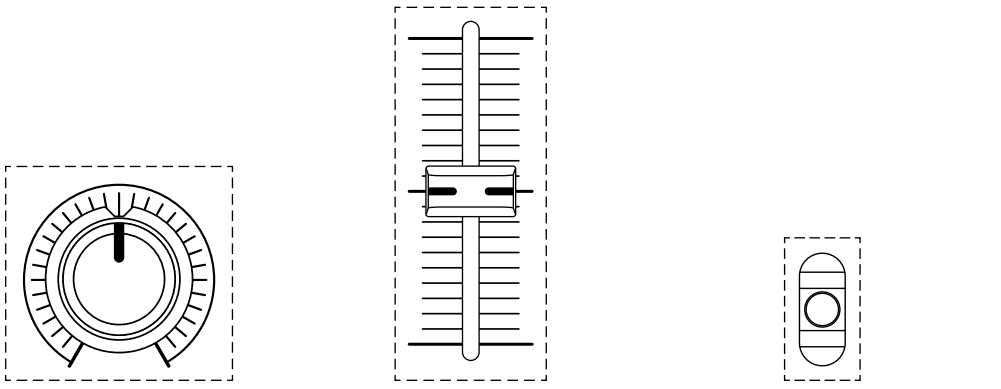
1. Press the bank select button on the right marked **B**. If its LED is flashing, you are in bank **B2**. Press bank select button **B** again and its LED will become solidly lit. You have now entered bank **B1**.

2. Press the patch select button on the left marked **8**. Patches are only loaded on release of patch select buttons. The LED of the patch select button corresponding to the patch you selected will then light up.

You have now selected patch **p8** in bank **B1**. Using this simple two-button system, it's easy to access all of the stored patches. Note that if you attempt to access a patch that isn't saved on the disk drive, the corresponding patch select button's LED will not light. Why not spend some time selecting different patches to get a flavour of the sounds the Super 6 is capable of producing?

Editing a Patch

The Super 6 has been designed to allow for quick and enjoyable patch editing. The instrument's control panel is split into two horizontal halves. The bottom half provides plenty of performance controls, whereas the top raised panel mainly consists of sound shaping controls. There are three main types of control elements:



Rotary Controls | Faders | Toggle switches

Editing a patch is as easy as turning rotary controls, moving faders and toggling switches. Any gesture applied to a control element will have an immediate effect on the sound. Note that when editing a sound – any lit patch select button LEDs will flash, indicating that you are editing a sound. See the section below on comparing edited sounds to saved patches for a description of how to switch between edited sounds and saved patches. Keep experimenting, and once you have created a sound you like, it's time to save it.

Saving a Sound as a Patch

Saving a sound as a patch is similar to selecting patches. Be aware that saving a sound will overwrite the sound previously saved to that memory location. The Super 6 allows you to compare your modified or newly created sound to the original patch by using the compare function (see the following section “Comparing an Edited Patch to a Saved Patch”).

To save a sound as a patch:

1. Choose and press a bank select button on the right. If you wish to access the other bank associated with the bank select button press it again. You can toggle between banks associated with each bank select button by pressing that bank select button. A solidly lit LED in the button means that the first bank associated with that bank select button is selected. A flashing LED in the button means that the second bank associated with that bank select button is selected.

2. Press and hold a patch select button of your choice on the left for 3 seconds. All of the patch and bank select button LEDs will flash once to signal that your sound is now saved.

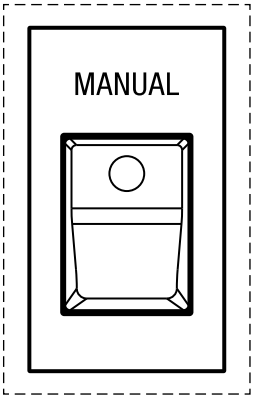
Comparing an Edited Sound to a Saved Patch

Comparing an edited sound to a saved patch can be very useful during the creation of sounds. This option allows you to compare sounds before committing to saving and overwriting any patches you might still have good use for.

Press a patch select button to load a saved patch. Press the same patch select button again to return to the sound you were editing. Pressing the **PATCH** button next to the **SHIFT** button will also toggle between the saved patch and the sound you were editing. Editing any saved patch will cause its corresponding patch select button LED to flash.

Manual Mode: What you see is what you get!

In addition to patch storage the Super 6 also provides a manual mode. Manual mode is accessed by pressing the white **MANUAL** button located to the left-hand side of the keyboard. Entering manual mode ignores the current patch settings and prompts the Super 6 to respond to whatever the front panel controls are currently set to. This is a great way to further understand how each of the controls affects the sound. Beyond that, it can also be a source of unexpected and exciting results!

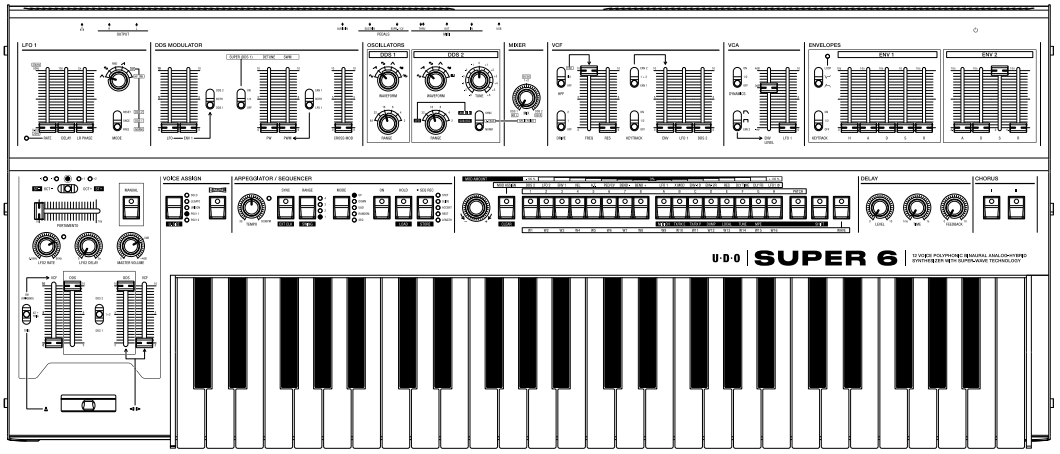


The manual button.

To return to patch mode simply press the **PATCH** button again.

Starting from a Default Patch

Although stored patches make fantastic jumping-off points, sometimes it may be useful to start from scratch. The Super 6 provides the ability to set the controls to a simple one oscillator sawtooth wave, giving you a basic starting point from which to create fresh sounds.



The default patch settings.

To initialise the default patch:

1. Press the **SHIFT** button to enter shift mode. Its LED will light up.
2. Press the **MANUAL** button and a default patch will be initialised.
3. Press **SHIFT** again to exit shift mode.

Level Up!

The Super 6 has been designed to be played and tweaked in real-time and we encourage you to do precisely this on your journey of finding and creating new sounds. After all, this is by far the best way to learn and fully understand the capabilities of your new instrument.

For a deeper explanation of the instrument's features and capabilities, the following passages of this manual explain all of the Super 6's operation in far greater detail.

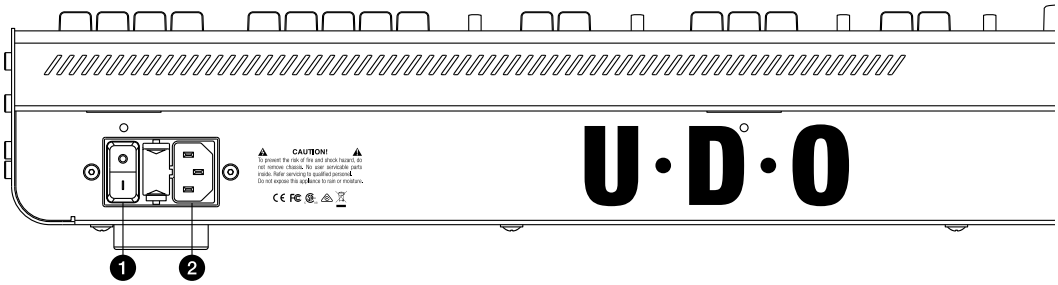
For info on how to adapt the instrument to your particular environment, such as using it alongside other MIDI instruments, or controlling it from a Digital Audio Workstation (DAW) or sequencer, we recommend reading the sections on global settings, connections and MPE control. Throughout the manual, you will also find some handy tips to help you familiarise yourself with the Super 6 and its possibilities for sound creation.

Enjoy!

UPDATING THE FIRMWARE

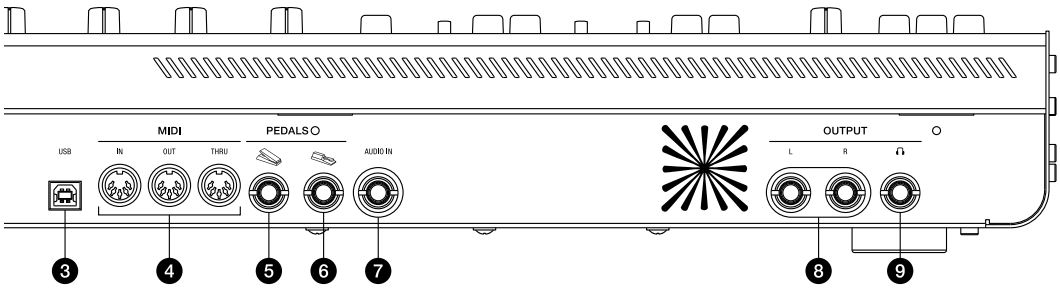
Instructions on how to carry out firmware updates are available on our website udo-audio.com.

CONNECTIONS



1. Power Switch: Use this switch to power cycle the Super 6.

2. Power Connector: The AC power connector accepts a standard, grounded IEC power cord and operates over a range of 90 to 250 volts and 50 to 60 Hz.



3. USB Port: Connect the Super 6 to your computer using the included USB cable for bidirectional MIDI communication, patch and sequence management, firmware updates and to import new waveforms. The Super 6 is a class-compliant device that does not require any drivers to interface with a computer.

4. MIDI In, Out and Thru Ports: Standard 5-pin MIDI DIN connectors.

5. Expression Pedal Input: Connect an expression pedal to this input to add expressive control and dynamics to your live performance. You will have a variety of options for using an expression pedal, since it is an assignable modulation source in the Super 6's modulation matrix. This input accepts any standard expression pedal that features a TRS (Tip-Ring-Sleeve) connector.

6. Sustain Pedal Input: Connect a normally-opened foot switch to this input to sustain notes during your performance. Note that the state of the sustain pedal at power-up of the Super 6 is taken as its off state during operation.

7. Audio In: This input allows you to process an external audio signal through the Super 6's signal path. The external audio signal will enter the signal path through the channel of the DDS 2 oscillator before passing through the mixer, the analog filters, and the chorus and delay effects. (See the section on page 31 for more details.) The audio input accepts a stereo 1/4 inch jack.

8. Main Audio Outputs (Left and Right): The Super 6 is capable of gorgeous stereo sounds. Connect both outputs to your mixer or audio interface using unbalanced 1/4 inch jacks. Although we highly recommend making use of the stereo outputs – after all, you've just acquired a superb binaural synthesizer – you can also use the Super 6 in mono mode. If you only connect the left output to your mixer or audio interface, the left and right signals will be summed to mono.

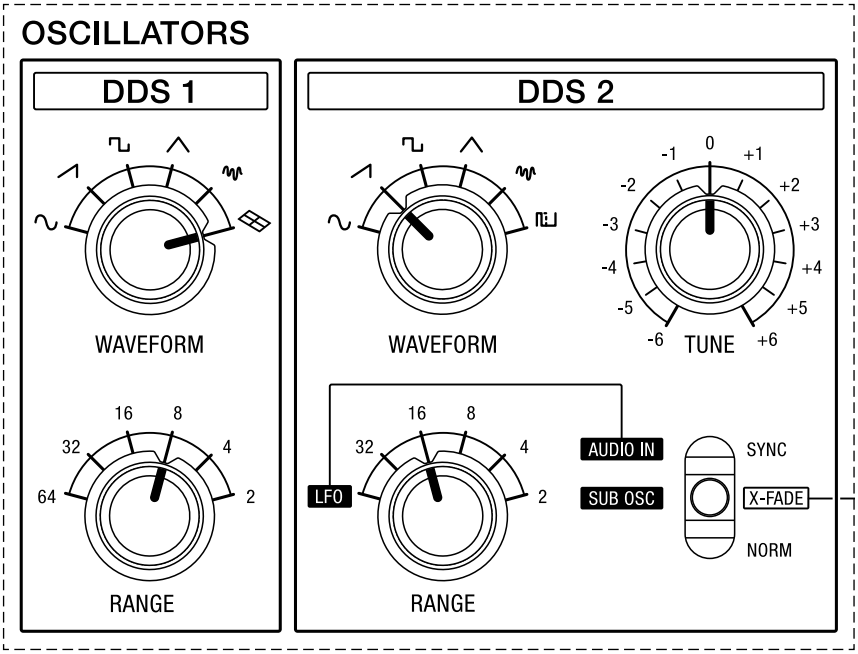
9. Headphone Output: Connect a 1/4 inch stereo headphone jack to The overall volume of the headphone output is controlled by the **MASTER VOLUME** knob on the front panel.

SOUND DESIGN & PROGRAMMING

In this section we are going to explore the sound design capabilities of the Super 6 by explaining the function of every front panel control related to the manipulation of sound.

Oscillators

Oscillators belong to the most basic and essential building blocks of a synthesizer. Without them, you could neither hear a sound nor shape or modulate what is producing an audio signal.



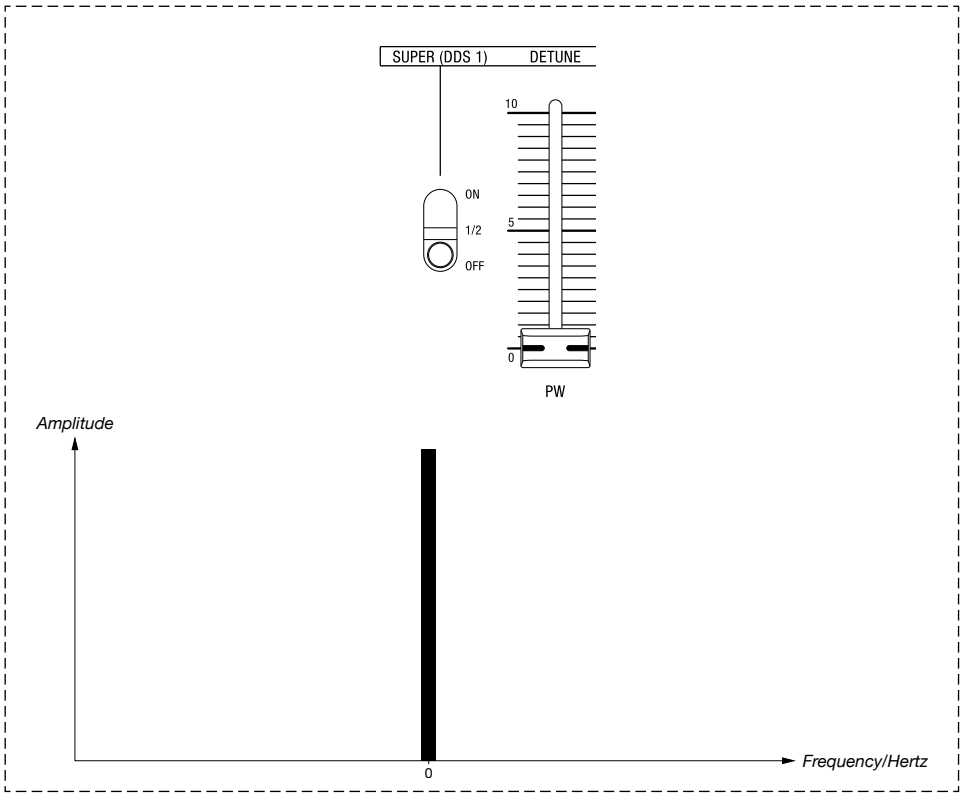
The oscillator section of the Super 6.

The primary sound sources of the Super 6 are its two FPGA-based oscillators; DDS 1 and DDS 2. Although they are capable of generating superb analog tones, they utilize UDO's Direct Digital Synthesis (DDS) method. For more information on what DDS means and how it works see page *x* at the beginning of this document.

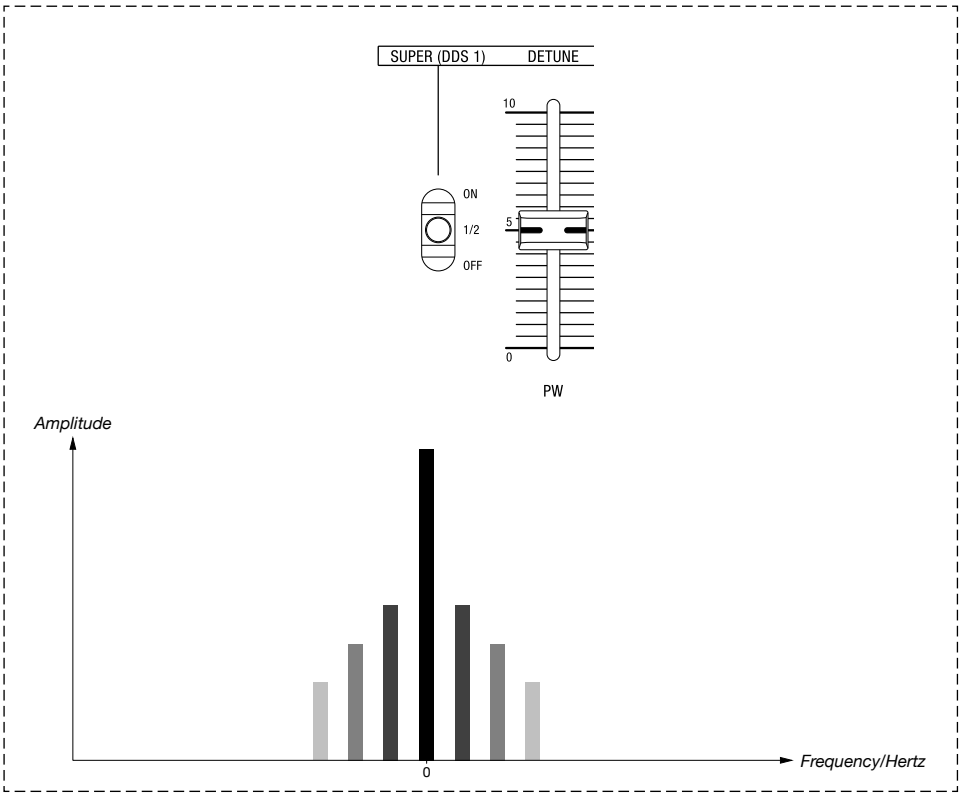
Both of the Super 6's oscillators are capable of producing classic analog waveforms like sine, triangle, sawtooth and square. In addition, the first oscillator (DDS 1) also features a selection of 16 waveforms you can choose from. These 16 selectable waveforms are replaceable (see pages 89), allowing for a potentially unlimited sonic palette.

DDS 1 Parameters

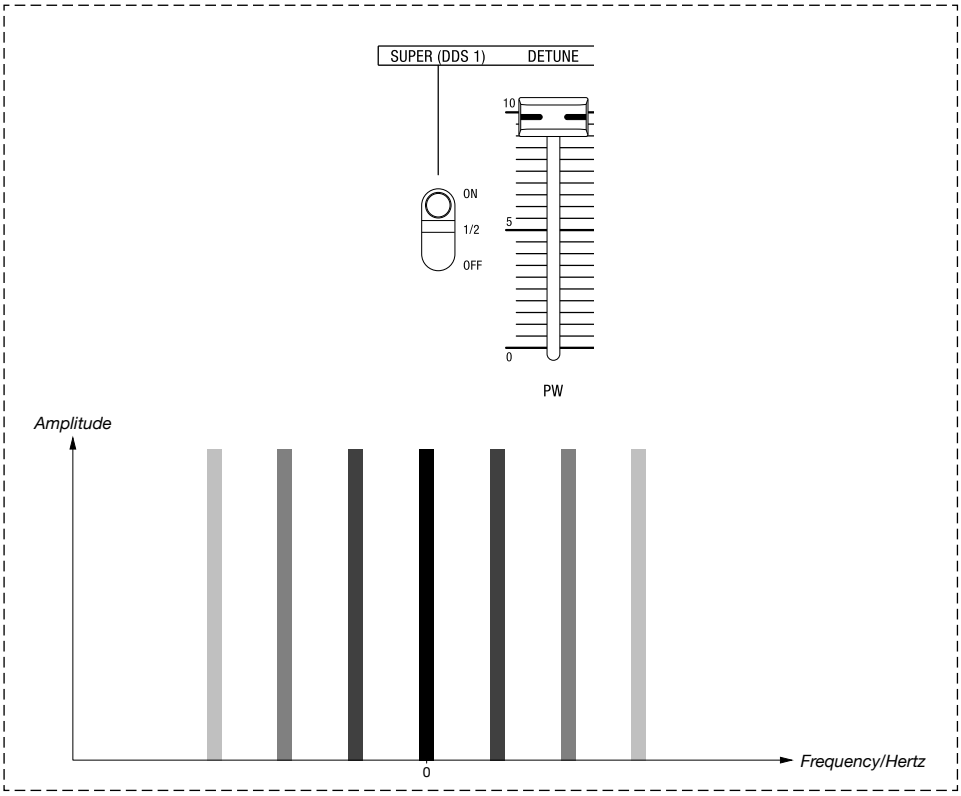
DDS 1 features an FPGA-based super waveform oscillator core.
It provides a centroid oscillator as well as six sister oscillators that can be dynamically de-phased in the stereo field if one of both Super modes is activated in the DDS Modulator section (see pages 51 – 56).
This essentially means that DDS1 is made up of seven free running oscillators, which gives the Super 6 its characteristic rich and wide sound.



The centroid oscillator of DDS 1. If Super mode is not activated it will be the only oscillator of DDS 1 that will produce a sound.

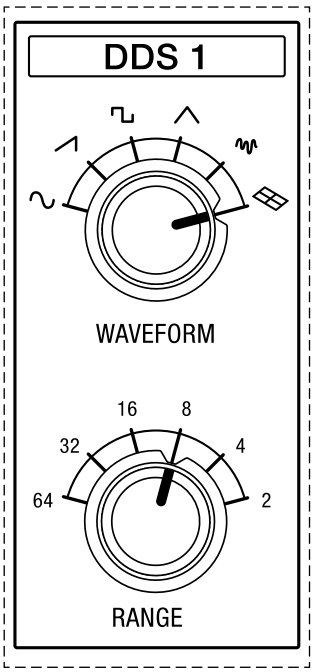


The centroid oscillator and the six sister oscillators spread to each side when Super mode is switched to 1/2 and the detune parameter is set to 5.



The centroid oscillator and the six sister oscillators spread to each side when Super mode is switched to full intensity and the detune parameter is set to 10.

The detune spread of the oscillators can be adjusted in the DDS Modulator section and modulated by LFO 1 and/or envelope 1 (see pages 51 – 56 for more details).



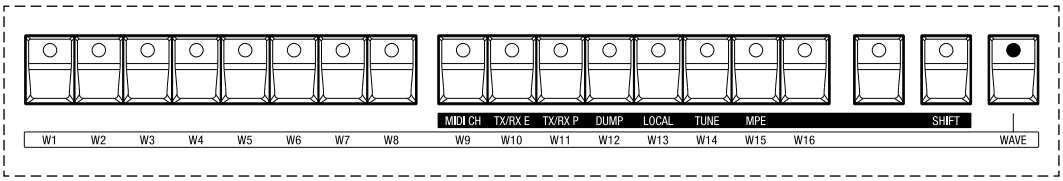
DDS1 wafevorm and range controls.

WAVEFORM: This rotary control allows you to select a waveform for DDS 1. You can either select one of the classic waveform shapes like sine, sawtooth, square, triangle and noise or one of the 16 additional waveforms that can also be replaced. See the following section on how to select additional waveforms for more information.

RANGE: This rotary control allows you to adjust the coarse frequency of DDS 1 over a range from 64 to 2 feet.

Selecting Alternative Waveforms for DDS 1

To select an alternative waveform for DDS 1, turn the waveform rotary control to the rightmost position. You will now hear the currently selected alternative waveform.



Waveform selection buttons.

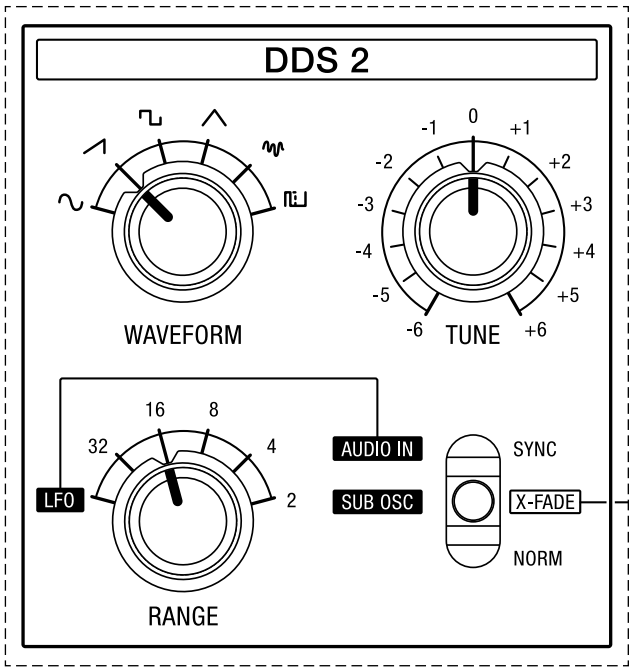
If you would like to change the waveform, proceed with the following steps:

1. Turn the waveform rotary control to the rightmost position or push the **WAVE** button located to the right of the bank select buttons. Its LED will flash, indicating that you are now in waveform selection mode. Notice how the description of the **WAVE** button is surrounded by a box that also includes the names of the functions the patch and bank select buttons take over in this mode: **W1** to **W16**, which stands for waveform 1 to waveform 16. The LED of the currently selected waveform will light up as soon as you enter the waveform selection mode.

2. Press any of the other 15 buttons to select a different waveform.

DDS 2 Parameters

DDS 2 features an FPGA-based waveform oscillator core running at a multiple MHz sample rate and provides you with six classic analog waveforms. Unlike DDS 1, which uses sampled waveforms, DDS 2 has an algorithmic core and thus behaves in a subtly different way.



DDS 2 controls.

WAVEFORM: This rotary control allows you to select a waveform for DDS 2. You can select one of the following classic waveforms: sine, sawtooth, square, triangle, noise, or pulse.

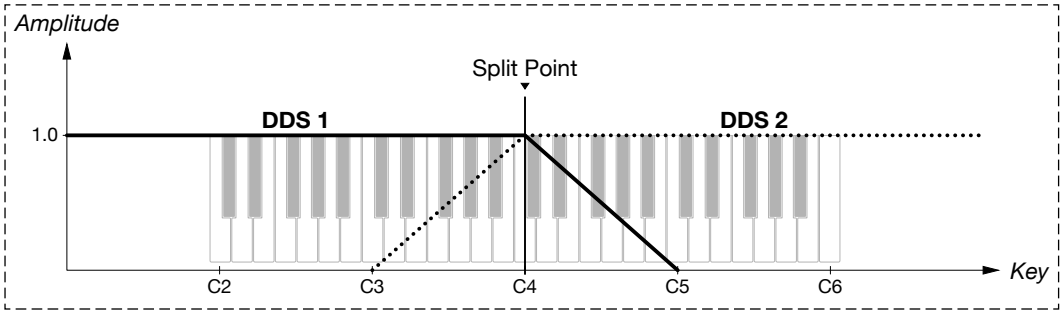
RANGE: This rotary control allows you to adjust the coarse frequency of DDS 2 over a range from 32 to 2 feet. If you turn the range control to the leftmost position, DDS 2 will act as an additional LFO. You can use DDS 2 as an LFO either in conjunction with an external audio signal or with the enabled sub oscillator. Read more about these additional modes on pages 29 – 33.

TUNE: This rotary control allows you to fine tune the frequency of DDS 2 upwards and downwards. You can either use this control to slightly detune DDS 2 from DDS 1 in order to create thicker sounds or to create intervals like thirds, fourths or fifths that can be played at the press of one key.

The toggle switch in this oscillator subsection allows you to select three different modes that provide additional controls for DDS 2:

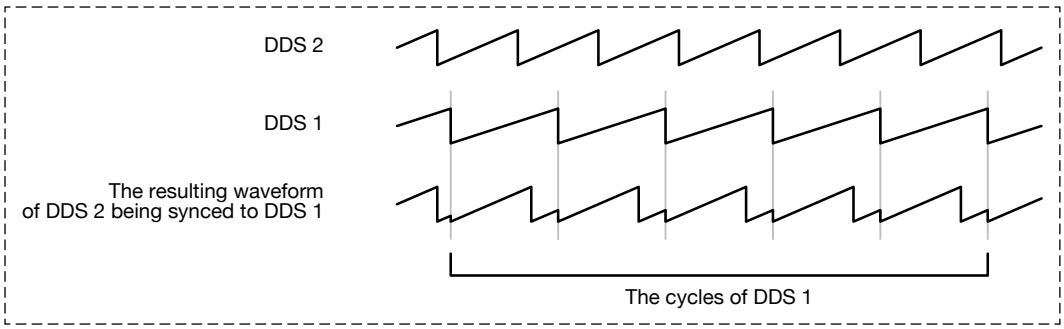
- **NORM:** This is the default mode for DDS 2.

- **X-FADE:** When this mode is activated, you can crossfade between the signals of DDS 1 and DDS 2 relative to an adjustable split point on the keyboard. The crossfade between the output signal of both oscillators will occur over a range of two octaves. The split point can be defined using the **MIXER** control (see page 32).



Crossfading the signals of DDS 1 and DDS 2 across the keyboard.

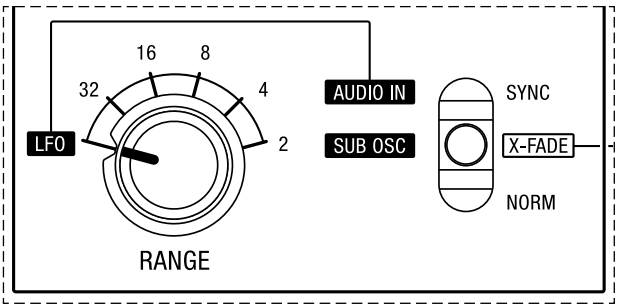
- **SYNC:** Selecting this option, also known as ‘hard sync’, will force DDS 2 to restart its cycle every time DDS 1’s cycle is starting. If you are setting the frequencies of DDS 1 and DDS 2 to different intervals, the sync option will create a more complex and harmonically richer waveform than the standard waveforms do.



DDS 2 being synced to DDS 1. In this example both oscillators are set to a sawtooth waveform.

Using DDS 2 as an LFO

As mentioned above, you can also use DDS 2 as an LFO. To do so, turn the **RANGE** rotary control to the leftmost position marked **LFO**. Irrespective of other settings, DDS 2 will be in LFO mode for as long as the **RANGE** rotary control remains in that position.



DDS 2 set to LFO mode.

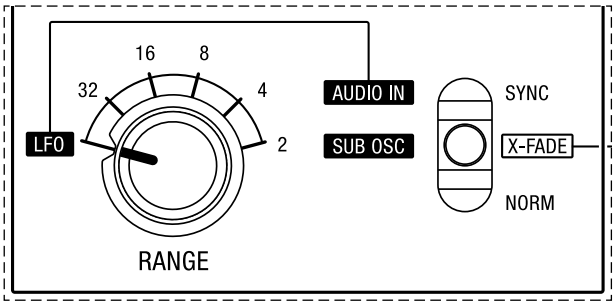
If DDS 2 is used as an LFO, the output signal of DDS 2 is no longer routed to the audio path. In this mode the **TUNE** control determines its rate or frequency over a range from 0.1 to 100 Hz. The LFO waveform can be selected just like its in default mode, i.e. via the **WAVEFORM** rotary control.

It is worth mentioning that DDS 2 in LFO mode provides two more waveforms than LFO 1, namely sine and pulse. If you pulse width modulate the second oscillator by means of the DDS Modulator or modulate its frequency via LFO 1, this can turn DDS 2 into a very complex and dynamic LFO, allowing for interesting modulation results. You can route DDS 2 in LFO or default mode to all available modulation destinations via the modulation matrix. See page 67–70 for more details.

Enabling the Sub Oscillator

You can enable the sub oscillator to add more bottom end to your bass sounds:

1. Turn the **RANGE** rotary control to the leftmost position marked **LFO**.
2. Flip the toggle switch to the middle position next to which it says **SUB OSC** in inverted letters.



Enabled sub oscillator.

In this mode, the sub oscillator's audio signal replaces the audio signal of DDS 2. The pitch of the sub oscillator is locked one octave below the frequency of DDS 1, which essentially means that the sub oscillator is tied to DDS 1. Its waveform is a fixed square wave that allows you to add plenty of harmonic richness to the bottom end of any sound you are working on. The **WAVEFORM** and **TUNE** rotary controls will have no impact on how the sub oscillator behaves.

You can adjust the level of the sub oscillator via the mixer section. The **MIX** control blends between the audio signals of DDS 1 and the sub oscillator. See pages 32 & 33 for more details on the mixer section.

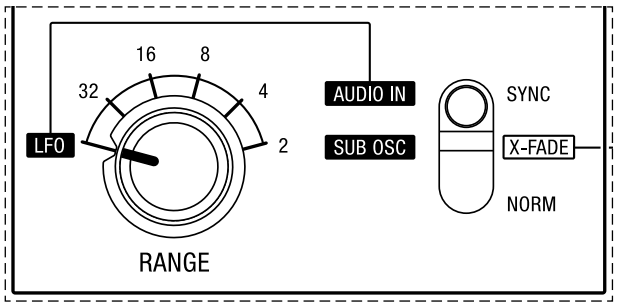
Processing an External Audio Signal

In addition to the two options described above, you may also use the DDS 2 module to process an external audio signal:

1. Connect an external audio source to the audio input on the rear side of the Super 6 by using a stereo 1/4 inch jack.

2. Turn the **RANGE** rotary control to the leftmost position marked **LFO**.

3. Flip the toggle switch to the upper position next to which it says **AUDIO IN** in inverted letters.



Allowing an external audio signal to be processed.

As you may have noticed these settings activate DDS 2's LFO mode. In this mode the audio signal of DDS 2 is bypassed to give way to the external audio signal, which is routed through the DDS 2 channel into the mixer. You can control the balance between the audio signals of DDS 1 and the external audio source with the **MIX** control in the mixer section (see pages 32 & 33 for more details on the mixer). Here, the external audio signal simply replaces that of DDS 2. After the mixer, the external audio signal is routed through the voltage controlled filter (VCF), the voltage controlled amplifier (VCA) and the effects section all of which allow you to further modify and process the incoming signal.

You can also adjust the input gain of the external audio signal:

1. Press the **SHIFT** button to the right of the patch and bank select buttons.

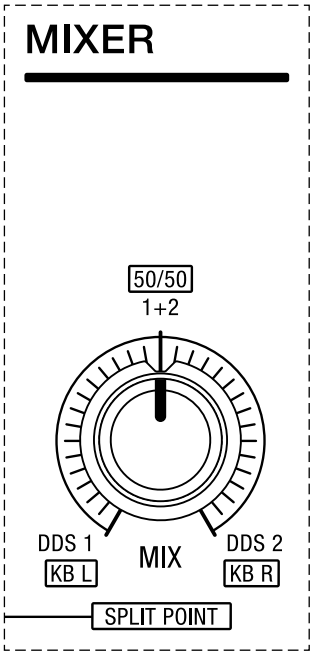
2. Turn the **MIX** control in the mixer section to adjust the input gain.

3. Return to editing your sound by pressing the **SHIFT** button again.

If you don't adjust the input gain manually, the gain defaults to a line input level that makes the external audio signal as loud as the Super 6's oscillator signals. The audio input also features a gate-trigger detector so that the envelopes and LFO 1 in reset mode will be triggered when the incoming audio signal reaches a threshold determined by the input gain level. The LED to the left of ENV 1 will indicate when the external audio signal passes the threshold. It will light up every time a trigger impulse is being received.

Mixer

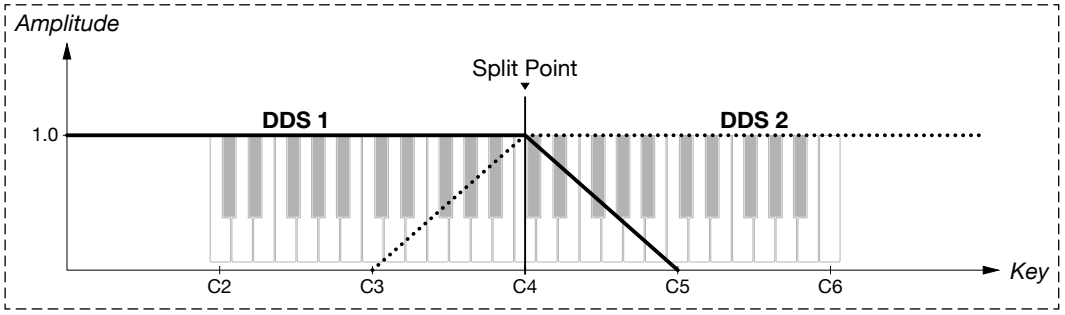
The mixer section allows you to control the balance between the audio signals coming from DDS 1 and DDS 2 or DDS 1 and an external audio signal. If DDS 2 is set to X-FADE mode, you will be able to crossfade between the audio signals relative to an adjustable split point on the keyboard.



The mixer section.

MIX: At a 12 o'clock setting the signals of both audio sources will be equally balanced. At the leftmost position, only the audio signal of DDS 1 will be audible. Likewise, only the audio signal of DDS 2 or that of an external audio source will be audible if you turn the rotary control to its rightmost position.

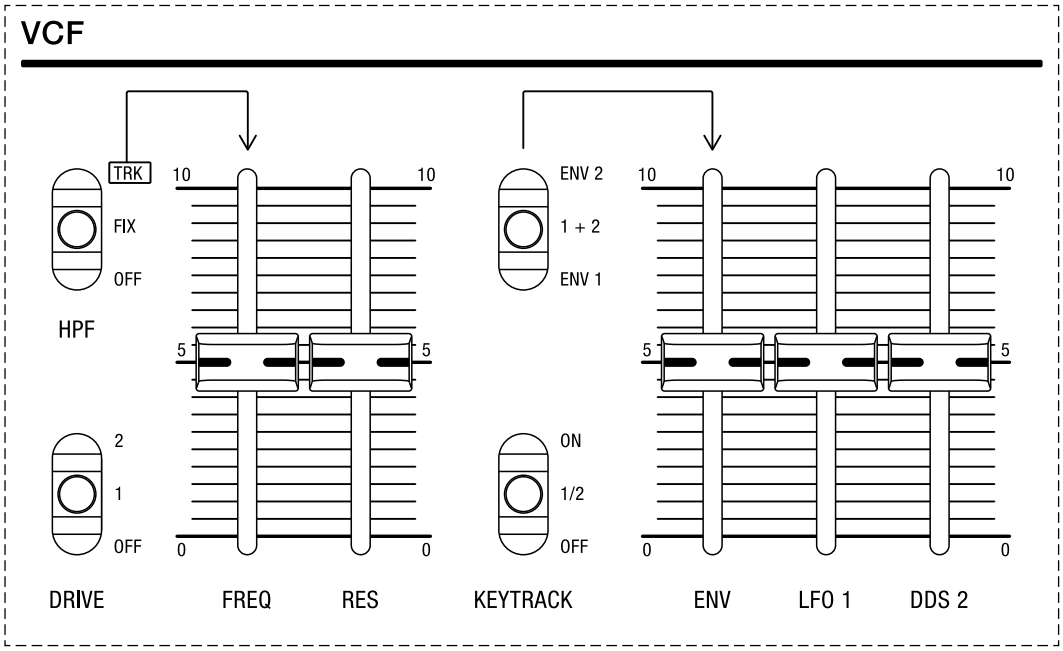
When DDS 2 is set to X-FADE mode (see page 28), the mixer rotary control will adjust the split point on the keyboard which the audio signals of DDS 1 and DDS 2 or DDS 1 and an external source will be crossfaded relative to. At a 12 o'clock setting the signals of both audio signals will be crossfaded over two octaves relative to a split point that is going to be located at middle C (C4). The more you turn the **MIX** control counter-clockwise, the more the split point will be moved down to the left half of the keyboard. Likewise, the split point will be moved upwards to the right half of the keyboard if you turn the **MIX** control clockwise.



Crossfading the signals of DDS 1 and DDS 2 across the keyboard.

VCF (Voltage Controlled Filter)

The voltage controlled filter (VCF) is an integral part of the instrument's sonic character, shaping the sound of the oscillators by modifying their signals' spectral content. The Super 6's main filter is an analog 4-pole, 24 dB per octave, resonant low-pass filter using a classic polysynth filter design from Sound Semiconductor (SSI). It is preceded in the signal chain by a voltage controlled high-pass filter (HPF) that can either be off, fixed, or can also track the low-pass filter cutoff frequency for band-pass operation.



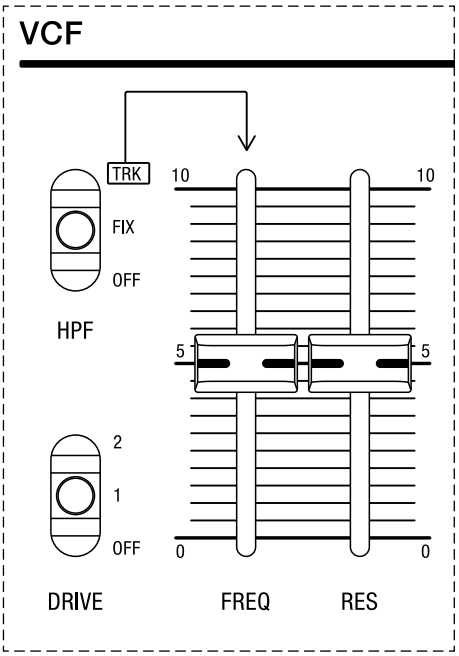
The filter section.

The **low-pass** filter subtracts high frequencies above the filter cutoff frequency (FREQ). The harmonic content below the cutoff frequency will pass through.

The **high-pass** filter (HPF) subtracts low frequencies. This can be disabled (OFF) for bass sounds or set to a fixed value of around 500 Hz (FIX) to remove 'muddy' low end from polyphonic sounds such as organs and low strings. It can also track the low-pass filter cutoff frequency (TRK) to provide a pseudo **band-pass** filter where only a narrow band of frequencies is passed.

The Super 6 provides various options for modulating the filter's cutoff frequency, making the filter section extremely flexible and capable of a wide range of sonic possibilities.

Overall, the Super 6's filter section is organised in two parts: The left half allows you to adjust all settings that are related to the filter itself as well as its different modes. In the right half of the filter section you will find controls that affect how the filter is modulated by various modulation sources and how it responds to key-tracking.



Left half of the filter section.

FREQ: This fader allows you to adjust the filter's cutoff frequency, i.e. the frequency at which the filter begins to cut off or subtract frequencies to shape the sound.

RES: This fader controls the amount of resonance the filter will respond with. If you increase the amount of resonance, the frequencies around the cutoff frequency as determined by the **FREQ** control will be emphasised and become more pronounced. The Super 6's low-pass filter can be driven into self-oscillation if you set resonance to the highest value. In this case, the filter will generate a pitch that is determined by the frequency setting and a timbre that sounds like a sine wave. You may also control or rather play the filter's pitch via the keyboard if you engage key-tracking (see below).

The **HPF** toggle switch allows you to choose from three different filter modes:

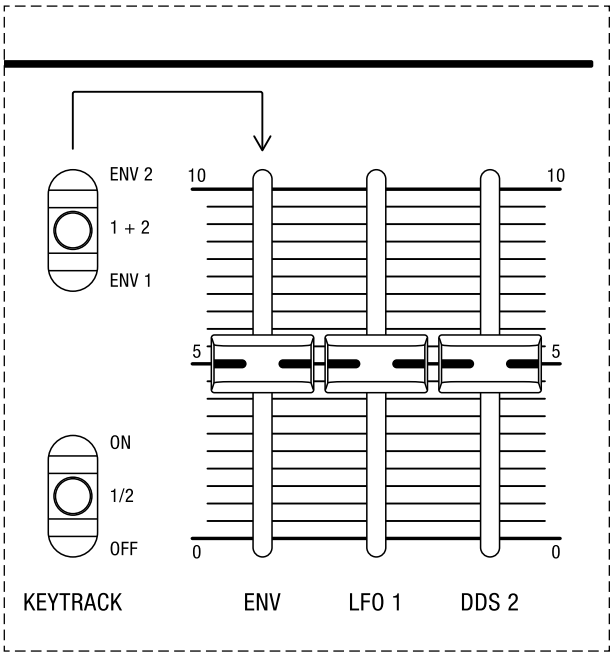
- **OFF:** With the control set to this option, the filter operates in low-pass mode, cutting away high frequencies above the cutoff point as determined by the cutoff frequency.
- **FIX:** In this mode the high pass filter removes a fixed amount of low frequency content from the sound below around 500Hz. This can be useful to clean up the sometimes excessive bass content of polyphonic sounds.

- **TRK:** In this mode the filter interlinks both the low-pass and high-pass modes to become a band-pass filter, only passing a band of frequencies as determined by the cutoff frequency.

The **DRIVE** toggle switch allows you to determine whether or not and how much the filter signal will be overdriven:

- **OFF:** This setting will result in no overdriven filter signal.
- **1:** At this setting the filter signal will be overdriven with respect to filter resonance. Use this option if you would like to add a subtle amount of distortion to your sound.
- **2:** At this setting the filter signal will be overdriven with full intensity. Use this option if you would like to add a healthy dose of distortion to your sound.

Note: *The response of filter drive will depend on the cutoff frequency and resonance settings. At high resonance settings, for example, the overdriven filter signal will entail much more aggressive sounds.*



Right half of the filter section.

ENV: This fader allows you to adjust the amount at which either or both envelopes will modulate the filter's cutoff frequency over time. This control is used in conjunction with the modulation source toggle switch (see below). You will learn more about how the envelopes can affect the filter in the paragraphs that cover the functionality of both envelopes (see pages 41 – 45).

The upper toggle switch allows you to select the source for the envelope modulation:

- **ENV 1:** At this setting envelope 1 will be selected as the source for the envelope modulation.
- **1 + 2:** At this setting both envelopes will be selected as the source for the envelope modulation.
- **ENV 2:** At this setting envelope 2 will be selected as the source for the envelope modulation.

LFO 1: This fader allows you to adjust the amount at which LFO 1 will modulate the filter's cutoff frequency.

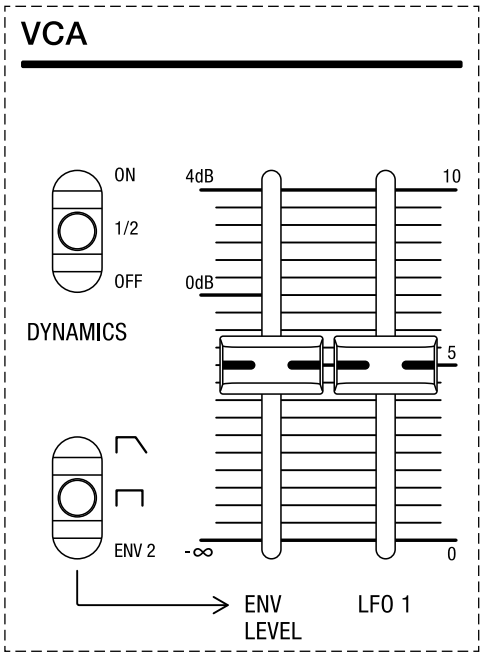
DDS 2: This fader allows you to adjust the amount at which DDS 2 will modulate the filter's cutoff frequency. The modulation whose intensity is being controlled here is otherwise known as filter FM (frequency modulation), which means that all the settings of DDS 2 as well as the filter will interact with each other. This kind of modulation can lead to complex, experimental, clangorous and even bell-like timbres.

The **KEYTRACK** toggle switch allows you to determine whether or not and to what degree the filter cutoff frequency will respond in relation to the pitch of the notes being played on the keyboard:

- **OFF:** At this setting the filter cutoff frequency will remain unaffected by the pitch of the notes that are being played on the keyboard.
- **1/2:** At this setting the filter cutoff frequency will respond in relation to the pitch of the notes being played on the keyboard. The higher the note you play on the keyboard, the more the filter cutoff frequency will increase, meaning that the sound will get brighter in higher registers. This is how acoustic instruments typically behave, so key-tracking can be a useful ingredient for creating more naturally-responding timbres. At a key-tracking setting of 1/2, the filter frequency will follow the keyboard pitch in quarter tone steps.
- **ON:** At this setting the filter cutoff frequency will also respond in relation to the pitch of the notes being played on the keyboard. This option allows for full key-tracking, meaning that the filter frequency will follow the keyboard pitch in semitones. This is useful if you use the filter in self-oscillating mode, as the pitch generated by the filter will then precisely follow the intervals you play on the keyboard, essentially allowing you to play the filter's output signal like an oscillator.

VCA (Voltage Controlled Amplifier)

After being shaped by the filter, the audio signal passes on to the voltage controlled amplifier (VCA). The Super 6 contains an analog amplifier section that can further be used to shape the sound by adjusting and modulating the amplitude or loudness over time. By default, the amplitude is controlled by envelope 2 (ENV 2) which gives you control over the attack, decay, sustain, and release stages. You will learn more about how the VCA can be modulated by the dedicated envelope in the section that covers the functionality of envelope 2 (see pages 44 and 45). Alternatively, the VCA can be controlled by one of two fixed envelopes, allowing the second envelope to be freed up for other duties if so desired.



The VCA section.

ENV LEVEL: This fader allows you to adjust the amount at which envelope 2 or one of the two fixed envelopes will modulate the VCA's amplitude over time. The envelope level control is used in conjunction with the envelope selector toggle switch.

The envelope selector toggle switch allows you to choose between three types of envelopes that will modulate the VCA's amplitude:

- **Lower position:** At this setting envelope 2 will be selected. This is the default setting, meaning that the second envelope is typically responsible for modulating the VCA's amplitude.
- **Middle position:** At this setting the first of the fixed envelopes will be selected. The attack, decay and release stages of this envelope have minimum duration, meaning that it will act as a straightforward on/off type envelope.

- **Upper position:** At this setting the second of the fixed envelopes will be selected. As with the first fixed envelope the attack and decay stages have minimum duration. However, the difference with the second fixed envelope is that it features a release stage. Use this fixed envelope if you would like to free up envelope 2 for other modulation duties, but still need your sound to fade out gradually after you release a key.

LFO 1: This fader allows you to adjust the amount at which LFO 1 will modulate the VCA's amplitude. This parameter is particularly useful for creating a tremolo effect, as your sound's loudness will be increased and decreased according to the rate of LFO 1. Use a triangle wave for a soft tremolo effect and a square wave for an abrupt tremolo effect.

The **DYNAMICS** toggle switch allows you to determine whether or not and to what degree the VCA level will respond to the keyboard velocity:

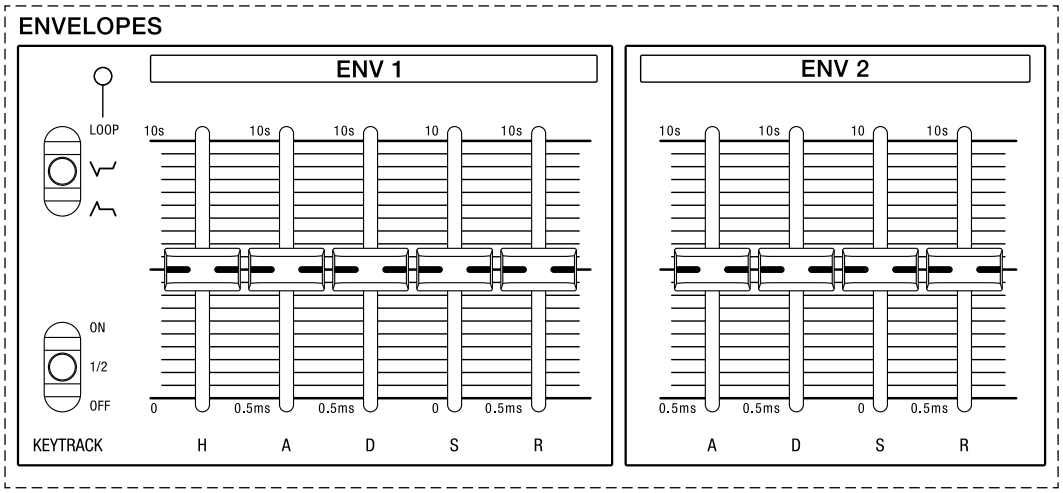
- **OFF:** At this setting the VCA level will remain unaffected by the keyboard velocity. The VCA will always respond in the same manner, no matter how soft or hard you hit a key.

- **1/2:** At this setting the VCA level will respond to the keyboard velocity with half of the possible intensity. If you play softly, the sound will get quieter. If you hit the keys harder, the sound will get louder. Use this setting if you prefer the velocity's impact on the VCA level to be rather subtle.

- **ON:** At this setting the VCA level will respond to the keyboard velocity with full intensity. If you play softly, the sound will get quieter. If you hit the keys harder, the sound will get louder. Use this setting if you prefer the velocity's impact on the VCA level to be significant, for example if you wish to emulate the behaviour of acoustic stringed instruments.

Envelopes

Envelope generators are essential ingredients for sound design. Without them a sound would remain static. It would simply start and stop for the duration of a key press, which is neither particularly exciting nor the way sounds work that surround us in our daily lives, be it in crowded places or while hiking in a remote location. Envelope generators help us to add dynamic movement to a sound insofar as they allow us to determine how a sound evolves over time. Typically, envelope generators are routed to filters and amplifiers to change the harmonic content and the volume of a sound through several durational stages.

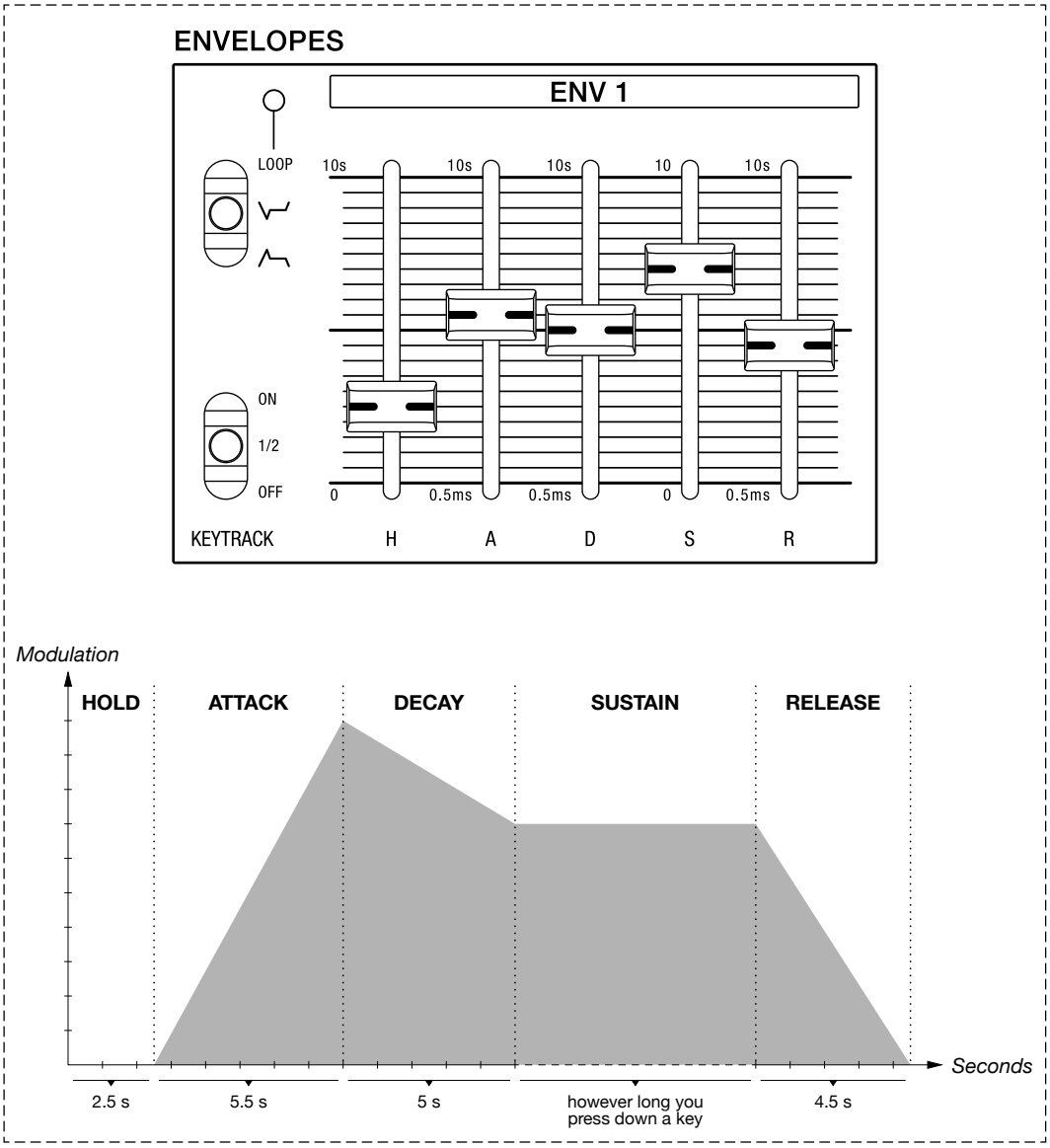


The envelope section.

The Super 6's envelopes can be routed to multiple destinations including the DDS Modulator (see pages 51 – 56), the VCF (see pages 34 – 37) and the VCA (see pages 38 & 39).

Both envelopes contain four stages known as attack, decay, sustain and release, or ADSR if you fancy acronyms. In addition to that, envelope 1 (ENV 1) also features a so-called hold stage that allows you to delay the moment the attack stage will begin after you pressed a key.

ENV 1 (Envelope 1)



Envelope 1 setting and a diagram of the resulting envelope shape.

H(OLD): This fader controls the amount of time it takes for the attack stage to start after you pressed a key. The hold stage can be as short as 0 seconds or as long as 10 seconds. At its minimum setting this parameter will have no impact, i.e. the envelope will then respond as if it only featured four stages (attack, decay, sustain, and release).

A(TTACK): This fader determines the duration of the envelope's attack stage. The higher the setting, the slower the attack time and the longer it will take for the envelope to affect its destination, for example the filter cutoff frequency. The attack stage can be as short as 0.5 milliseconds or as long as 10 seconds.

D(ECAY): This fader determines the duration of the envelope's decay stage. The higher the setting, the longer it will take for the envelope to travel from the maximum level reached at the end of the attack stage to the level that is determined by the sustain stage. The decay stage can be as short as 0.5 milliseconds or as long as 10 seconds.

S(USTAIN): This fader determines at which level the envelope is sustained if you hold down a note on the keyboard for longer than the hold, attack and decay stages. This is the only control parameter of the envelope generator that is not tied to a duration, but to a level. The duration of the sustain stage always depends on how long you keep holding down a key.

R(ELEASE): This fader determines the duration of the envelope's release stage once you release a key. The higher the setting, the slower the release time and the longer it will take for the effect the envelope has on its destination to fade out after you released a key. The release stage can be as short as 0.5 milliseconds or as long as 10 seconds.

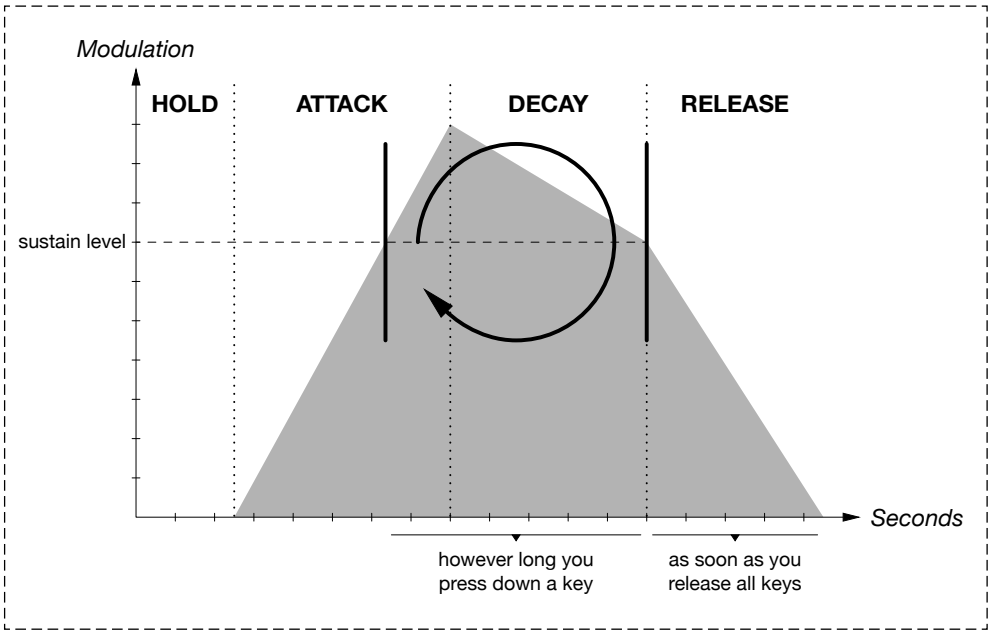
The **KEYTRACK** toggle switch allows you to determine whether or not and to what degree the duration of envelope 1 will respond relative to the pitch of the notes being played on the keyboard:

- **OFF:** At this setting the overall duration of envelope 1 will remain unaffected by the pitch of the notes that are being played on the keyboard.
- **1/2:** At this setting the overall duration of envelope 1 will respond in relation to the pitch of the notes being played on the keyboard. The higher the note you play on the keyboard, the faster the envelope shape will be articulated. At a key-tracking setting of 1/2, the time it takes for envelope 1 to travel through its stages will decrease relative to the keyboard pitch in quarter tone steps.
- **ON:** At this setting the overall duration of envelope 1 will also respond in relation to the pitch of the notes being played on the keyboard. This option allows for full key-tracking, meaning the time it takes for envelope 1 to travel through its stages will decrease relative to the keyboard pitch in semitones.

The toggle switch located at the bottom right of the envelope 1 section allows you to choose between three types of envelope behaviours:

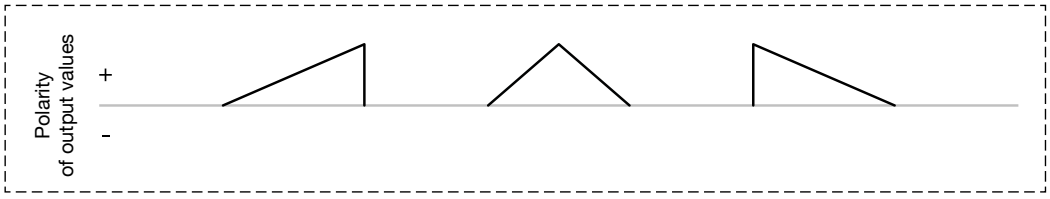
- **Lower position:** At this setting envelope 1 will be in default mode.
- **Middle position:** At this setting envelope 1's shape will be inverted or horizontally mirrored. An envelope that ramps up during its attack phase, for example, will now ramp down. The effect this will have on its modulation destination will be the opposite to envelope 1 acting in default mode.

- **Upper position:** At this setting envelope 1 will enter loop mode. Rather than just being triggered once, the envelope stages will be repeated once the end of the decay stage is reached. What is being looped are the attack and decay phases. Once you release a key, the release phase will be triggered. The rate at which the looped envelope is repeated will be indicated by the LED above the LOOP label. Note that the sustain level is the level that the envelope's value will rise from during the attack phase and fall to during the decay phase.



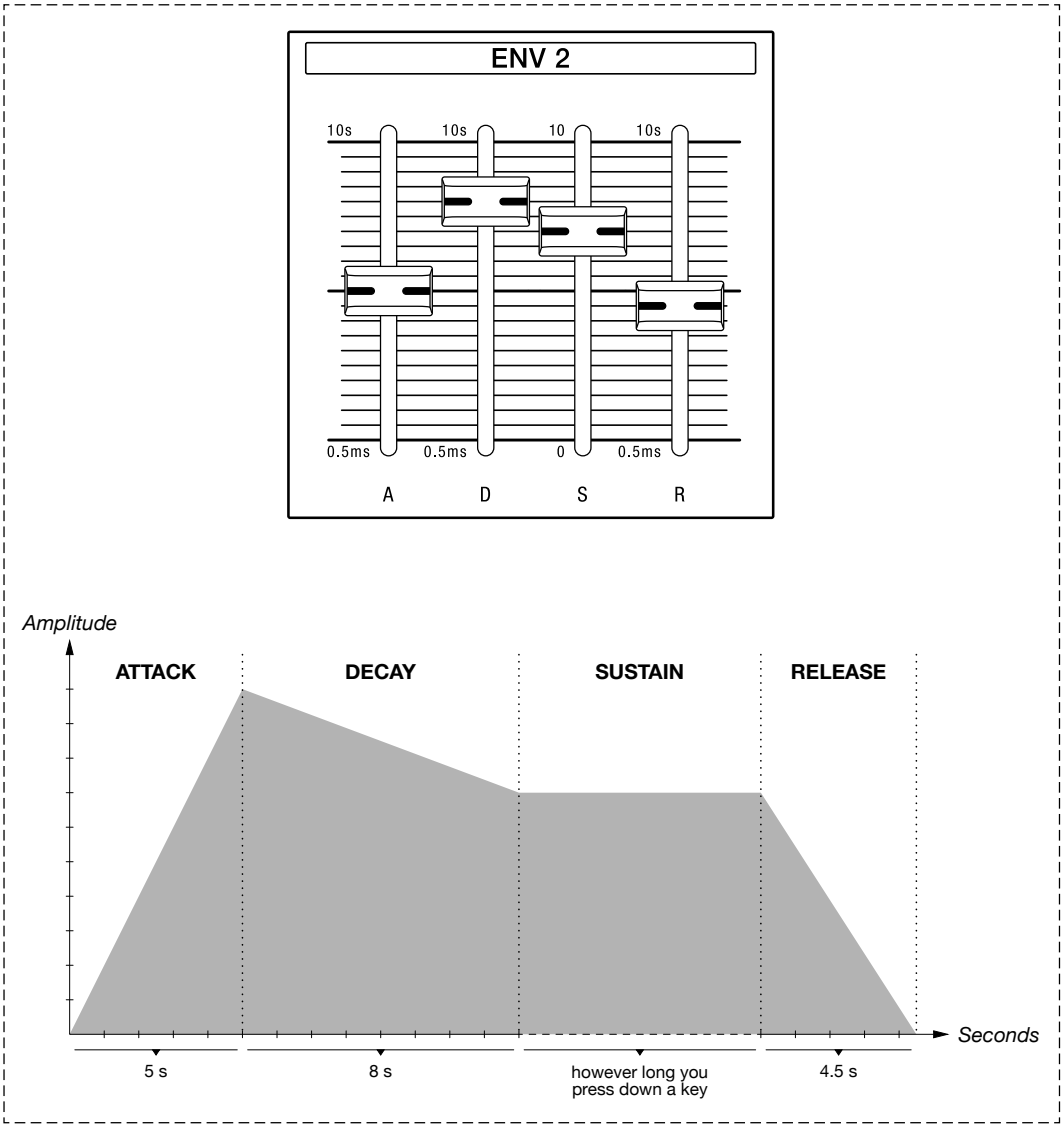
Envelope 1 in loop mode.

Note: *Loop mode allows you to use envelope 1 as an additional LFO that can even be key-tracked. If you opt for incredibly short settings this can generate sonic outcomes that resemble the results of frequency modulation.*



Possible waveforms produced by envelope 1 in loop mode: Sawtooth, triangle and reverse sawtooth.

ENV 2 (Envelope 2)



Envelope 2 setting and a diagram of the resulting envelope shape.

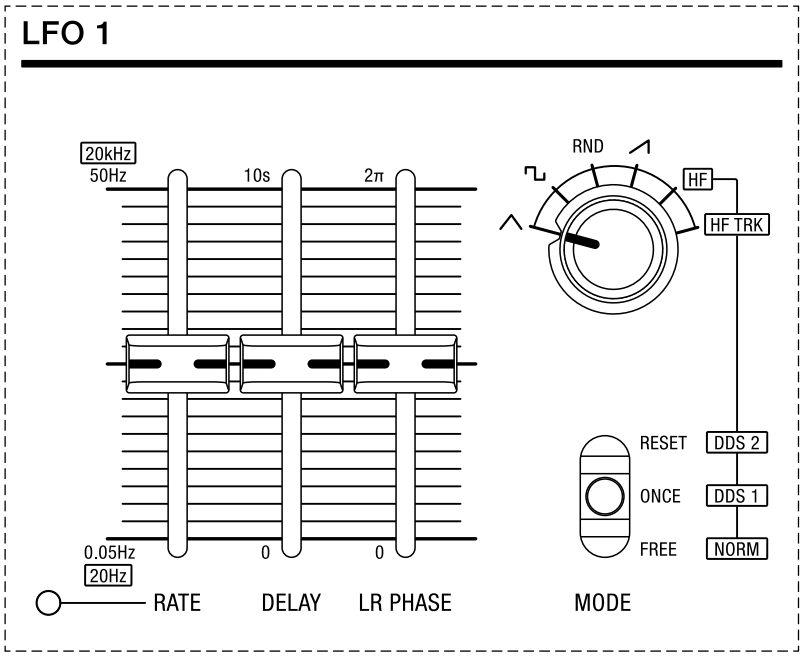
A(TTACK): This fader determines the duration of the envelope's attack stage. The higher the setting, the slower the attack time and the longer it will take for the envelope to reach its maximum level. The attack stage can be as short as 0.5 milliseconds or as long as 10 seconds.

D(ECAY): This fader determines the duration of the envelope's decay stage. The higher the setting, the longer it will take for the envelope to travel from the maximum level reached at the end of the attack stage to the level that is determined by the sustain stage. The decay stage can be as short as 0.5 milliseconds or as long as 10 seconds.

S(USTAIN): This fader determines the level at which the envelope is sustained if you hold down a note on the keyboard for longer than the attack and decay stages. This is the only control parameter of the envelope generator that is not tied to a duration, but to a level. The duration of the sustain stage always depends on how long you keep holding down a key.

R(ELEASE): This fader determines the duration of the envelope's release stage. The higher the setting, the longer it will take for the effect the envelope has on its destination to fade out after you've released a key. The release stage can be as short as 0.5 milliseconds or as long as 10 seconds. Applied to the VCA, exceptionally long release times can be useful for the emulation of reverb effects.

LFO 1 (Low Frequency Oscillator 1)



LFO 1 controls.

An LFO or low frequency oscillator is an oscillator that produces a frequency below the range of human hearing. In its default mode, LFO 1 can be used to modulate the frequency of oscillators to produce a vibrato effect or to modulate the amplitude controlled by the VCA to create a tremolo style effect. LFO 1 can also be set to a high frequency (HF). In this mode, LFO 1 covers an audible range between 20 Hz and 20 kHz, allowing it to be used either as a third oscillator, a drone or for FM (frequency modulation) style sounds. LFO 1 essentially consists of six LFOs: one for each of the six voices. In 12-voice mode one of these six LFOs is shared between two voices. The Super 6 also provides you with a second LFO whose functionality will be covered in the section on the performance control section of the instrument (see pages 59 – 66).

The rotary control allows you to select the shape of LFO 1. When used in low frequency mode it produces triangle, square, random or sawtooth waveforms.

The last two settings on the waveform rotary control are labelled **HF** and **HF TRK**. These are LFO 1's high frequency modes.

LFO 1 can be set to reset on every note press, cycle once or free-running.

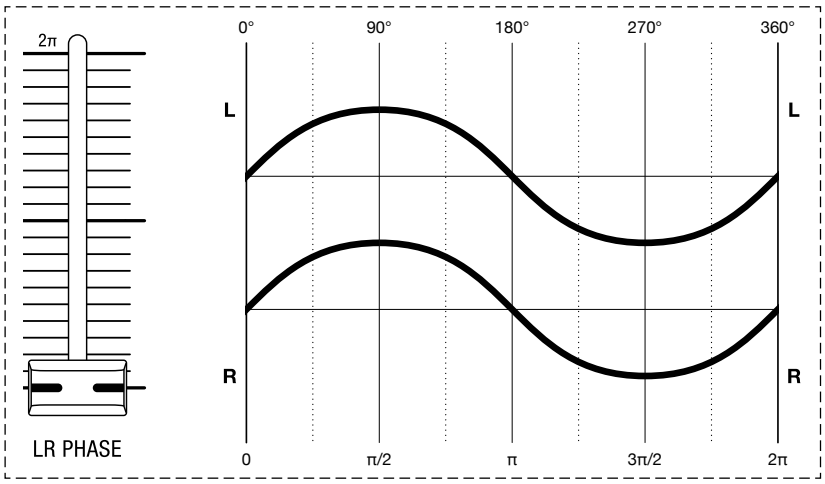
LFO 1 will sync to the tempo of the sequencer and arpeggiator or an external MIDI clock if SYNC is turned on.

Modulation Parameters

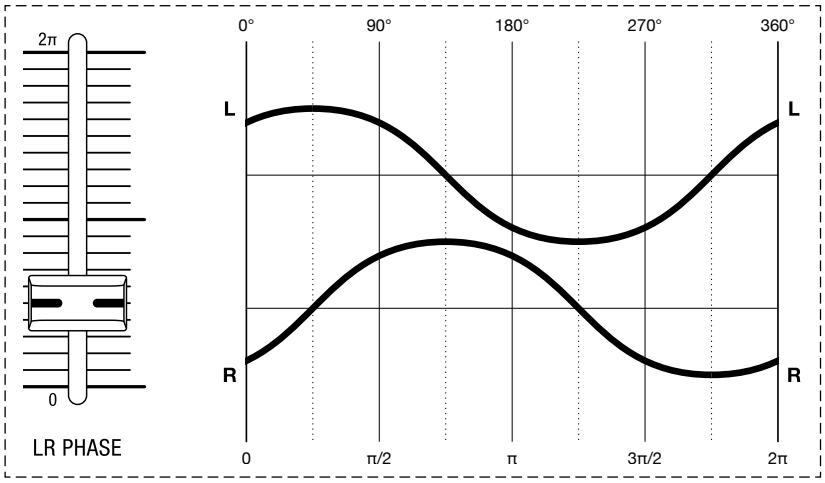
RATE: This fader controls the rate or frequency of LFO 1. The flashing LED at the bottom left of the LFO 1 section provides a visual indication of the rate.

DELAY: This fader determines the time it takes before the LFO modulation starts to affect the sound after you've pressed a key.

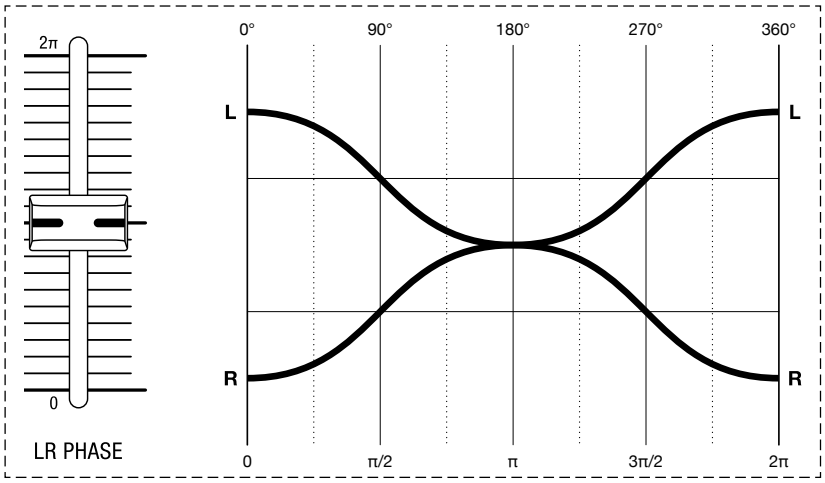
LR PHASE: This fader controls the Super 6's binaural sound engine's left-right channel phase relationship, in other words: LFO 1's effect on the stereo field. This parameter allows you to do fairly complex stereo modulations with just a single control.



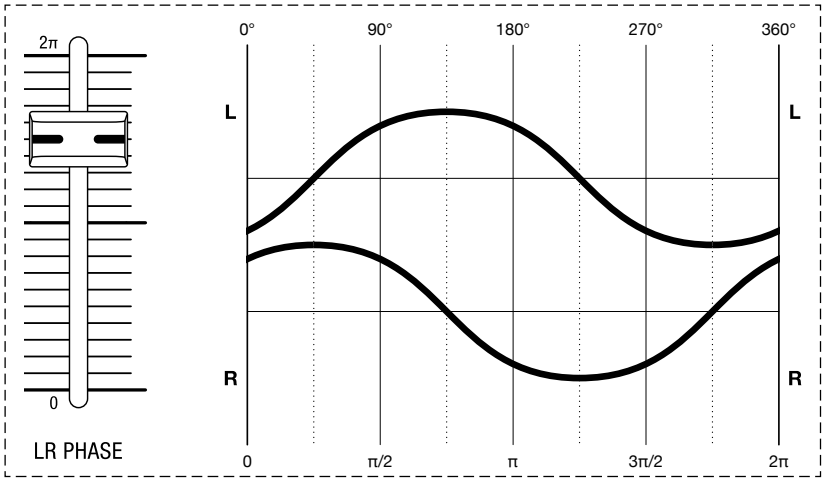
The left right phase when LR Phase is set to 0% (0).



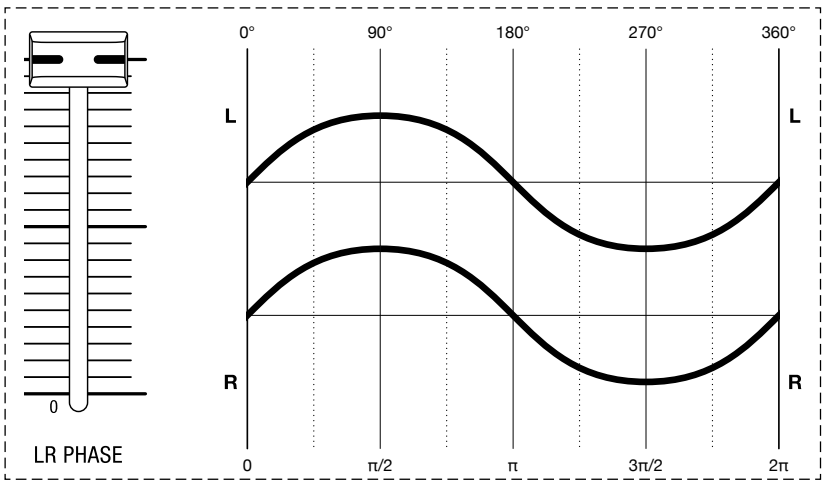
The left right phase when LR Phase is set to 25% (π/2).



The left right phase when LR Phase is set to 50% (π).

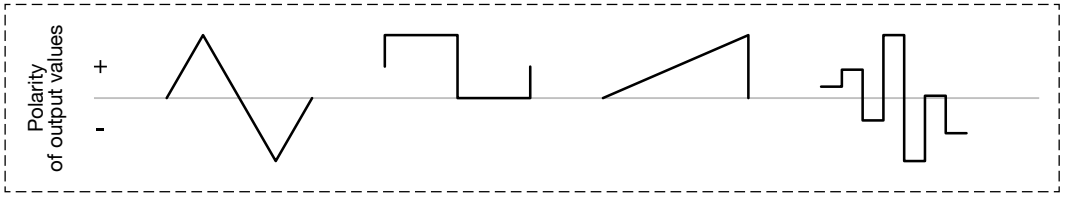


The left right phase when LR Phase is set to 75% (3π/2).



The left right phase when LR Phase is set to 100% (2π).

WAVEFORM: In low frequency mode, the rotary control allows for selecting the waveforms triangle, square, random or sawtooth. With random selected and its rate set to the max, a fifth waveform, white noise is generated.



LFO 1 waveforms.

Triangle can be used to produce vibrato effects as it alternates equally between positive and negative values. This is a bipolar waveform.

Square and **sawtooth** both generate positive values, allowing for pulsing sounds or modulation behaviours. The square wave can also be used to attain trill type effects at higher rates.

Random produces a random positive or negative value for the duration of one cycle. This is sometimes referred to as ‘sample and hold’ and can be used in low amounts to add subtle movement to a timbre, or wild effects at higher rates. With the rate fader set to the maximum setting, random will generate a white noise signal.

HF: Set to this option, LFO 1 will be switched to high frequency mode that allows for rates between 20 Hz and 20 kHz. In this mode, LFO 1 can either be used as a drone or as a constant modulation source for frequency modulation. The frequency of LFO 1 will remain the same no matter which key you press. The waveform of LFO 1 will be a sine at this setting by default.

HF TRK: Set to this option, LFO 1 will be switched to high frequency mode and respond to key tracking at the same time. In this mode, LFO 1 can either be used as a third oscillator or as a dynamic modulation source for frequency modulation. While the rate fader will still control the core frequency of LFO 1 just like the range switches in the oscillator section, it will now also respond to the keys you play, meaning that it will act like any other oscillator across the keyboard: If you play low notes, the frequency will go deeper; if you play high notes, the frequency will go higher. With the help of the rate fader you can adjust the tuning of LFO 1 to that of the Super 6’s main oscillators. The waveform of LFO 1 will be a sine at this setting by default.

To extend LFO 1's capabilities, you can employ a cunning trick and make use of the Super 6's 'Battwave' modification. This allows you to use the waveform that DDS 1 is currently set to (including the alternative DDS 1 waveforms) as LFO 1's waveform. Note that this doesn't include DDS 1's noise waveform.

Press **SHIFT** and at the same time, move LFO 1's rotary control one position in any direction. The waveform, copied from DDS 1, will be used either in the high frequency modes or in low frequency mode depending on whether the position you move the rotary control one position to, is a high frequency mode or low frequency mode. Switching the rotary switch once more, without holding **SHIFT**, will resume normal operation of LFO with its standard waveforms. This method offers you a broad palette of alternate oscillator flavours to use as LFO 1's waveform. Deluxe.

The **MODE** toggle switch allows you to select one of three modes:

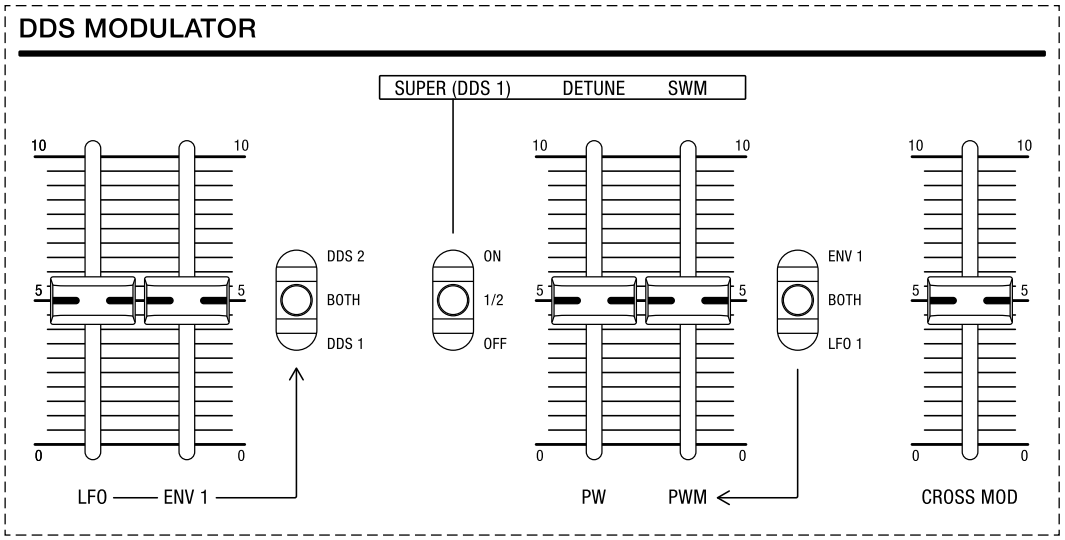
- **FREE:** In this mode LFO 1 will be free running.
- **ONCE:** LFO 1 will only go through one cycle after you pressed a key. At this setting LFO 1 can also be used as a simple envelope whose shape will be determined by the waveform you have selected.
- **RESET:** Resets the phase of LFO 1's waveform every time you press a key.

If LFO 1 is set to one of the two high frequency modes, the **MODE** toggle switch allows you to select one of the following modes:

- **NORM:** At this setting LFO 1 in high frequency mode will act as the modulation source.
- **DDS 1:** At this setting the audio signal of LFO 1 in high frequency mode will be routed to the audio channel of DDS 1. The signal of both LFO 1 and DDS 1 will be summed, so you will be able to fade between the audio signals of DDS 1 and LFO 1 on one side and DDS 2 on the other side in the mixer section.
- **DDS 2:** At this setting the audio signal of LFO 1 in high frequency mode will be routed to the audio channel of DDS 2. The signal of both LFO 1 and DDS 2 will be summed, so you will be able to fade between the audio signals of DDS 2 and LFO 1 on one side and DDS 1 on the other side in the mixer section.

DDS Modulator

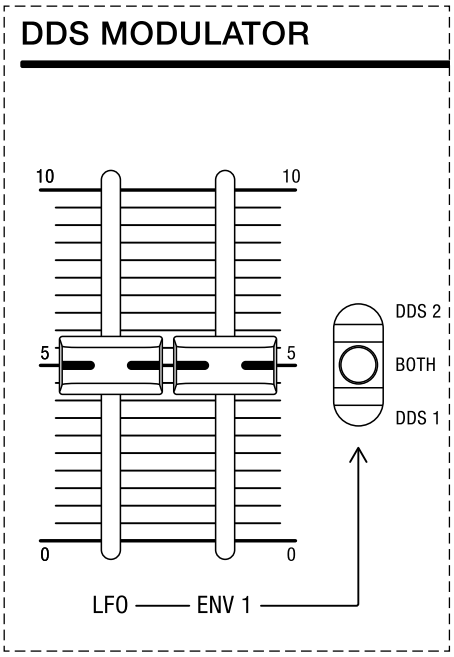
The DDS (Direct Digital Synthesis) Modulator section provides dedicated controls for modulating the Super 6's oscillators in various ways. While building blocks like the oscillators and the filter can be seen as the core ingredients that define the instrument's character, the DDS Modulator can be used to add more depth, complex textures and sonic width to your sound.



The DDS Modulator section.

The DDS Modulator section is organised in three parts: The first subsection provides controls for modulating each or both of the oscillators' pitch. The second subsection allows for adjusting and modulating the pulse width of both oscillators' waveforms or for modulating parameters that are unique to the first oscillator (DDS 1), depending on which modulation mode you opt for. Finally, the third subsection controls the amount of cross modulation between both oscillators.

Modulation Parameters



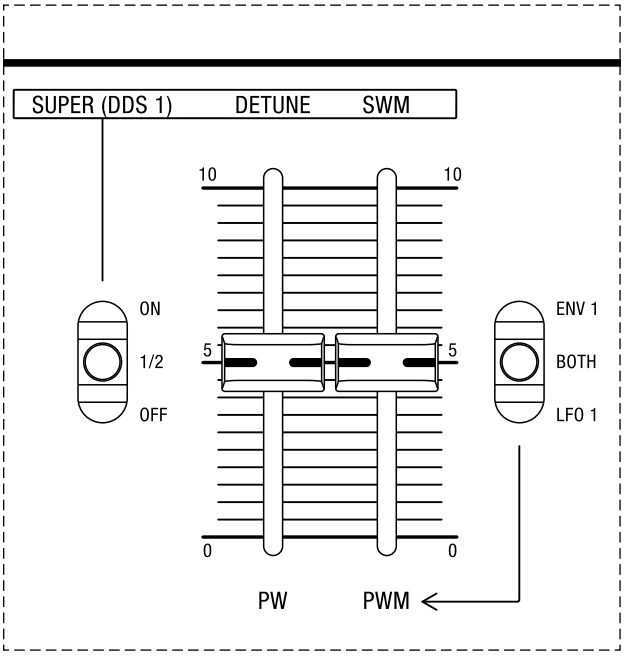
LFO and ENV 1 controls in the DDS Modulator section.

LFO: This fader controls the amount of pitch modulation by LFO 1.

ENV 1: This fader controls the amount of pitch modulation by ENV 1.

The toggle switch allows you to select the modulation destination for the pitch modulation driven by LFO 1 and/or ENV 1:

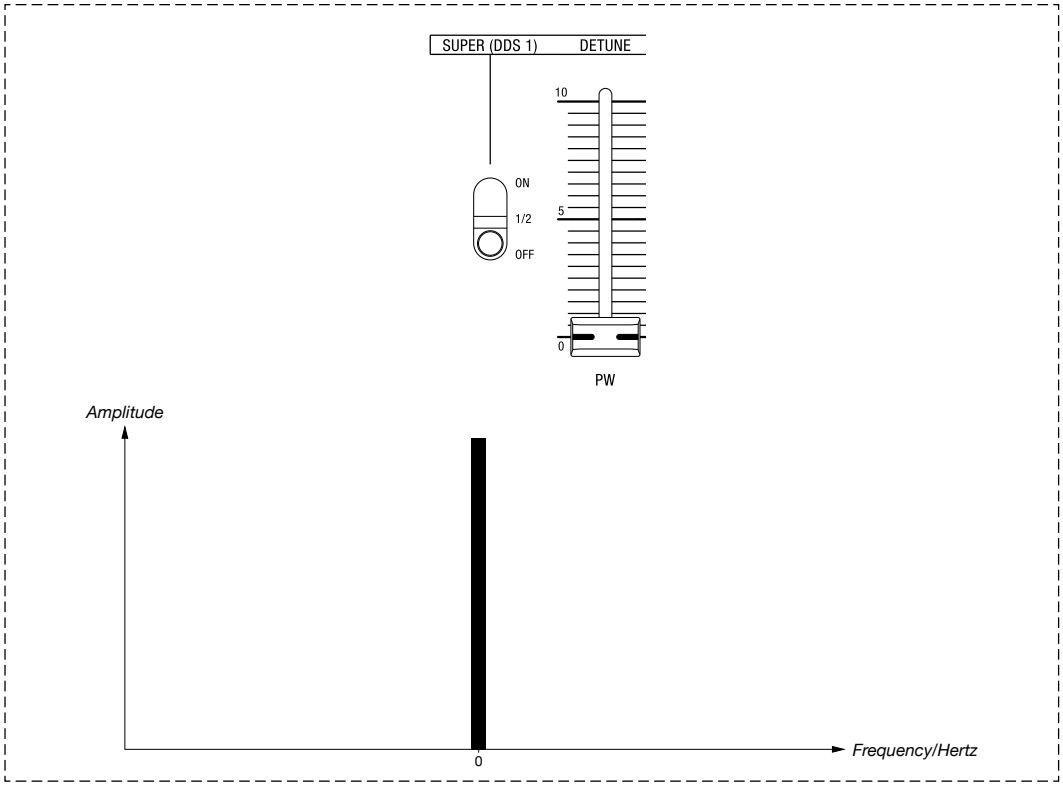
- **DDS 1:** At this setting the modulation will be routed to the first oscillator (DDS 1).
- **BOTH:** At this setting the modulation will be routed to both oscillators.
- **DDS 2:** At this setting the modulation will be routed to the second oscillator (DDS 2).



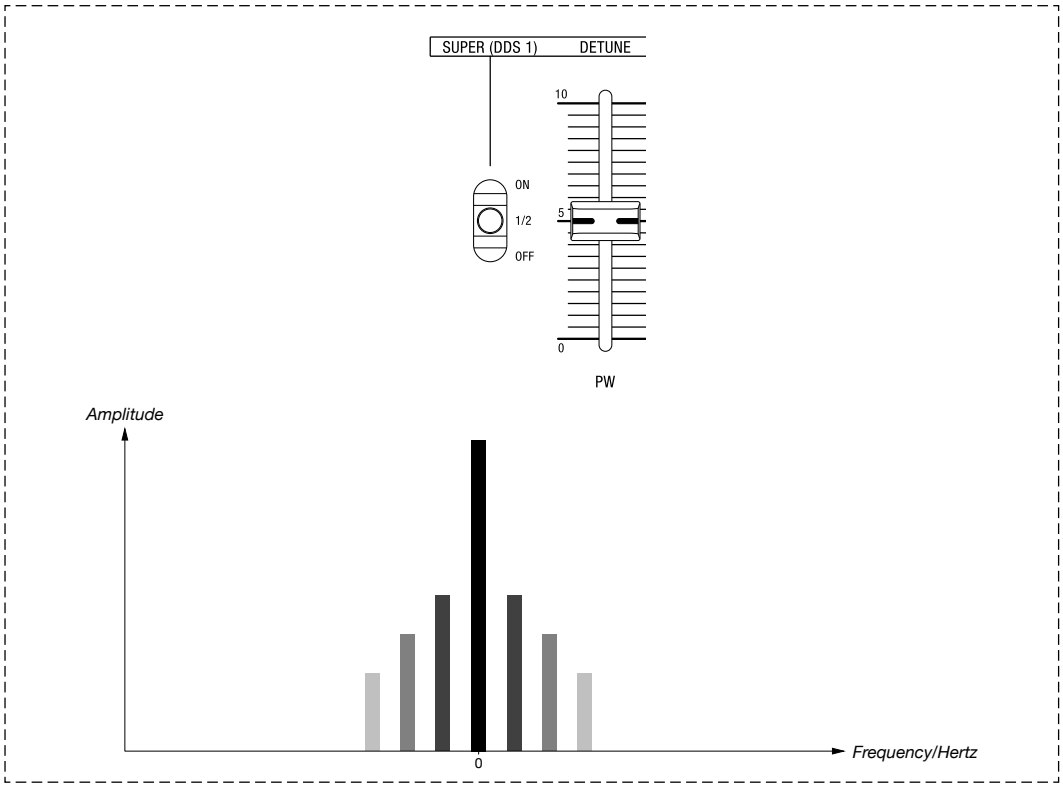
Super (DDS 1) controls in the DDS Modulator section.

The **SUPER (DDS 1)** toggle switch allows you to activate Super mode. Super mode is a unique feature of Super 6 that utilises its stereo signal path. If this mode is engaged, the first oscillator (DDS 1) can be dynamically de-phased, resulting in widening the sound in a unique way and positioning it in the stereo field. The toggle switch provides you with three options:

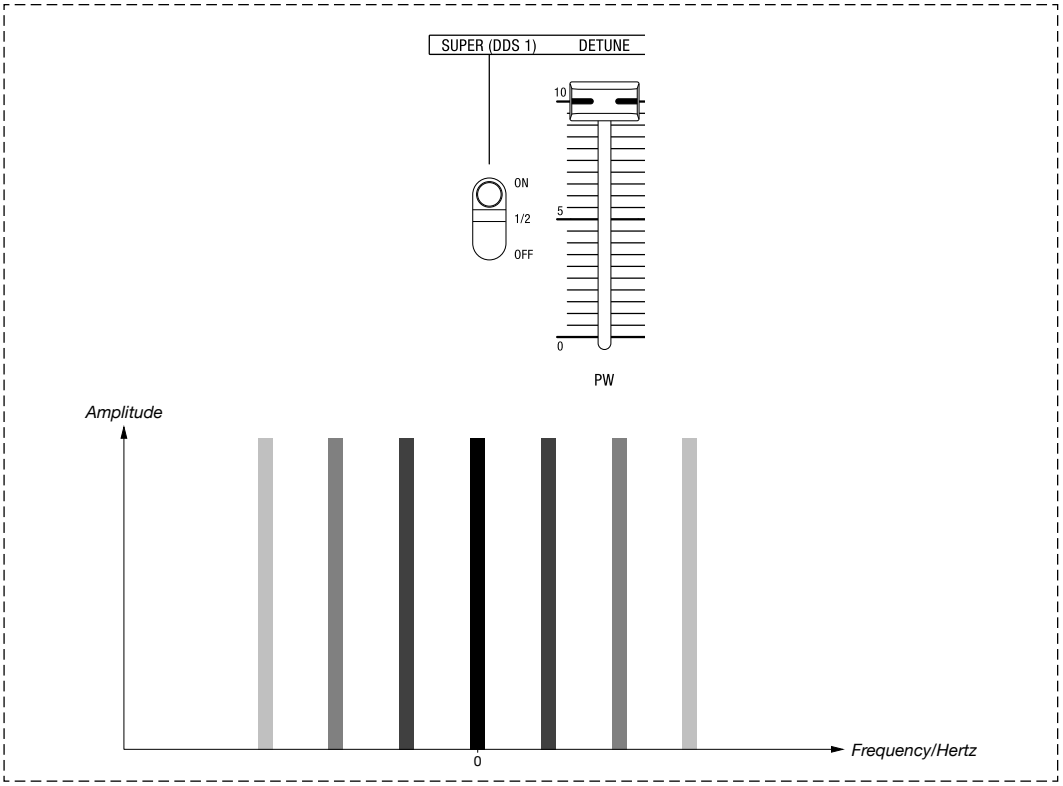
- **OFF:** This option deactivates Super mode. In this mode, both of the faders in this subsection will control the parameters **PW** and **PWM**.
- **1/2:** This option activates Super mode for the first oscillator (DDS 1) at half of the intensity. In this mode, both of the faders in this subsection control the parameters **DETUNE** and **SWM**.
- **ON:** This option activates full Super mode for the first oscillator (DDS 1). In this mode, both of the faders in this subsection control the parameters **DETUNE** and **SWM**.



The centroid oscillator of DDS 1. If Super mode is not activated it will be the only oscillator of DDS 1 that will produce a sound.



The centroid oscillator and the six sister oscillators spread to each side when Super mode is switched to 1/2 and the detune parameter is set to 5.



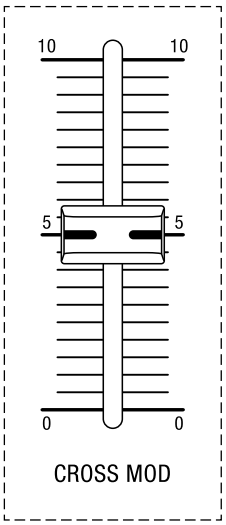
The centroid oscillator and the six sister oscillators spread to each side when Super mode is switched to full intensity and the detune parameter is set to 10.

PW / DETUNE: When Super mode is deactivated, this fader controls the pulse width of DDS 2's pulse wave. When Super mode is engaged, this fader also controls the amount of detune spread applied to the first oscillator (DDS 1). If you increase the amount of detuning, the sound of DDS 1 will thicken significantly due to stacked versions of the same waveform (sister oscillators) being detuned. In other words, when detuning in Super mode, layered copies of the first oscillator will be detuned with respect to the main oscillator to create luscious, dense sounds packed with stereo interest.

PWM / SWM: When Super mode is deactivated, this fader controls the amount of pulse width modulation (PWM) applied to DDS 2' pulse wave. When Super mode is engaged, this fader also controls the amount of super wave modulation (SWM). Super wave modulation determines how much intensity is applied to the detune spread modulation of DDS 1.

The toggle switch to the right allows you to select the modulation source for pulse width modulation (PWM) and super wave modulation (SWM):

- **LFO 1:** At this setting LFO 1 will be selected as the modulation source.
- **BOTH:** At this setting LFO 1 and ENV 1 will be selected as the modulation source.
- **ENV 1:** At this setting ENV 1 will be selected as the modulation source.



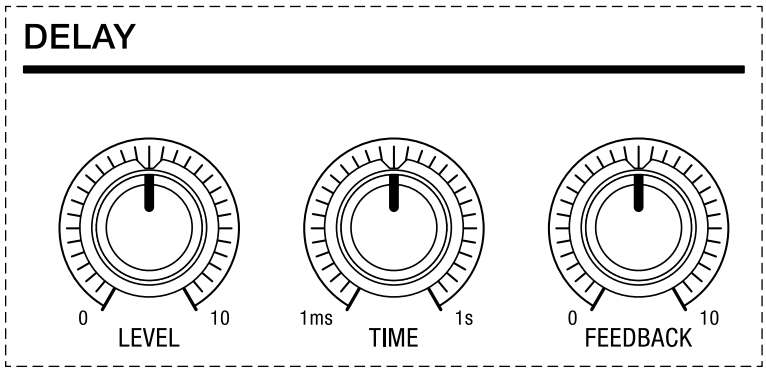
The cross mod fader in the DDS modulator section.

CROSS MOD: This fader controls the amount of cross modulation applied between the first and second oscillators. This parameter is useful for creating deep FM (frequency modulation) sounds. When applying cross modulation, DDS 2 is modulating DDS 1 with exponential FM (frequency modulation).

EFFECTS

The Super 6 features two 24-bit effects for adding the finishing touches to your sounds: A stereo delay that can be modulated and synced to the arpeggiator and sequencer or to an external clock, and a classic-style dual-mode stereo chorus. The effects are routed in series with the stereo chorus being the first and the stereo delay being the last in the audio signal path.

Delay



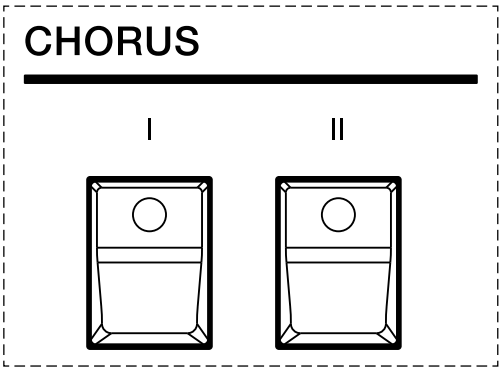
The delay section.

LEVEL: This rotary control allows you to determine to what degree the delay signal is mixed with the source signal. Higher values will result in a wet effect mix whereas lower values will make the dry signal more prominent.

TIME: This rotary control allows you to adjust the delay time over a range from one millisecond to one second. If you activate the sync option in the arpeggiator and sequencer section, the delay time will be synced to the internal clock as set by the **TEMPO** control in the arpeggiator and sequencer section (see pages 74 – 81). If you press the **SYNC** button the delay will be synced to either an internal or external MIDI clock signal (see page 75). If synced, the **TIME** control allows you to adjust the delay time in clock divisions that are relative to the internal or external tempo, for example, quarter notes, eighth notes or 16th note triplets.

FEEDBACK: This rotary control allows you to adjust for how long the delay signal will be repeated until it fades out. Low levels will result in few repetitions which will be useful for creating a slapback effect if used in conjunction with short delay times. When this control is turned fully clockwise the delay signal will be repeated endlessly without decay or degradation.

Chorus



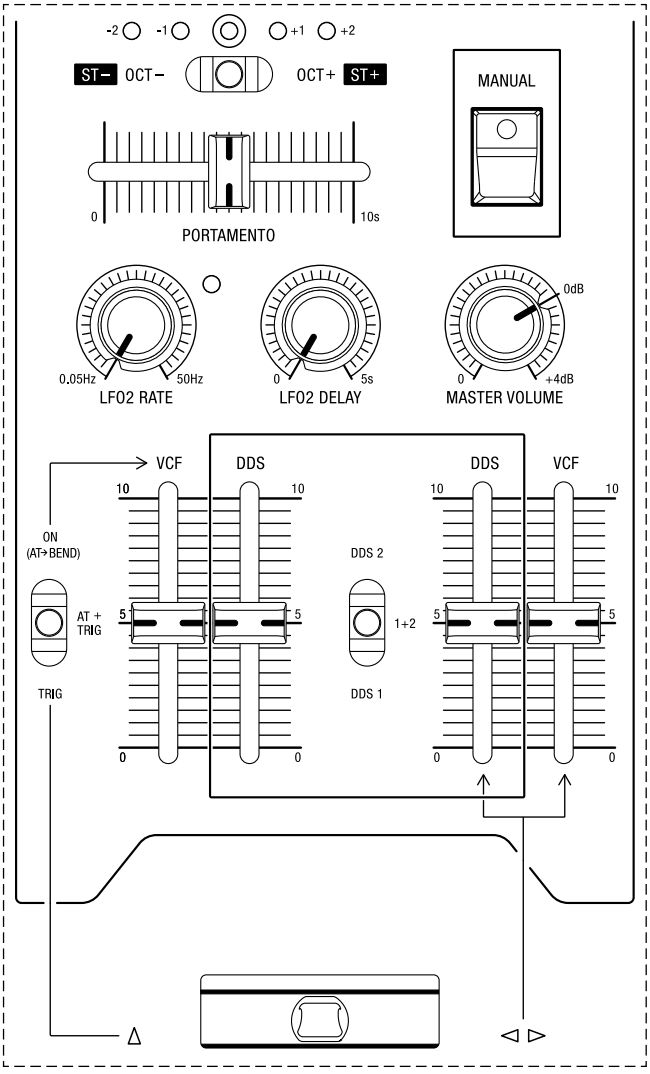
The chorus section.

The Super 6's chorus effect is a classic, simple and effective design that can be used to thicken your sound even further. Button **I** will activate a smooth and subtle chorusing effect whilst button **II** will activate a denser chorus effect that is modulated at a higher rate. By pushing both buttons **I** and **II** a third and even more intense chorus effect can be activated.

The intense chorus effects can be useful if you decided to only utilize one oscillator for a patch and hence need a tool that helps you thickening the overall sound. A subtle chorus is useful for adding a little bit more movement to an already rich sounding patch.

PERFORMANCE CONTROL SECTION

The Super 6 has been designed as a true performance instrument and features a comprehensive performance control section in addition to a responsive 49-key Fatar keyboard that is velocity sensitive and responds to aftertouch. Simply put, velocity sensitivity means that the harder you hit a note, the louder the sound will be. Aftertouch allows you to modulate the sound when pressure is applied to a note while you are holding the key. The type and amount of modulation is controlled by the dedicated faders **DDS** and **VCF** in the performance control section.

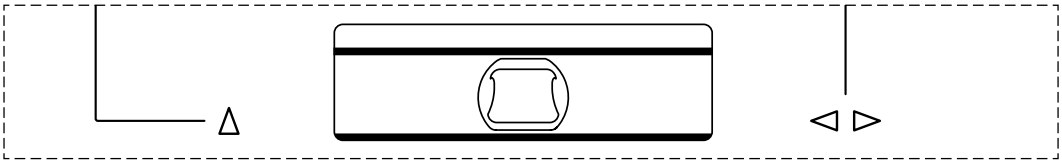


The performance control section.

The performance control section situated to the left of the keyboard allows for a number of different modulation possibilities and features a number of immediate and variable control parameters that can be easily accessed and adjusted whilst playing.

The Bender Control

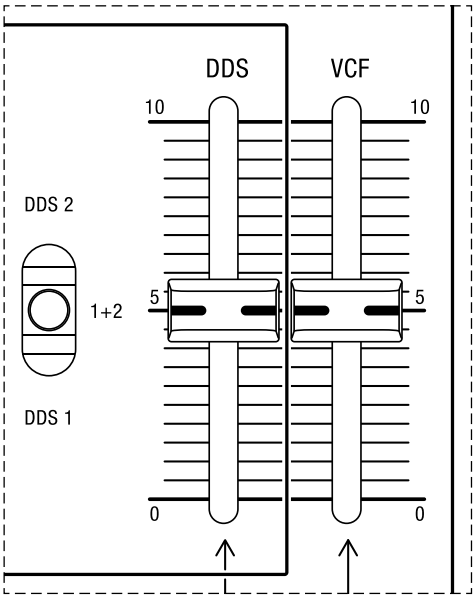
The bender control can be used to modulate both the pitch and the cutoff frequency of the filter. It responds to horizontal (left/right) as well as to vertical (up) movements. You can also combine movements across both axes at the same time if you would like to mix the modulation effect of the bender control.



The bender control.

Controlling Pitch and Filter Cutoff Frequency

Left/Right Axis: By moving the control to the left, the pitch will be bent downwards while the filter cutoff frequency will be lowered resulting in a more dampened sound. By moving the control to the right, the pitch will be bent upwards while the filter cutoff frequency will be increased resulting in a brighter sound. The degree to which the bender affects the pitch and the filter cutoff frequency is determined by the faders **DDS** and **VCF** situated on the right side of the performance control section. At low settings, moving the bender will only cause a subtle effect. The highest **VCF** fader setting will cause the filter to fully open or fully close when the bender is moved horizontally. The highest **DDS** fader setting will cause the pitch to be bent upwards and downwards by one octaves once the bender is pushed to its extreme positions.



The right half of the Performance Control Section.

DDS: This fader allows you to adjust how much the bender will affect the oscillators' pitch. Which oscillator is going to be affected by the pitch modulation is determined by the toggle switch to the left of this fader.

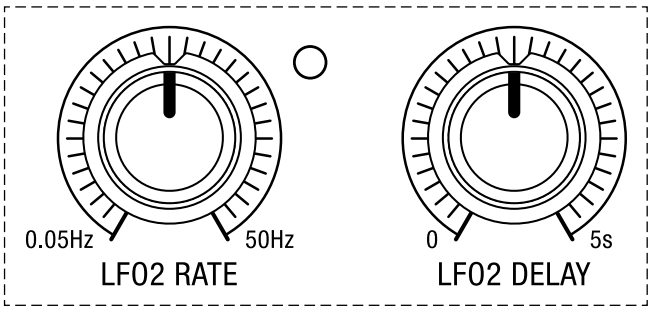
The oscillator select toggle switch allows you to select one of three options:

- **DDS 1:** With DDS 1 selected only the pitch of the first oscillator will be affected.
- **1 + 2:** With this option selected, the pitch of both oscillators will be affected.
- **DDS 2:** With DDS 2 selected only the pitch of the second oscillator will be affected.

VCF: This fader allows you to adjust how much the bender will affect the filter cutoff frequency.

Triggering LFO 2 to Modulate Pitch and Filter Cutoff Frequency

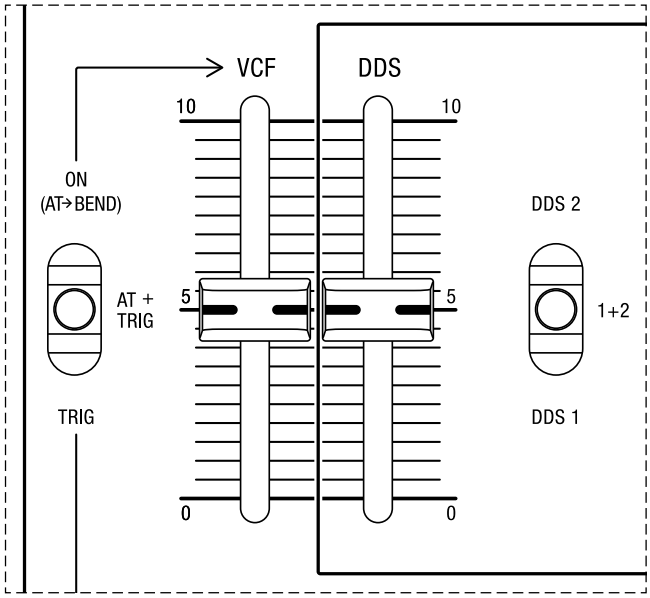
Up/Down Axis: Moving the bender control upwards will trigger LFO 2. The type and amount of modulation is determined by the faders **DDS** and **VCF** situated on the left side of the performance control section in conjunction with the LFO 2 rotary controls located above these faders. LFO 2 operates as a single or global LFO for all voices, meaning that its modulation won't vary from voice to voice like LFO 1.



LFO 2 parameters.

LFO 2 RATE: This rotary control allows you to adjust the rate or frequency of LFO 2. The flashing LED to the top right of this control provides a visual indication of the rate.

LFO 2 DELAY: This rotary control determines the time it takes before the LFO modulation starts to affect the sound after you moved the bender, allowing you to introduce modulation gradually over the duration of a held note.



The left half of the Performance Control Section.

DDS: This fader allows you to adjust the modulation depth at which LFO 2 will affect the oscillators' pitch. Which oscillators are going to be affected by the pitch modulation is determined by the toggle switch to the right of this fader.

The oscillator select toggle switch allows you to select one of three options:

- **DDS 1:** With DDS 1 selected only the pitch of the first oscillator will be affected by LFO 2.
- **1 + 2:** With this option selected, the pitch of both oscillators will be affected by LFO 2.
- **DDS 2:** With DDS 2 selected only the pitch of the second oscillator will be affected by LFO 2.

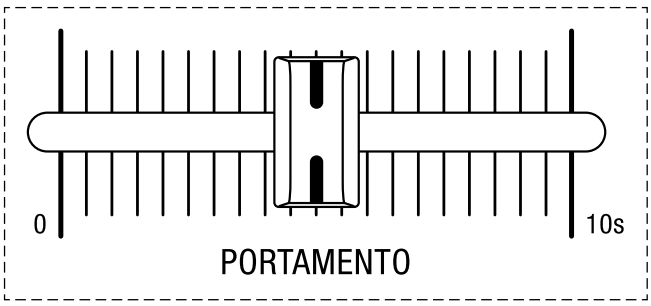
VCF: This fader allows you to adjust the modulation depth at which LFO 2 will affect the filter cutoff frequency.

The leftmost toggle switch in the performance control section determines how LFO 2 modulations will be triggered:

- **TRIG:** With this option selected, moving the bender upwards will cause the sound to be modulated as set by the LFO 2 rotary controls and the **DDS** and **VCF** faders.
- **AT + TRIG:** With this option selected, both aftertouch and the vertical bender movement will cause the sound to be modulated as set by the LFO 2 rotary controls and the **DDS** and **VCF** faders. If you use the bender and apply pressure via the keyboard at the same time, only the gesture with the greater effect on triggering the modulation will control the intensity of the modulation.
- **ON (AT -> BEND):** With this option selected, LFO 2 will affect the sound without any trigger impulse, as it will essentially be 'on' all the time. In addition, aftertouch is now set to trigger the same modulations that are controlled by horizontal bender movements.

Portamento

When Portamento is engaged, the sound will slide in pitch with each new note that is being played. The higher the portamento time, the longer it takes for the sound to slide in pitch after a new note is triggered via the keyboard. The Super 6 is capable of polyphonic portamento. When you change chords, each of the notes slide over different lengths of time depending on the pitches of the notes.

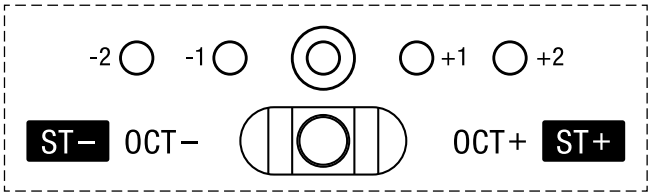


The portamento fader.

PORTAMENTO: This fader allows you to adjust the amount of time it takes to slide from one pitch to another. When set to the leftmost position, portamento will have no effect. When set to the rightmost position the portamento time is 10 seconds.

Octave Selector & Transpose Function

The Super 6's octave selector toggle switch allows you to switch octaves over a range of four octaves. The control is spring-loaded, allowing it to be used expressively as part of a performance. The currently selected octave is indicated by the lit LEDs above the toggle switch with +2 being the highest octave and -2 the lowest.



The octave selector toggle switch.

If you press the **SHIFT** button, the octave selector toggle switch will transpose the currently selected sound by semitones. This mode will be indicated by the flashing LEDs above the toggle switch. You can transpose a sound by up to 12 semitones upwards or downwards. Press the **SHIFT** button again to return to octave selection.

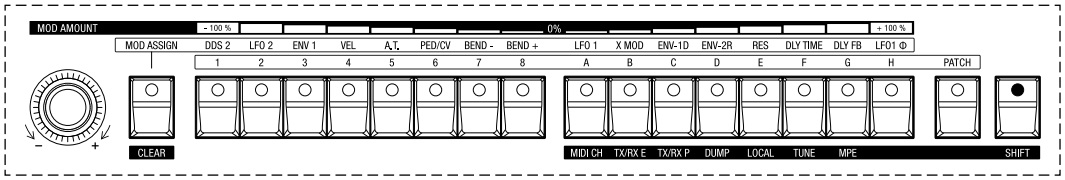
Master Fine Tune

In addition to the transpose function, you can also fine tune the Super 6. To enter the master fine tune mode, press the **SHIFT** button. You will then be able to adjust the fine tuning by means of the **MOD AMOUNT** rotary control.

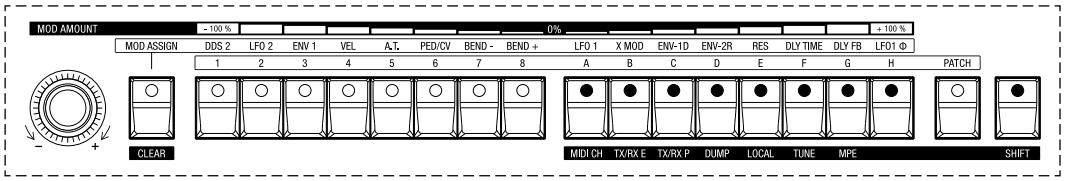
If you turn the **MOD AMOUNT** control clockwise, the frequency will be increased. If you turn the rotary control counter-clockwise, the frequency will be decreased. You can adjust the fine tuning over a range from -1 semitone or -100 cents to +1 semitone or +100 cents.

As soon as you touch or slightly move the **MOD AMOUNT** control, the LEDs of patch and bank select buttons **1-8** and **A-H** will indicate the current fine tuning setting. If you turn the **MOD AMOUNT** control clockwise the number of lit LEDs will shrink towards the right when the fine tune amount is negative and grow towards the right when the modulation amount is positive. The effect is reversed when turning the **MOD AMOUNT** control counter-clockwise. The printed line at the very top of the patch and bank select button section serves as a legend for what amount of fine tuning is being indicated by the lit patch select button LEDs.

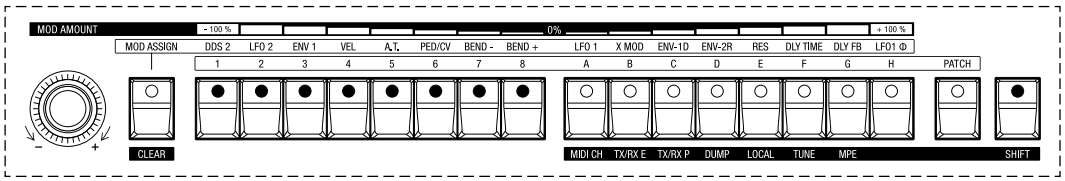
In the first example the lit LEDs of the patch and bank select buttons (coloured black here) indicate a master fine tune at the default setting of 440 Hz:



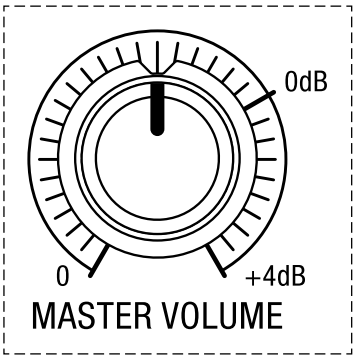
In the second example the lit LEDs of the patch and bank select buttons (coloured black here) indicate a master fine tune setting of +1 semitone or +100 cents:



In the third example the lit LEDs of the patch and bank select buttons (coloured black here) indicate a master fine tune setting of -1 semitone or -100 cents:



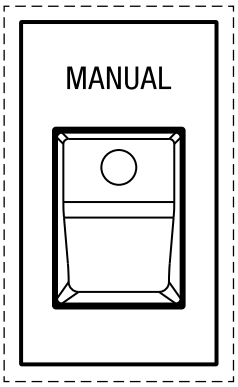
Master Volume



The master volume control.

The Super 6's main volume is controlled by the **MASTER VOLUME** rotary control. Turning the control fully clockwise will increase the volume to a maximum of +4 decibels. This control will also determine the headphone volume if you connect headphones to the rear side of the Super 6.

Manual

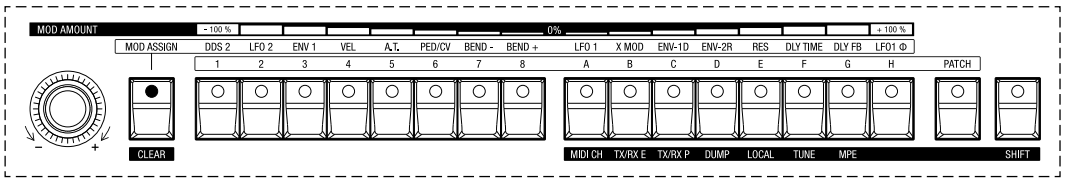


The manual button.

Manual mode is accessed by pressing the white **MANUAL** button located in the upper right corner of the performance control section. Entering manual mode ignores the current patch settings and prompts the Super 6 to respond to whatever the front panel controls are currently set to. To return to patch mode simply press the **PATCH** button.

USING THE MODULATION MATRIX

The top raised panel and the performance control section provide you with a lot of options for assigning a variety of modulation sources to a number of different modulation destinations. You can further extend these capabilities by using the Super 6's modulation matrix. The modulation matrix is accessed via the patch button section, and there are two different methods to map modulation routings, which will be described below.



The front panel section relevant to the modulation matrix.

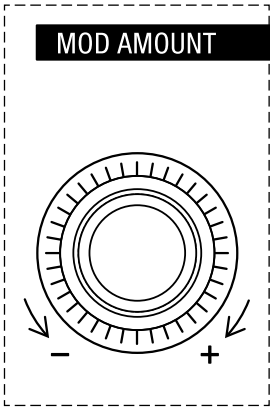
Before we go into detail about the different ways in which you can map modulation routings, we would like to point out how the patch and bank select buttons behave during modulation assignment.

The modulation matrix is entered by pressing the **MOD ASSIGN** button to the left of the eight patch select buttons. Its LED will then flash, indicating that you are now in modulation assign mode.

In modulation assign mode patch select buttons **1-8** represent eight modulation sources while bank select buttons **A-H** represent eight modulation destinations. The following modulation sources and destinations are available to you:

	Modulation Sources		Modulation Destinations
1	DDS 2	A	LFO 1 Rate
2	LFO 2	B	Cross Modulation
3	Envelope 1	C	Envelope 1 Decay
4	Velocity	D	Envelope 2 Release
5	Aftertouch	E	Filter Resonance
6	Expression Pedal/CV Control	F	Delay Time
7	Bend left (-)	G	Delay Feedback
8	Bend right (+)	H	LR Phase Parameter of LFO 1

No matter which method you choose to map modulation routings, the modulation amount, i.e. the intensity with which a modulation source modulates a modulation destination, will always be determined by using the **MOD AMOUNT** rotary control.

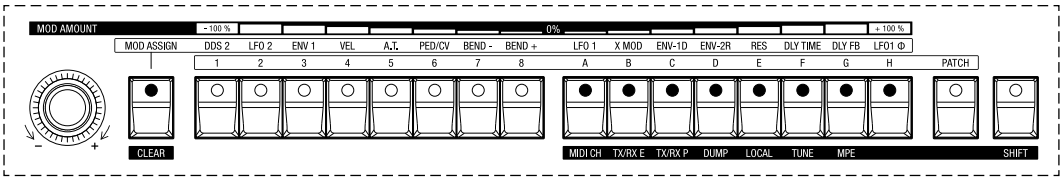


The Mod Amount control.

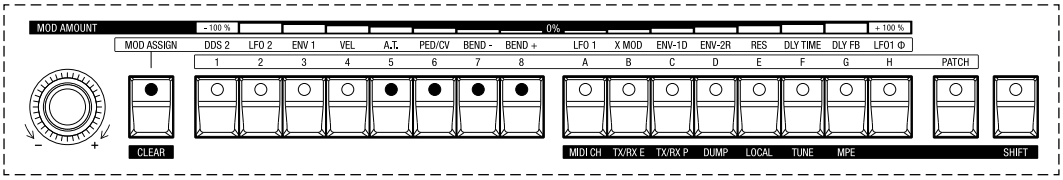
If you turn the **MOD AMOUNT** control, you can adjust the modulation amount settings over a range from -100% (negative modulation amounts) to +100% (positive modulation amounts).

When assigning a modulation amount with the **MOD AMOUNT** control, the LEDs of the patch and bank select buttons **1-8** and **A-H** will indicate your setting. If you turn the **MOD AMOUNT** control clockwise the number of lit LEDs will shrink towards the right when the modulation amount is negative and grow towards the right when the modulation amount is positive. The effect is reversed when turning the **MOD AMOUNT** control counter-clockwise. The printed line at the very top of the patch and bank select button section serves as a legend for the amount value indicated by the button LEDs.

In the first example, the lit LEDs (coloured black here) on the patch and bank select buttons indicate a positive modulation amount value of +100%:



In the second example, the lit LEDs (coloured black here) on the patch and bank select buttons indicate a negative modulation amount value of -50%:



Matrix Destination Mappings

This method of mapping modulation routings using the modulation matrix allows you to map all of the modulation sources present in the modulation matrix to all of the modulation destinations present in the modulation matrix with independent modulation amounts:

1. Press the **MOD ASSIGN** button. Its LED will flash, indicating that you have entered modulation assign mode.

2. Initially, the patch and bank select buttons' LEDs indicate which modulation sources are actively modulating and which modulation destinations are actively being modulated. These active sources and destinations are highlighted with flashing LEDs. Note that the modulation sources corresponding to patch select buttons **1-8** may also modulate destinations other than those corresponding to bank select buttons **A-H** (described in the following section).

3. To create a mapping by selecting a source first; press any modulation source button (patch select buttons **1-8**). Its LED will become solidly lit. If this source is actively modulating any destinations in the matrix, the LEDs within the buttons (bank select buttons **A-H**) representing those modulated destinations will flash. Press any destination button to proceed to a mapping lock. Both source and destination buttons' LEDs will then become solidly lit indicating the mapping lock.

4. To create a mapping by selecting a destination first; press any modulation destination button (bank select buttons **A-H**). Its LED will become solidly lit. If this destination is actively being modulated by any sources in the matrix, the LEDs within the buttons (patch select buttons **1-8**) representing those modulating sources will flash. Press any source button to proceed to a mapping lock. Both source and destination buttons' LEDs will then become solidly lit indicating the mapping lock.

5. After creating a mapping lock using the method of either point 3. or 4. above, turn the **MOD AMOUNT** rotary control to dial in the amount of modulation you would like to apply. When the rotary control is moved, the LEDs of the patch and bank select buttons will indicate your setting.

6. To return to the initial modulation matrix 'view' as described in point 2. above, press the **MOD ASSIGN** button. Otherwise, as described in points 3. and 4. press any patch or bank select button to initiate a new mapping or to initiate editing a current mapping. Press the **MOD ASSIGN** button once more to exit mod assign mode.

Direct Parameter Control Mappings

This alternative method for mapping modulation routings using the modulation matrix provides you with an immediate approach that allows you to route a modulation source to many parameters on the front panel:

1. Press the **MOD ASSIGN** button. Its LED will flash, indicating that you have entered modulation assign mode.

2. Initially, the patch and bank select buttons' LEDs indicate which modulation sources are actively modulating and which modulation destinations are actively being modulated. These active sources and destinations are highlighted with flashing LEDs. Note that the modulation sources corresponding to patch select buttons **1-8** may also modulate destinations other than those corresponding to bank select buttons **A-H** (as per the method described in this section) and will flash if those sources are actively modulating any destinations, not only those corresponding to bank select buttons **A-H**.

3. To create a direct mapping, first press and hold one of the eight modulation source buttons (patch select buttons **1-8**).

4. While still holding the chosen modulation source button, move any parameter on the front panel you would like to modulate. An LED scroll on the patch and bank buttons will indicate a mapping lock. For any illegal modulation mappings, the LED scroll will not occur.

5. After creating a mapping lock, turn the **MOD AMOUNT** rotary control to dial in the amount of modulation you would like to apply. When the rotary control is moved, the LEDs of the patch and bank select buttons will indicate your setting.

6. To return to the initial modulation matrix 'view' as described in point 2. above, press the **MOD ASSIGN** button. Otherwise, as described in points 3. and 4. above; press and hold one of the eight modulation source buttons to initiate a new direct mapping or to initiate editing a current direct mapping. Press the **MOD ASSIGN** button once more to exit mod assign mode.

This method of mapping modulation routings is useful for assigning individual modulation sources to modulation destinations that are not listed among the modulation destinations selectable via bank select buttons **A-H**.

Clearing Modulation Mappings

If you would like to clear all mapped modulation, press the **SHIFT** button and then the **MOD ASSIGN** button. All modulation routing will be instantly erased.

To clear modulation per source or per destination, follow the steps below:

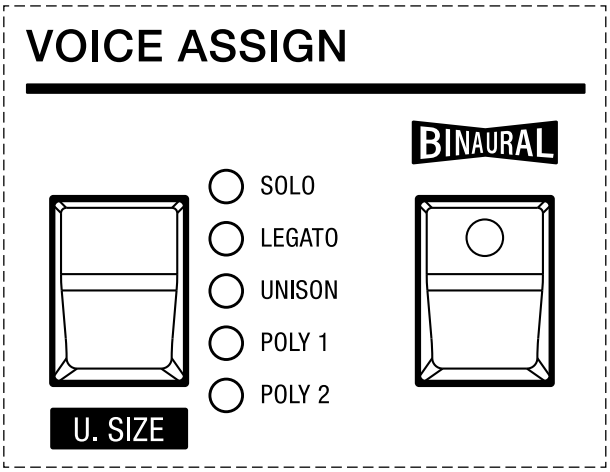
1. Press the **MOD ASSIGN** button. Its LED will flash, indicating that you have entered modulation assign mode.

2. If you would like to clear all modulation only mapped from a specific source, including direct parameter control modulation, press the source button (patch select button **1-8**) corresponding to the source for which you wish to remove mapping. Then, press the **SHIFT** button and then the **MOD ASSIGN** button. All modulation mapped from the selected source only will be instantly erased.

3. If you would like to clear all modulation only mapped to a specific destination contained within the available modulation destinations in the modulation matrix, press the destination button (bank select button **A-H**) corresponding to the destination for which you wish to remove mapping. Then, press the **SHIFT** button and then the **MOD ASSIGN** button. All modulation mapped to the selected destination only will be instantly erased.

VOICE ASSIGN

The voice assign function allows you to determine how the Super 6's voices are used when a note is played. The leftmost button in the voice assign section can be used to step through five of the available options, indicated by one of the five voice assign LEDs.



The voice assign section.

POLY 2: This option activates a polyphonic mode with two oscillators per voice. The release phase of notes that overlap will be curtailed in this mode.

POLY 1: This option activates a polyphonic mode with two oscillators per voice. This mode allows note releases to overlap when new notes are played and is the instrument's default mode.

UNISON: In unison mode, the Super 6's voices will be stacked for a huge monophonic sound. It is possible to choose how the voices are stacked whilst in unison mode by accessing the **U. SIZE** parameter.

U. SIZE: To access the unison size function, press the **SHIFT** button. Then press the **U. SIZE** button to vary the way voices are stacked in unison mode. One lit LED means that 3 binaural voices will be stacked. Two lit LEDs means that 6 binaural voices will be stacked. Three lit LEDs means that 6 binaural voices will be stacked in an octave. Four lit LEDs means that 6 binaural voices will be stacked as an octave and a fifth. Five lit LEDs means that 6 binaural voices will be stacked as a major chord. Pressing the **SHIFT** button returns the button used as **U. SIZE** button to voice assign mode again.

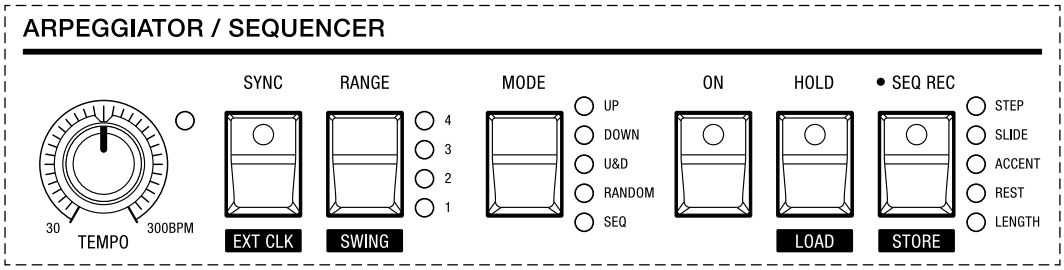
LEGATO: In legato mode the Super 6 acts like a mono synth, meaning that only one note can be played at a time. This mode differs from **SOLO** in that each time a note is played while playing legato style, the envelopes won't be re-triggered. Overlapping notes will also slide from the previous pitch to the next. The amount of pitch slide is controlled by the **PORTAMENTO** fader in the performance control section (see page 63).

SOLO: In solo mode the Super 6 acts like a mono synth, meaning that only one note can be played at a time. Each time a note is played the envelopes will be re-triggered.

BINAURAL: This option can only be deactivated for the modes **POLY 1** and **POLY 2**. By default, the Super 6 operates in binaural mode – where its twelve voices are twinned to form six true stereo 'Super' voices. The left and right channels are assigned a complete synthesizer voice. Starting with the stereo oscillators, parameters of both channels of each Super voice may be independently controlled, facilitating you to create gorgeous stereo images. The effect on the sound ranges from subtle to extreme stereo movement and an enhanced sense of spatial positioning relative to conventional monaural signal-chains. In this sense, the Super 6's six 'super voices' each use two 'conventional' voices. With binaural mode turned off, the Super 6 switches to a monaural signal path and twelve notes of polyphony.

ARPEGGIATOR & SEQUENCER

The Super 6 features a flexible arpeggiator as well as a powerful 64-step sequencer that allows for programmable step, slide, accent, rest and sequence length settings.



The arpeggiator and sequencer section.

Arpeggiator Mode

If you activate the arpeggiator and play a chord, the arpeggiator will play back a pattern based on its settings and the notes you hold. You can choose between 4 different octave ranges, 4 different playback options as well as 5 different swing amounts; providing you with plenty of options for changing the way the currently held chord is being arpeggiated. In addition to that, LFO 1 and the delay time can be locked to the arpeggiator's clock while the arpeggiator itself can be synced to an external MIDI clock signal coming from your DAW or another device.

TEMPO: This rotary control allows you to set the playback speed of the arpeggiator. The tempo can be as slow as 30 BPM or as fast as 300 BPM. The LED to the top right of this control will indicate the current tempo by flashing according to the set tempo rate. If the arpeggiator is synced to an external MIDI clock, the **TEMPO** control allows you to adjust the playback speed in clock divisions that are relative to the external tempo, for example; quarter notes, eighth notes or sixteenth-note triplets.

SYNC: If this option is activated, the rate of LFO 1 and the delay time of the stereo delay effect will be synced to the playback speed of the arpeggiator. The **RATE** fader in the LFO 1 section as well as the **TIME** rotary control in the delay section will then allow you to adjust the corresponding rate and duration in clock divisions that are relative to the internal tempo. If this option is deactivated, LFO 1 and the delay time of the stereo delay effect will run independently of the arpeggiator's tempo setting.

EXT CLK: This feature allows you to sync the arpeggiator to an external MIDI clock. To activate this option, press the **SHIFT** button and then the **SYNC** button. If the arpeggiator is synced to an external MIDI clock, the **TEMPO** control allows you to adjust the playback speed in clock divisions that are relative to the external tempo, for example; quarter notes, eighth notes or sixteenth-note triplets.

Once you press **SHIFT** and **SYNC** you will be able to define how the Super 6 is going to respond to MIDI clock messages. You can activate and combine any of the following options:

- **PATCH SELECT BUTTON 1:** With this option selected, MIDI clock signals will be sent. If this option is deactivated (LED flashing), no MIDI clock signals will be sent.

- **PATCH SELECT BUTTON 2:** With this option selected, MIDI clock signals will be received. If this option is deactivated (LED flashing), no MIDI clock signals will be received.

- **PATCH SELECT BUTTON 3:** With this option selected, the Super 6 will respond to MIDI Start and MIDI Stop commands. If this option is deactivated (LED flashing), the Super 6 will not respond to MIDI Start or MIDI Stop commands.

  Note: *If you set up these options so that MIDI clock is received, but not sent, keep in mind that the arpeggiator will not play back any pattern for as long as no MIDI clock is being received*

RANGE: This button allows you to choose from four different octave settings. Set to 1 (one octave), only the notes that you actually hold on the keyboard will be arpeggiated. Set to 2 (two octaves), the notes that you actually hold on the keyboard and the corresponding notes one octave above will be arpeggiated. Set to 3 (three octaves), the notes that you actually hold on the keyboard and the corresponding notes from the two octaves above will be arpeggiated. Set to 4 (four octaves), the notes that you actually hold on the keyboard and the corresponding notes from the three octaves above will be arpeggiated.

SWING: Press the **SHIFT** button and then the **RANGE** button to access this feature. It allows you to select from 5 different swing settings, the first being off. Set to 1, the amount of swing will be subtle. Set to the other extreme (4), the amount of swing will be very pronounced. Try using different swing amounts to find the best rhythmic feel for your arpeggio.

The **MODE** button allows you to choose between five different playback modes:

- **UP:** With this option selected, the arpeggiated pattern will be played back from the lowest to the highest note.
- **DOWN:** With this option selected, the arpeggiated pattern will be played back from the highest to the lowest note.
- **U&D:** With this option selected, the arpeggiated pattern will be played from the lowest note to the highest note and back to the lowest note again.
- **RANDOM:** With this option selected, the arpeggiated pattern will play back all the held notes in random order.
- **SEQ:** This option activates the sequencer mode. For more details on the sequencer see pages 77 – 82.

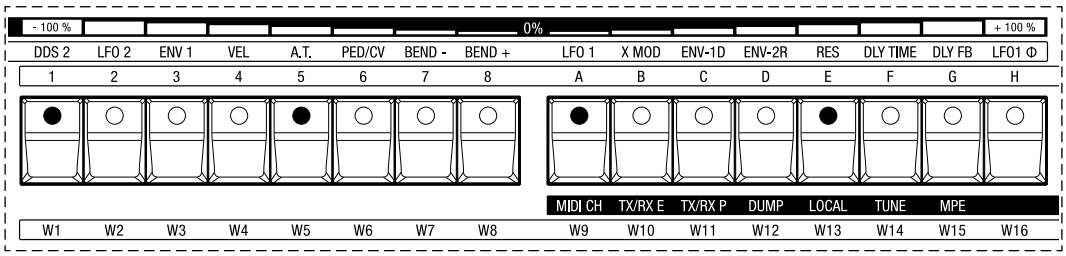
ON: Press this button to turn the arpeggiator on or off. When this button's LED is on, the arpeggiator is active, unless **MODE** is set to **SEQ** in which case the sequencer is active.

HOLD: If you activate this option, the notes you play will be held in the arpeggio pattern. New notes that are played are added onto the arpeggio pattern.

Sequencer Mode

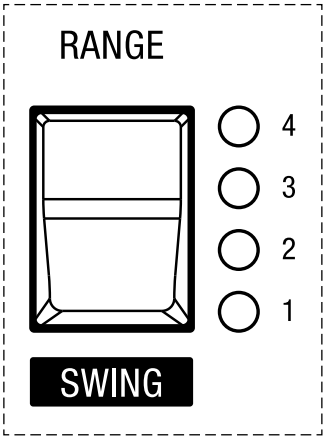
In sequencer mode, the Super 6 allows for the recording of up to 64 steps with programable step, slide, accent, rest, and sequence length settings. Each sequence you program can be saved to and loaded from a memory location. Up to sixteen sequences can be saved and recalled. Albeit a programmed or selected sequence can be linked to a patch when you save the latter, the independent sequencer storage allows you to stick to one particular patch while only changing the sequence to try out how well different step sequences work within the context of the same sound.

Once the sequencer mode is activated, the patch and bank select buttons will turn into a row of 16 steps with each of the 16 buttons representing one step of the sequence.



The patch and bank select buttons in sequencer mode. In this example, every fourth step (1, 5, 9, 13) is activated.

To allow for the displaying of all 64 steps, the step sequence represented by the patch and bank select buttons is organized in four pages. The page of the currently selected step sequence you are on will be indicated by the four LEDs next to the **RANGE** button.



The Range select button.

In sequencer mode, the **RANGE** button numbers correspond to the following pages of the step sequence:

- **LED 1:** Set to this option, the 16 patch and bank select buttons representing the steps of the sequence will display page 1 of the step sequence: steps 1-16. Whenever you enter the sequencer mode, this will be the default page being indicated by the 16 buttons.
- **LED 2:** Set to this option, the 16 patch and bank select buttons representing the steps of the sequence will display page 2 of the step sequence: steps 17-32.
- **LED 3:** Set to this option, the 16 patch and bank select buttons representing the steps of the sequence will display page 3 of the step sequence: steps 33-48.
- **LED 4:** Set to this option, the 16 patch and bank select buttons representing the steps of the sequence will display page 4 of the step sequence: steps 49-64.

TEMPO: This rotary control allows you to set the playback speed of the sequencer. The tempo can be as slow as 30 BPM or as fast as 300 BPM. The LED to the top right of this control will indicate the current tempo by flashing according to the set tempo rate. If the sequencer is synced to an external MIDI clock, the **TEMPO** control allows you to adjust the playback speed in clock divisions that are relative to the external tempo, for example; quarter notes, eighth notes or sixteenth-note triplets.

SYNC: If this option is activated, the rate of LFO 1 and the delay time of the stereo delay effect will be synced to the playback speed of the sequencer. The **RATE** fader in the LFO 1 section as well as the **TIME** rotary control in the delay section will then allow you to adjust the corresponding rates and durations in clock divisions that are relative to the internal tempo. If this option is deactivated, LFO 1 and the delay time of the stereo delay effect will run independently of the sequencer's tempo setting.

EXT CLK: This feature allows you to sync the sequencer to an external MIDI clock. To activate this option, press the **SHIFT** button and then the **SYNC** button. If the sequencer is synced to an external MIDI clock, the **TEMPO** control allows you to adjust the playback speed in clock divisions that are relative to the external tempo, for example; quarter notes, eighth notes or sixteenth-note triplets.

Once you press **SHIFT** and **SYNC** you will be able to define how the Super 6 is going to respond to MIDI clock messages. You can activate and combine any of the following options:

- **PATCH SELECT BUTTON 1:** With this option selected, MIDI clock signals will be sent. If this option is deactivated (LED flashing), no MIDI clock signals will be sent.
- **PATCH SELECT BUTTON 2:** With this option selected, MIDI clock signals will be received. If this option is deactivated (LED flashing), no MIDI clock signals will be received.

- **PATCH SELECT BUTTON 3:** With this option selected, the Super 6 will respond to MIDI Start and MIDI Stop commands. If this option is deactivated (LED flashing), the Super 6 will not respond to MIDI Start or MIDI Stop commands.

Note: *If you set up these options so that MIDI clock is received, but not sent, keep in mind that the sequencer will not respond for as long as no MIDI clock is being received.*

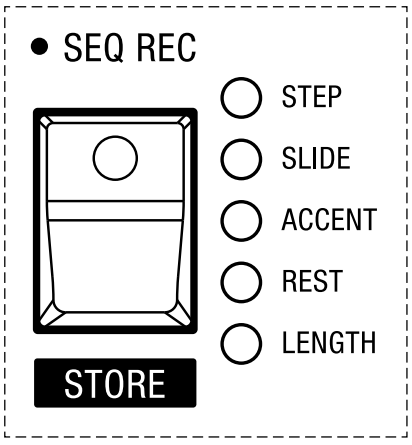
SWING: Press the **SHIFT** button and then the **RANGE** button to access this feature. It allows you to select from 5 different swing settings, the first being off. Set to 1, the amount of swing will be subtle. Set to the other extreme (4), the amount of swing will be very pronounced. Try using different swing amounts to find the best rhythmic feel for your sequence.

MODE: Selecting the option **SEQ** will activate the sequencer. For all other playback options related exclusively to the arpeggiator see pages 74 – 76. If **SEQ** is selected and **ON** is activated, but none of the **SEQ REC** tracks are selected then the loaded sequence will be transposed according to the keys you press. A sequence's root note will always be the lowest note in the first step of the sequence. If that note is C4, the root note will be C4. If you trigger the sequence by pressing C3, the original sequence will be transposed downwards by an octave. If you trigger the sequence by pressing G4, the original sequence will be transposed upwards by a fifth.

ON: Press this button to turn the sequencer on or off. When this button's LED is on, the sequencer is active if **MODE** is set to **SEQ**; otherwise, the arpeggiator is active.

HOLD: If you activate this option, the sequence will be held and transposed according to the keys you press.

SEQ REC: Pressing this button at any point will start the sequencer's recording mode. Once you start playing notes, they will be recorded. All simultaneously held notes will be recorded to one step. Once you release all the keys, the next simultaneously held notes will be recorded to the next step. Using the polyphonic modes allows you to record up to 12 notes per step.



The SEQ REC button and the five track LEDs that indicate which track is currently selected.

In addition to initialising step recording mode, the **SEQ REC** button is used for skipping through the five available sequencer tracks. By selecting one of the options, the step sequence represented by the 16 patch and bank select buttons will be updated accordingly. If you select the option **ACCENT**, for example, the patch and bank select buttons will display the sequencer track for accents, showing you which steps have accents activated. The following information can be edited track by track:

- **STEP:** This option is selected by default once you have pressed the **SEQ REC** button. With **STEP** being selected, you can record notes or chords step by step. In this mode, a step will be recorded after you release all the keys you just played. After that, the sequencer will advance to the next step. Active steps are represented by lit buttons. If you would like to edit or re-record a step, simply press the corresponding step button. It will then start flashing, indicating that the sequencer is now waiting for you to play a new note or chord. Once you have done so, the step button's LED will stop flashing and the sequencer will advance to the next step.

- **SLIDE:** This option is selected after you have pressed the **SEQ REC** button twice. The slide track allows you to define which steps are going to be tied together. If portamento is activated in the performance control section (see page 63) a portamento effect will occur between tied steps. In order to tie steps together, activate adjacent patch and bank select buttons; whose LEDs will then light up. If, for example, you would like to tie steps 3 and 4 together, activate patch select buttons **3** and **4** while on page 1 of the sequence.

- **ACCENT:** This option is selected after you have pressed the **SEQ REC** button three times. The accent track allows you to define which steps should be accented. Accents allow you to emphasize steps with increased velocity. This option is useful for adding dynamic variety to your sequence. Active accents are indicated by lit LEDs.

- **REST:** This option is selected after you have pressed the **SEQ REC** button four times. The rest track allows you to define which steps should be omitted. A rest on a step will skip the note or chord you recorded to that step. Active rests are indicated by unlit LEDs.

- **LENGTH:** This option is selected after you have pressed the **SEQ REC** button five times. The length track allows you to define the length of a sequence. First, choose the page on which the last step of the sequence should fall using the **RANGE** button. Then press the patch and bank select button that corresponds to the step that should be the last step of the sequence. To indicate the active steps the LEDs representing the last step in the sequence and all of the steps before it will be lit. The sequence will start all over again after that the final step that you have selected. If, for example, you would like your sequence to be eight steps long, make sure that you are on page 1 and activate patch select button **8**.

Once you press the **SEQ REC** button a sixth time after having skipped through all available sequencer tracks, you will exit the sequencer recording mode and the **SEQ REC** button's LED will switch off.

In addition to the five tracks described above, you will also be able to record any modulation that is being controlled by the horizontal bender movement (left and right) as you record each note step. This information won't be accessible via a dedicated track, though, as it is supposed to be a spontaneous option for adding variety to your sequences that can instantly be overwritten or rerecorded. Make sure to enter the sequencer recording mode with the track option set to **STEP** to be able to record any modulation controlled by the horizontal bender movement.

Loading and Storing Sequences

As well as recording and playing, you can also load and store sequences.

LOAD: Press the **SHIFT** button and then the **HOLD** button to load a sequence from one of the 16 memory locations. Once you have entered this mode, the currently selected sequence number will be indicated by the solidly lit patch and bank select button. Choose a different sequence by pressing one of the patch and bank select buttons (**1-8** and **A-H**). The patch select buttons allow you to select sequences 1-8 while the bank select buttons allow you to select sequences 9-16.

Let's say you'd like to select sequence **12**:

1. Press the **SHIFT** button and then the **HOLD** button.
2. Press the bank select button on the right marked **D**.
   Its LED will become solidly lit.

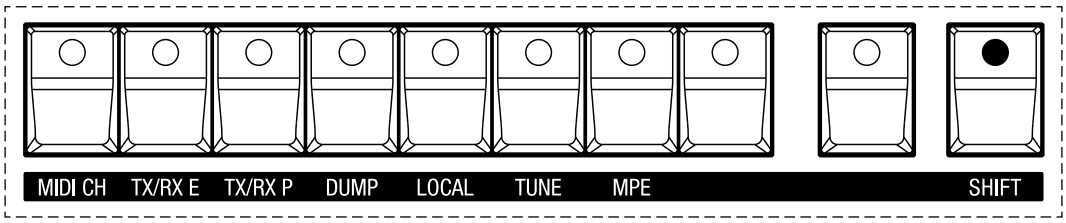
You have now selected sequence **12**. Using this simple system, it's easy to access all of the stored sequences. Why not spend some time selecting different sequences to try out which works best with the currently selected patch?

STORE: Press the **SHIFT** button and then the **SEQ REC** button to save a sequence to one of the 16 memory locations. Once you have entered this mode, the currently selected sequence number will be indicated by the solidly lit patch and bank select button. Storing a sequence is similar to saving a patch:

1. Press the **SHIFT** button and then the **SEQ REC** button.
2. Press and hold one of the patch and bank select buttons for 3 seconds. All of the patch and bank select button LEDs will flash once to signal that your sequence is now saved.

GLOBAL SETTINGS

The global settings allow you to define how the Super 6 will behave and respond on a global level, i.e. independent of individual patch settings or sounds you have programmed. You are able to configure a variety of MIDI settings, dump patches, or perform a calibration. The global settings are accessed in shift mode, meaning you have to press the **SHIFT** button first to be able to select any global parameters.



The global settings section.

MIDI CH: This option allows you to determine the MIDI channel the Super 6 will respond to. Once you press this button the patch and bank select buttons (**1-8** and **A-H**) will indicate which one of the 16 available MIDI channels is currently selected. By default, this parameter is set to MIDI channel 1. Press one of the 16 buttons to select a different MIDI channel. The button's LED will become solidly lit. Press **SHIFT** to exit the global settings.

Note: *Try to avoid using the MIDI ports and the USB port simultaneously. While the Super 6 can transmit data from both types of ports at the same time, incoming MIDI messages from different sources connected via the MIDI and USB ports can cause the Super 6 to behave in erratic ways due to overlapping information being received.*

TX/RX E: This option allows you to determine how the parameter data generated by the Super 6's controls (sliders, rotary controls, toggle switches, buttons) will be transmitted and received. Control change messages can be transmitted and received as continuous controller messages (CCs) or non-registered parameter numbers (NRPNs) via MIDI. NRPNs can cover the complete range of all available parameters, while CCs are limited to a range of 128 standardized parameters. Once you press **TX/RX E** you can activate the following options:

- **PATCH SELECT BUTTON 1:** With this option selected, parameter changes will be transmitted as continuous controller messages (CCs).
- **PATCH SELECT BUTTON 2:** With this option selected, parameter changes will be received as continuous controller messages (CCs).
- **PATCH SELECT BUTTON 3:** With this option selected,

parameter changes will be transmitted as non-registered parameter numbers (NRPNs).

- **PATCH SELECT BUTTON 4:** With this option selected, parameter changes will be received as non-registered parameter numbers (NRPNs).

Note: *You can only combine options 1 and 2 or options 3 and 4.*

To exit this parameter, press the button **TX/RX E** again or press **SHIFT** to exit the global settings.

TX/RX P: This option allows you to determine whether program change messages will be transmitted and received via MIDI. Once you press **TX/RX P** you can activate and combine both of the following options:

- **PATCH SELECT BUTTON 1:** With this option selected, program change messages will be transmitted.
- **PATCH SELECT BUTTON 2:** With this option selected, program change messages will be received.

To exit this parameter, press the button **TX/RX P** again or press **SHIFT** to exit the global settings.

DUMP: This option allows you to dump the currently selected patch via MIDI.

LOCAL: This option allows you to connect or disconnect the Super 6's keyboard from the internal or 'local' sound engine. This can be beneficial for using the instrument as a master controller in conjunction with a DAW or another external device. Disconnecting the keyboard is also helpful for avoiding MIDI loops while recording to a DAW. If the LED of the **LOCAL** button is lit after you pressed **SHIFT**, the Super 6's keyboard is connected to the internal sound engine. If the LED of the **LOCAL** button is not lit, the Super 6's keyboard is disconnected from the internal sound engine.

TUNE: This option allows you to autotune the Super 6's filters for calibration purposes. Once you press the **TUNE** button, the 16 patch and bank select buttons will indicate the progress of the autotune process. Their LEDs will light up from the left to the right until 12 buttons are lit. As soon as the filter autotune process is completed, the LEDs will extinguish. Feel free to select another global parameter now or press **SHIFT** to exit the global settings.

MPE: This option allows you to activate or deactivate the Super 6's MIDI Polyphonic Expression (MPE) mode. If the LED of the **MPE** button is lit after you have pressed **SHIFT**, this indicates that MPE mode is activated. If the LED of the **MPE** button is not lit, this indicates that MPE mode is deactivated. By default, MPE mode is deactivated. When MPE is activated, the Super 6 will respond to incoming MIDI messages sent by an MPE controller via an individual MIDI channel per note. See page 86 for more details on MPE support and possible configurations. Press **SHIFT** to exit the global settings.

GLOBAL RESET: In case your Super 6 is not behaving as expected and you are not sure what might be causing this behaviour, you are able to reset all parameters to the default settings the Super 6 is shipped with:

1. Turn on the Super 6.
2. Press and hold the **MANUAL** button for 5 seconds until all LEDs turn off and on again.
3. Release the **MANUAL** button.

MPE SUPPORT

When the Super 6's MIDI Polyphonic Expression (MPE) mode is enabled, the instrument will respond to incoming MIDI messages sent by an MPE controller via an individual MIDI channel per note. Generally speaking, MPE mappings are an extension of certain standard mappings (e.g. pitch bend, aftertouch), but polyphonic. Therefore, dedicated controls for the corresponding amounts are already present on the Super 6's front panel.

The Super 6's response to the five gestural dimensions MPE controllers send out can be adjusted in the following ways:

- **Note On Velocity:** The Super 6's response to this MIDI message can be controlled by the **DYNAMICS** toggle switch in the VCA section (see pages 39 – 40).

- **Note Off Velocity:** The Super 6's response to this MIDI message can be controlled by the **DYNAMICS** toggle switch in the VCA section (see pages 39 – 40).

- **Polyphonic Aftertouch:** Polyphonic aftertouch can be assigned in the same manner as channel (monophonic) aftertouch. Use the controls in the performance control section (see pages 59 – 63) or the modulation matrix (see pages 67 – 71) to determine what should be modulated by aftertouch.

- **Polyphonic Pitch Bend:** The Super 6's response to polyphonic pitch bend messages can be configured in the same manner as the synth engine's response to the horizontal movement applied to the bender control.

- Use the **DDS** fader and the oscillator select toggle switch in the performance control section to determine:

  a) how much the polyphonic pitch bend will affect the pitch of the oscillators.

  b) which oscillators should response to pitch bend messages (see pages 59 – 63).

- **Polyphonic Expression:** Polyphonic expression is mapped to the **PED/CV** channel in the modulation matrix. Hence, polyphonic expression can be assigned in the same manner as the modulation source **PED/CV**. Use the modulation matrix to determine what should be modulated by polyphonic expression (see pages 67 – 71).

PATCH, WAVEFORM & SEQUENCE MANAGEMENT

If you connect your Super 6 to a computer, you can easily access and organise patches, alternative waveforms and sequences which are stored on the instrument. This is useful for swapping, backing up and freeing up the Super 6's internal memory of those patches, waveforms and sequences. No specific software or web app is required for these tasks.

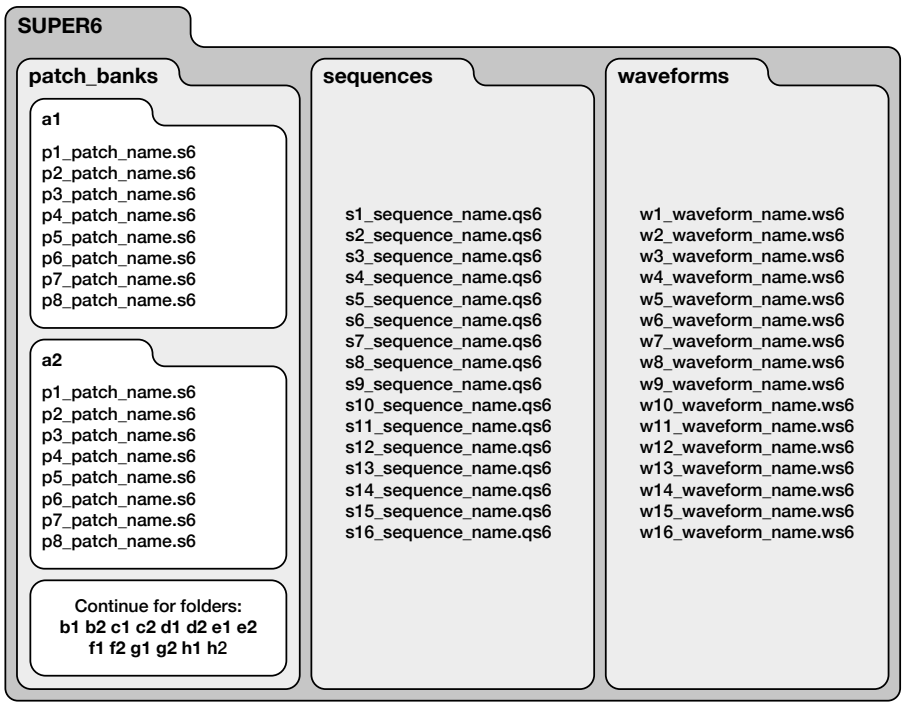
Accessing the SUPER6 drive:

1. Turn off the Super 6.
2. Connect the Super 6 to your computer using the included USB cable.
3. While holding the **PATCH** button, turn the Super 6 on.
4. Once the LEDs have turned on for 3 seconds, release the **PATCH** button.

The Super 6 will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.

SUPER6 contains three folders: **patch_banks**, **waveforms** and **sequences**. The folder **patch_banks** can contain up to 16 subfolders: 1 for each bank. Within each of the bank folders in **patch_banks**, you will find up to 8 patches. Since **waveforms** and **sequences** are not organised in banks, the **waveforms** and **sequences** folders do not contain any subfolders. You will find the 16 alternative DDS 1 waveforms in the **waveforms** folder, and up to 16 sequences in the **sequences** folder.

The figure below illustrates the file structure of the SUPER6 disk drive:



File Name Convention

The first character of each file – **p, s** or **w** – is used to prefix patch, sequence and waveform files. The second character is used to define the memory location of the patch, waveform or sequence. For patches use numbers 1-8. For alternative waveforms and sequences, use numbers 1-16.

Patch Files: p1_********.s6

Sequence Files: s1_********.qs6

Waveform Files: w1_********.ws6

After the prefix and number and an underscore, patch, sequence and waveform names can be freely defined to make it easier for you to identify the files. However, you should leave the filenames free of spaces.

Loading Patches Stored to Your Computer

1. Follow steps 1–4 on page 87 on Accessing the SUPER6 drive.
2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.
3. Click on the drive icon of the Super 6.
4. Navigate to the folder '**patch_banks**'.
5. Open the desired bank folder (**a1** – **h2**).
6. Copy and paste the patch files you would like to transfer to the Super 6 to the bank folder you have selected in the previous step.
7. If necessary, edit the name prefix of the patch files you copied and pasted, so that it matches the desired patch location. Make sure to manually delete the patches you would like to replace in the selected folder in case the names of the new patches are not identical to the names of the old patches. Make sure to empty the trash on your computer if necessary so that the files are indeed deleted from the disk.

Loading Waveforms Stored to Your Computer

1. Follow steps 1–4 on page 87 on Accessing the SUPER6 drive.

2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.

3. Click on the drive icon of the Super 6.

4. Navigate to the folder '**waveforms**'.

5. Copy and paste the waveform files you would like to transfer to the Super 6 to the '**waveforms**' folder you have selected in the previous step.

6. If necessary, edit the name prefix of the waveform files you copied and pasted, so that it matches the desired waveform location. Make sure to manually delete the waveforms you would like to replace in case the names of the new waveforms are not identical to the names of the old waveforms. Make sure to empty the trash on your computer if necessary so that the files are indeed deleted from the disk.

Note: *UDO will be periodically releasing more waveforms.*

Loading Sequences Stored to Your Computer

1. Follow steps 1–4 on page 87 on Accessing the SUPER6 drive.
2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.
3. Click on the drive icon of the Super 6.
4. Navigate to the folder '**sequences**'.
5. Copy and paste the sequence files you would like to transfer to the Super 6 to the '**sequences**' folder you have selected in the previous step.
6. If necessary, edit the name prefix of the sequence files you copied and pasted, so that it matches the desired sequence location. Make sure to manually delete the sequences you would like to replace in case the names of the new sequences are not identical to the names of the old sequences. Make sure to empty the trash on your computer if necessary so that the files are indeed deleted from the disk.

Backing up Patches to Your Computer

1. Connect the Super 6 to your computer using the included USB cable.

2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.

3. Click on the drive icon of the Super 6.

4. Click on the folder '**patch_banks**' and copy and paste it to your computer's hard drive. You may also navigate to one of the 16 bank folders (**a1** – **h2**) or a specific patch within those folders to copy and paste it to your computer's hard drive.

Note: *This method is an alternative to the dump option as described in the 'Global Settings' chapter of this manual (see page 83).*

Backing up Waveforms to Your Computer

1. Connect the Super 6 to your computer using the included USB cable.

2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.

3. Click on the drive icon of the Super 6.

4. Click on the folder '**waveforms**' and copy and paste it to your computer's hard drive. You may also navigate to a specific waveform to copy and paste it to your computer's hard drive.

Backing up Sequences to Your Computer

1. Connect the Super 6 to your computer using the included USB cable.

2. The instrument will appear on your computer's desktop as an external drive named **SUPER6** and can be accessed just like any flash drive.

3. Click on the drive icon of the Super 6.

4. Click on the folder '**sequences**' and copy and paste it to your computer's hard drive. You may also navigate to a specific sequence to copy and paste it to your computer's hard drive.

MIDI SPECIFICATIONS

System Real-Time Messages

CC#	Value	Control Function
Timing Clock	Yes	Yes
Start	No	Yes
Stop	No	Yes

Channel Messages

CC#	Value	Control Function
Note Off	Yes	Yes
Note On	Yes	Yes
Polyphonic Key Pressure	No	Yes
Control Change	See Global Settings (pages 83 – 85)	See Global Settings (pages 83 – 85)
Program Change	See Global Settings (page 83)	See Global Settings (page 83)
Channel Pressure	Yes	Yes
Pitch Bend Change	Yes	Yes

Channel Messages — Control Change

The table below lists the continuous controller messages (CCs) that are mapped to the controls of the Super 6. These messages are transmitted and/or received dependent on TX/RX E configuration in the global settings (see pages 83 – 84).

CC#	Control Function
0	Bank Select
1	Modulation Lever
2	-
3	Tempo
4	Foot Controller
5	Portamento Time
6	Data Entry MSB
7	VCA Env Level
8	-
9	-
10	-

CC#	Control Function
11	-
12	Delay Time
13	Delay Feedback
14	Chorus I On
15	Chorus II On
16	LFO 1 Waveform/HF Mode
17	LFO 1 Rate
18	LFO 1 Delay
19	LFO 1 L/R Phase
20	LFO 1 Mode
21	DDS LFO 1 Amt

CC#	Control Function
22	DDS Env 1 Amt
23	DDS Modulator Dest
24	Super Mode
25	PW/Detune
26	PWM/SWM
27	PWM/SWM Src
28	Cross Mod
29	DDS 1 Waveform
30	DDS 1 Range
31	DDS 2 Waveform
32	-
33	-
34	DDS 2 Range
35	DDS 2 Tune
36	DDS 2 Mode
37	Oscillator Mix/Split Point
38	LSB for Control 6 (Data Entry)
39	-
40	VCF HPF Mode
41	VCF Drive
42	-
43	VCF Keytrack
44	VCF Env Src
45	VCF Env Amt
46	VCF LFO 1 Amt
47	VCF DDS 2 Amt
48	VCA Dynamics
49	VCA Env Mode
50	Env 1 Mode
51	Env 1 Keytrack
52	Env 1 Hold
53	Env 1 Attack
54	Env 1 Decay
55	Env 1 Sustain
56	Env 1 Release
57	Env 2 Decay
58	Env 2 Sustain
59	Manual
60	LFO 2 Trigger Src

CC#	Control Function
61	Performance Ctrl Dest
62	LFO 2 Rate
63	LFO 2 Delay
64	Sustain Pedal
65	-
66	-
67	-
68	-
69	-
70	DDS LFO 2 Amt
71	VCF Resonance
72	Env 2 Release
73	Env 2 Attack
74	VCF Cutoff Frequency
75	VCF LFO 2 Amt
76	DDS Pitch Bend Amt
77	VCF Pitch Bend Amt
78	Voice Assign Mode
79	Unison Size
80	Binaural Mode On
81	Sync
82	Arp Range
83	Arp/Seq Swing
84	-
85	Arp/Seq Mode
86	Arp/Seq On
87	Hold
88	-
89	Seq Rec Mode
90	Seq Length
91	Delay Level
92	VCA LFO 1 Amt
93	-
94	-
95	-
96	Data Increment
97	Data Decrement
98	Non-Registered Parameter Number (NRPN) - LSB
99	Non-Registered Parameter Number (NRPN) - MSB

CC#	Control Function
100	Registered Parameter Number (RPN) - LSB
101	Registered Parameter Number (RPN) - MSB
102	-
103	-
104	-
105	-
106	-
107	-
108	-
109	-
110	-
111	-
112	-
113	-

CC#	Control Function
114	-
115	-
116	-
117	-
118	-
119	-
120	All Sound Off
121	Reset All Controllers
122	Local Control On/Off
123	All Notes Off
124	Omni Mode Off
125	Omni Mode On
126	Mono Mode On
127	Poly Mode On

Non-Registered Parameter Numbers

The table below lists the non-registered parameter numbers (NRPNs) that are mapped to the global and patch-related parameters of the Super 6. These messages are transmitted and/or received dependent on TX/RX E configuration in the global settings (see pages 83 – 85).

Global Parameters

NRPN	Value	Control Function
2048	0-200	Master Fine Tune: 0 = -100 Cents 100 = 0 Cents 200 = +100 Cents
2049	0-24	Master Coarse Tune: 0 = -12 Semitones 12 = 0 Semitones 24 = +12 Semitones
2050	0-4	Octave Selector: 0 = -2 Octaves 2 = 0 Octaves 4 = +2 Octaves
2051	0-15	MIDI Channel: 0 = MIDI Channel 1 15 = MIDI Channel 16

NRPN	Value	Control Function
2052	0-1	MIDI Clock Transmit: 0 = Off 1 = On
2053	0-1	MIDI Clock Receive: 0 = Off 1 = On
2054	0-1	Respond To MIDI Start & Stop: 0 = Off 1 = On
2055	0-3	MIDI Controller Transmit: 0 = Off 1 = CC 2 = NRPN 3 = CC & NRPN

NRPN	Value	Control Function
2056	0-3	MIDI Controller Receive: 0 = Off 1 = CC 2 = NRPN 3 = CC & NRPN
2057	0-1	MIDI Program Change Transmit: 0 = Off 1 = On

NRPN	Value	Control Function
2058	0-1	MIDI Program Change Receive: 0 = Off 1 = On
2059	0-1	Local Control 0 = Off 1 = On

Patch-Related Parameters

NRPN	Value	Control Function
0	0-5	LFO 1 Waveform/HF Mode
1	0-21	LFO 1 DDS 1 Waveform
2	0-255	LFO 1 Rate
3	0-255	LFO 1 Delay
4	0-255	LFO 1 L/R Phase
5	0-2	LFO 1 Mode
6	0-255	DDS LFO 1 Amt
7	0-255	DDS Env 1 Amt
8	0-2	DDS Modulator Dest
9	0-2	Super Mode
10	0-255	PW/Detune
11	0-255	PWM/SWM
12	0-2	PWM/SWM Src
13	0-255	Cross Mod
14	0-20	DDS 1 Waveform
15	0-5	DDS 1 Range
16	0-5	DDS 2 Waveform
17	0-5	DDS 2 Range
18	0-254	DDS 2 Tune
19	0-2	DDS 2 Mode
20	0-254	Oscillator Mix/Split Point
21	0-2	VCF HPF Mode
22	0-2	VCF Drive
23	0-255	VCF Cutoff Frequency
24	0-255	VCF Resonance
25	0-2	VCF Keytrack
26	0-2	VCF Env Src
27	0-255	VCF Env Amt
28	0-255	VCF LFO 1 Amt

NRPN	Value	Control Function
29	0-255	VCF DDS 2 Amt
30	0-2	VCA Dynamics
31	0-2	VCA Env Mode
32	0-255	VCA Env Level
33	0-255	VCA LFO 1 Amt
34	0-2	Env 1 Mode
35	0-2	Env 1 Keytrack
36	0-255	Env 1 Hold
37	0-255	Env 1 Attack
38	0-255	Env 1 Decay
39	0-255	Env 1 Sustain
40	0-255	Env 1 Release
41	0-255	Env 2 Attack
42	0-255	Env 2 Decay
43	0-255	Env 2 Sustain
44	0-255	Env 2 Release
45	0-255	Portamento Time
46	0-1	Manual
47	0-2	LFO 2 Trigger Src
48	0-2	Performance Ctrl Dest
49	0-255	LFO 2 Rate
50	0-255	LFO 2 Delay
51	0-255	DDS LFO 2 Amt
52	0-255	VCF LFO 2 Amt
53	0-255	DDS Pitch Bend Amt
54	0-255	VCF Pitch Bend Amt
55	0-4	Voice Assign Mode
56	0-5	Unison Size
57	0-1	Binaural Mode On

NRPN	Value	Control Function
58	0-255	Delay Level
59	0-255	Delay Time
60	0-255	Delay Feedback
61	0-1	Chorus I On
62	0-1	Chorus II On
63	0-255	Tempo
64	0-1	Sync
65	0-3	Arp Range
66	0-4	Arp/Seq Swing

NRPN	Value	Control Function
67	0-4	Arp/Seq Mode
68	0-1	Arp/Seq On
69	0-1	Hold
70	0-5	Seq Rec Mode
71	0-63	Seq Length
72-135	0-1	Seq Step 1-64 Slide
136-199	0-1	Seq Step 1-64 Accent
200-263	0-1	Seq Step 1-64 Rest

Please see the UDO website for the most up to date MIDI specification.

System Exclusive Messages

Please see the appropriate section of the UDO website.

GLOSSARY

The following list provides you with brief explanations of key terms printed on the Super 6's front panel as well as basic synthesis and music technology terminology used in this manual.

Aftertouch (AT): Aftertouch is a keyboard expression feature which allows you to modulate a sound as you play notes on the keyboard.

Arpeggiator: An arpeggiator plays back a rhythmic pattern based on its settings and the notes you hold.

Band-Pass Filter: A band-pass filter is a combination of a low-pass and a high-pass filter. It subtracts spectral content above and below its cutoff frequencies.

Bender: A bender is a performance controller that can be moved in two axes; horizontally (left/right) and vertically (up/down). The corresponding gestures can impact the sound in individual ways.

Binaural: The Latin term 'binaural' literally means 'with both ears'. In Binaural mode, the Super 6 features a true stereo signal path in which its twelve voices are twinned to form six stereo 'Super' voices. Consequently, the left and right channels, and each of your ears, are assigned a complete synthesizer voice. Starting with the stereo oscillators, parameters of both channels of each Super voice may be independently controlled, facilitating you to create gorgeous stereo images. The effect on the sound ranges from subtle to extreme stereo movement and an enhanced sense of spatial positioning relative to conventional monaural signal-chains.

Clock Signal: A clock signal is a signal that oscillates between high and low states at a constant frequency. Typically, a square wave is used to synchronize elements of digital circuits. A clock signal acts like a metronome. It can control the rate of an arpeggiator, a sequencer, LFOs, and time-based effects such as delays. An internal clock signal is one that the instrument you're using is producing itself. An external clock signal, on the other hand, is one that is fed into your instrument from another device.

Clock Sync: This is a function that allows you to synchronize modules of a system, such as an arpeggiator, a sequencer, LFOs, and time-based effects, to one clock signal. If synced to either an internal or external clock, parameters like LFO rate or delay time will respond at a rate that is relative to the internal or external tempo settings. The increments of the synchronized rate are called clock divisions. These can be quarter notes, eighth notes or 16th note triplets instead of absolute tempo settings like 120 BPM, for example.

Cross Modulation (Cross Mod, X Mod): Cross modulation is a type of frequency modulation (FM). This parameter allows you to control the amount which one oscillator modulates the frequency of another oscillator. The result can be complex, clangorous or bell-like timbres.

Cutoff Frequency: The cutoff frequency is a filter parameter. It allows you to define the frequency at which the filter begins to subtract spectral content in order to shape the sound.

Detune Spread: When Super mode is engaged, this parameter allows you to control the amount that detuned versions of the DDS 1 waveform will be spread across the spectrum.

Direct Digital Synthesis Oscillator (DDS): Direct Digital Synthesis is the signal generation method employed by both oscillator cores of the Super 6. At its centre is a clock signal – three orders of magnitude higher than typical audio sample rates. The clock signal increments a counter through thousands of indexes in your choice of waveform, selecting the appropriate sample to output every twenty-billionths of a second with interpolation filling in the gaps between samples at different oscillator frequencies. The samples produced by our numerically-controlled oscillators are then transformed to analog voltages by a DAC, one for each oscillator, which operates at the same clock rate before being filtered by a preliminary analog low-pass filtering stage.

Drive: The drive parameter controls the overdrive of the input signal to the Super 6's filter circuit. It allows you to overdrive the signal being processed by the filter from subtle saturation to a more distorted signal.

Dump: This function allows you to transfer data from the Super 6 to a connected computer for backups. You can dump the currently selected patch via MIDI.

Envelope (ENV): An envelope is a shaping tool that defines how a signal or parameter it is modulating will evolve over time. Most envelope generators feature four stages: attack, decay, sustain and release. The attack stage determines how much time it takes for the modulated signal or parameter to fade in to a maximum level. The decay stage determines how long it takes for the modulated signal or parameter to reach the sustain level once the maximum level has been reached in the attack stage. The sustain stage determines at which level the modulated signal or parameter is sustained if you hold down a note on the keyboard after the decay stage is complete. The release stage determines the time it takes for the modulated signal or parameter to decrease to a minimum level once you release a key. The first envelope of the Super 6 also features a hold stage that determines the amount of time it takes for the attack stage to start after you press a key.

High-Pass Filter (HPF): A high-pass filter subtracts frequency content below its cutoff frequency. The frequency content above the cutoff frequency will remain unaffected, meaning the highs will pass through.

Keyboard Tracking (Keytrack, TRK): The Super 6 features a keyboard tracking option for three modules: LFO 1, the filter, and the first envelope. Whatever is tied to keyboard tracking will respond in relation to the pitch of the notes being played on the keyboard. The higher the note you play on the keyboard, the more the LFO rate will increase, the brighter the filter will sound and the faster the envelope shape will be articulated.

Left Right Phase (LR Phase): This parameter controls the phase difference between LFO 1's modulation of the Super 6's binaural sound engine's left channel and right channel, in other words: LFO 1's effect on the stereo field.

Loop: A loop is essentially a repetition of a recording or shape, meaning once the end is reached, whatever is looped will start all over again. The Super 6 features a loop option for the first envelope. Rather than just being triggered once, its stages will be repeated once the end of the decay phase is reached. (The decay phase is the final time-based stage that has an effect while a note is held.) What is being looped are the attack and decay phases. Once you release a key, the release phase will be triggered.

Low Frequency Oscillator (LFO): An LFO or low frequency oscillator is an oscillator that produces a frequency below the range of human hearing. It can be used, for example, to modulate the frequency of oscillators to produce a vibrato effect or to modulate the amplitude controlled by the VCA to create a tremolo style effect. The Super 6's first LFO can also be set to high frequency modes. In these modes, it oscillates at an audible rate; between 20 Hz and 20 kHz, allowing it to be used either as a third oscillator, a drone or for FM (frequency modulation) style sounds.

Low-Pass Filter: A low-pass filter subtracts frequency content above its cutoff frequency. The frequency content below the cutoff frequency will remain unaffected, meaning the lows will pass through.

MIDI: Musical Instrument Digital Interface. MIDI is a standardized protocol that allows various devices from different manufacturers to communicate with each other. This not only includes instruments but also computers and several types of controllers.

Mixer: A mixer allows you to adjust the level of each of the oscillators' signals and their combination in the output signal.

Modulation (MOD): Modulation is the process of affecting a target or destination signal or parameter with a source signal. You can, for example, have an LFO control the behaviour of an oscillator's frequency or have an envelope control the behaviour of a sound's loudness. Common modulation sources include LFOs, envelopes, regular oscillators as well as performance controls like aftertouch and velocity.

MPE: MIDI Polyphonic Expression. This is a standardized protocol that allows sound engines or synthesizers to be played via dedicated MPE controllers. MPE controllers emulate the complex articulation one might find in an acoustic instrument's individual notes. Each pad or key of an MPE controller allows for simultaneous gestures across different axes (pressure, left/right, up/down) that will alter how each individual note is articulated while a pad or key is held. How hard you hit a pad or key and in what manner you've released it will also have an impact on the sound of the note.

Oscillator: Oscillators are the primary sound sources of any synthesizer. Both of the Super 6's oscillators are capable of producing classic analog waveforms like sine, triangle, sawtooth and square. In addition to the classic waveforms, the first oscillator (DDS 1) also features a selection of 16 alternative waveforms you can choose from.

Patch: A patch is a stored set of parameters which determine a sound's characteristics. The Super 6 allows for 128 patches to be stored in its internal memory. These patches are organized in 16 banks that each feature eight memory locations.

Portamento: Portamento is a pitch sliding effect from one note to another. If this parameter is activated, the sound will slide in pitch to each new note's pitch that is being played. The higher the portamento time, the longer it takes for the sound to slide to a new note's pitch after that new note is triggered via the keyboard.

Pulse Width (PW): The pulse width marks the duration a pulse signal is 'on'. It is commonly measured in percentages of a duty cycle. A duty cycle of 50% produces a square wave, meaning that the pulse signal is on for as long as it's off per duty cycle. When a pulse signal is on for longer than its off, it has a duty cycle of more than 50%. When a pulse signal is off for longer than it's on, it has a duty cycle of less than 50%. The sound of a pulse wave that has a duty cycle of more or less than 50% will be thinner than that of a square wave and bear a nasal character. At a duty cycle of 0% or 100% there is no audible sound, as there is no change in amplitude that constitutes oscillation.

Pulse Width Modulation (PWM): Pulse width modulation affects how the pulse width changes over time while you press down a key. The pulse width can be modulated by a modulation source like an LFO or an envelope.

Resonance: Resonance is a filter parameter. If increased, the frequencies around the cutoff frequency will be emphasised and become more pronounced. The Super 6's low-pass filter can be driven into self-oscillation if you set resonance to the highest value. In this case, the filter will generate a pitch that is determined by the cutoff frequency setting and bear a timbre similar to that of a sine wave.

Sequencer: Traditionally, a sequencer is a modulation source that sends out control signals to a variety of parameters per step. A step is the smallest rhythmic unit a sequencer offers. The Super 6's sequencer allows for the recording of up to 64 steps and is focused on the recording and editing of note events. It allows you to program step, slide, accent, rest and sequence length settings. In addition to that, you will also be able to record any modulation that is being controlled by the horizontal bender movement (left and right) in real-time.

Split Point: The split point is the key on the Super 6's keyboard relative to which the audio signals of DDS 1 and DDS 2 or DDS 1 and an external source will be crossfaded if you activate X-Fade mode in the DDS 2 section.

Sub Oscillator: A sub oscillator is an oscillator with a fixed waveform that is locked one octave or more below the frequency of the oscillator it is tied to. In the case of the Super 6, the activated sub oscillator will replace the audio signal of DDS 2. Its waveform is a fixed square and its pitch is locked one octave below the frequency of DDS 1, which is the oscillator it is tied to.

Super Mode: The Super mode is a unique feature of Super 6 that utilises its stereo signal path. If this mode is engaged, the first oscillator (DDS 1) can be dynamically de-phased, resulting in widening the sound in a unique way and positioning it in the stereo field.

Super Wave Modulation (SWM): When Super mode is engaged, super wave modulation determines how much modulation intensity is applied to the detune spread modulation of DDS 1.

Swing: Swing is a rhythmic variation that involves alternately lengthening and shortening the first and second consecutive notes of a two-part beat pattern. The Super 6 provides 5 different swing settings when you engage arpeggiator or sequencer playback: from none to pronounced. Swing will make your pattern sound less static.

Sync: This option, also known as 'hard sync', will force DDS 2 to restart its cycle every time DDS 1's cycle is starting. If you are setting the frequencies of DDS 1 and DDS 2 to different intervals, the sync option will create more complex and harmonically richer waveforms than the standard waveforms do.

Velocity (VEL): Keyboard velocity controls how dynamically a sound will respond each time you hit a key. If velocity controls the behaviour of the VCA, for example, the sound will get quieter, the softer you play. Conversely, the sound will get louder, the harder you hit the keys.

Voltage Controlled Amplifier (VCA): A voltage controlled amplifier controls the amplitude or loudness of a sound. On the Super 6, envelope 2 is routed to the VCA by default. You can use this envelope controlling the VCA to shape how the amplitude or loudness of a sound is modulated over time.

Voltage Controlled Filter (VCF): This is the module that gave subtractive synthesis its name. The voltage controlled filter is an integral part of the Super 6's sonic character, shaping the sound of the oscillators by subtracting some of their signals' spectral content.

Waveform: A waveform describes the shape of a signal produced by an oscillator. Among the classic analog waveforms are shapes like sine, triangle, sawtooth and square with sine waves producing the least complex harmonic content and square waves producing the most complex harmonic content.

X-Fade: This option allows you to crossfade between the signals of DDS 1 and DDS 2 relative to an adjustable split point on the keyboard. The crossfade between the output signal of both oscillators will occur over a range of two octaves.

SUPPORT INFORMATION

Support information is available on our website udo-audio.com.

U·D·O

12 VOICE POLYPHONIC BINAURAL ANALOG-HYBRID
SYNTHESIZER WITH SUPER-WAVE TECHNOLOGY

SUPER 6

UDO SUPER 6 — OWNER'S MANUAL

VERSION 2.0 · AUGUST 2020

SUPPORT & DOWNLOADS:
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