

Synapse



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Description

Fade. Switch. Mix. Route.

Synapse is a crossfading switch with a signal path that can be rearranged on the fly. Its dynamic routing and mixing functionality make it capable of turning static waveforms into evolving soundscapes.

The core of Synapse is comprised of four crossfade circuits chained to a sequential switch, all under digital control. This enables many intelligent behaviors that aren't possible in the analog domain. Crossfade positions can be saved in up to eight memory locations for easy recall. These let you create sections within your patch, and travel through them with a single knob – all without repatching. In addition, the switch outputs can be rotated left, right, or randomized, enabling unique spatialization of sounds through effect chains, filters, or other mixers.

Synapse can process CV signals just as well as audio and even generate its own adjustable DC voltage for modulation. A configurable +5V DC offset is normalled to each B input, allowing it to function as a four step sequencer or eight stage stored voltage source without needing any additional modules.

- Configurable switching behavior eliminates clicks and pops
- Internal LFO modulation
- Eight memory locations save crossfade positions
- DC coupled inputs work for audio or CV signals
- Configurable internal +5V DC offset

Specifications

Depth:

- 22mm

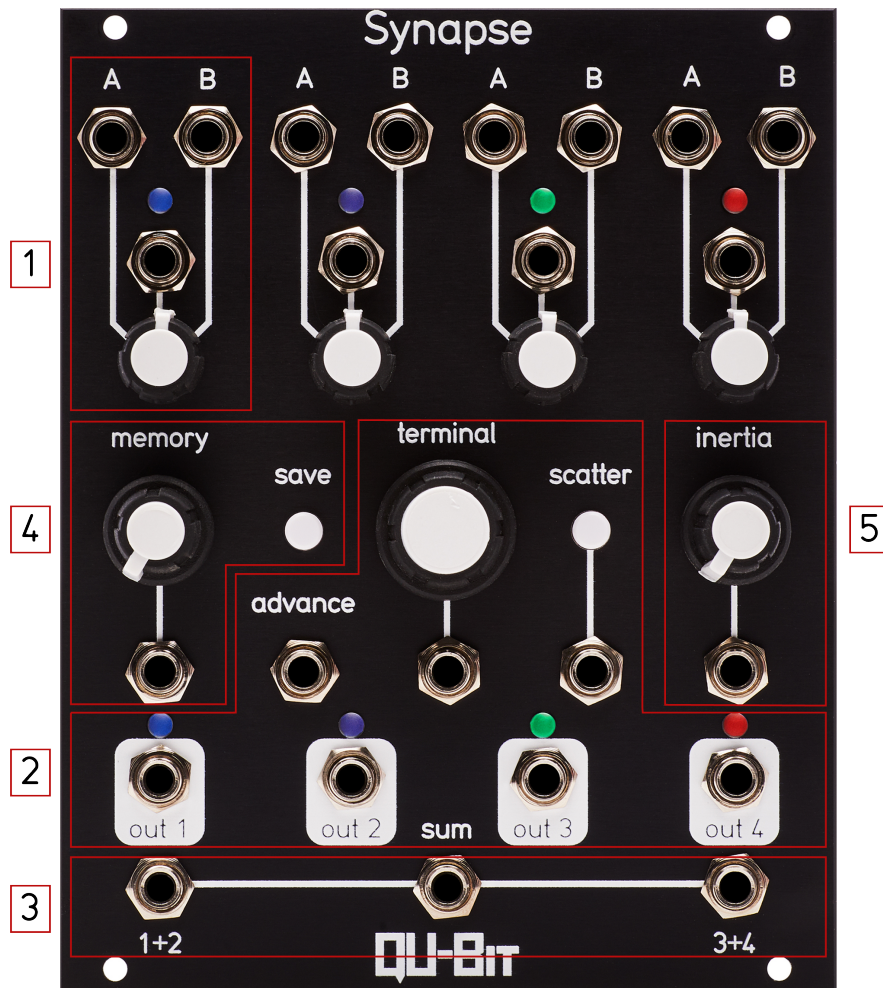
Current Consumption:

- +12V: 167mA
- -12V: 81mA

Installation

To install, locate 20 HP of space in your Eurorack case and confirm the positive 12 volts and negative 12 volts sides of the power distribution lines. Plug the connector into the power distribution board of your case, keeping in mind that the red band corresponds to negative 12 volts. In most systems, the negative 12 volt supply line is at the bottom. The power cable should be connected to the Synapse with the red band facing the bottom of the module.

Marked Diagram



1. Cross Fade Channels

Each Cross Fade Channel has two inputs: A and B.

Inputs are DC-coupled, suitable for audio or control signals.

Cross Fade Channels also have a knob and CV input to control the blending of the two inputs.

When a channel's cross fade knob is set fully counter-clockwise, only the A input signal will pass to the outputs.

When a channel's cross fade knob is set fully clockwise, only the B input signal will pass to the outputs.

CV range is -5V to 5V, and adds to the knob position.

Per-channel Master Volume

Each pair of inputs can have its master volume adjusted.

To adjust a channel's maximum volume, hold the Terminal encoder, and turn the channel's cross fade knob.

The LEDs for the inputs will illuminate white and the brightness will correspond to the output level.

When a channel's cross fade knob is set fully counter-clockwise, the A and B inputs for that channel will be silenced.

When a channel's cross fade knob is set fully clockwise, the A and B inputs for that channel will have their maximum volume set to unity.

+5V DC Offset

A +5V DC offset can be enabled, allowing the Synapse to become a stand alone modulation device.

When enabled, a +5V DC signal will be applied to each channel's B input.

To activate the DC offset, hold the Terminal encoder and rotate the Memory knob.

If the DC offset is enabled, the Out 1 LED will be illuminated blue.

When the Memory knob is moved below center, the DC offset will be disabled.

When the Memory knob is moved above center, the DC offset will be enabled.

The DC offset is disabled by default.

Linear / Constant Loudness Curves

The cross fade curve of the Synapse is configurable between linear and constant loudness.

To toggle between linear and constant loudness curves, press the Scatter button while holding the Terminal encoder.

When Linear is selected, the Out 2 LED will illuminate white.

When Constant Loudness is selected, the Out 3 LED will illuminate white.

The curve for the cross fade channels is linear by default.

2. Terminal Switches

Each cross fade channel feeds into the Terminal switches and can be routed to any of the four outputs.

The output LED will correspond to the currently selected cross fade channel.

Terminal

Rotating the Terminal encoder will shift each channel's output in the direction of the rotation.

Clicking the Terminal encoder will reset all outputs to their default positions.

CV range is -5V to +5V and will shift right with positive voltage and left with negative voltage.

Advance

Sending a trigger or gate signal to the Advance input will move all channels one output to the right.

This allows Synapse to function as a traditional sequential switch.

Scatter

Pressing the Scatter button will shuffle the positions of all outputs.

Sending a trigger or gate to the Scatter input will shuffle the positions of all outputs.

Click-less switching

Click-less switching can be enabled to suppress clicks and pops when switching between audio signals.

To activate the click-less switching, hold the Terminal encoder and rotate the Inertia knob.

If click-less switching is enabled, the Out 4 LED will be illuminated blue.

When the Inertia knob is moved below half, click-less switching will be disabled

When the Inertia knob is moved above half, click-less switching will be enabled.

Click-less switching is enabled by default.

3. Sum Outputs

1 + 2 / 3 + 4

Post-switch sum of the signals being output by the designated channels.

Sum

Pre-switch sum of the output of each cross fade channel.

4. Memory

Memory allows for the storage of 8 sets of cross fade states.

Moving the memory knob will load each saved bank.

When moving to a new Memory location, the LED corresponding to the selected bank will blink white and then begin to repeatedly fade to indicate that the Memory location is selected.

Changes to a Memory location can be auditioned by changing the cross fade knob position while a Memory location is selected. Changes will not be saved unless the save button is pressed.

When set fully counter-clockwise Memory is bypassed.

When a Memory location is selected, the CV inputs to the cross fade channels will be disabled.

CV input range is -5V to +5V and will add to the knob position.

Save

Pressing the Save button will store the current cross fade positions to the selected bank (when Memory is not bypassed).

Save will also store the current state of the module to be recalled after a power-cycle.

Memory Edit Functions

Resetting Memory

To reset all Memory locations, hold the Save button and click the Terminal encoder.

Once reset, all Memory locations will be assigned to the A input only.

All LEDs will blink white to indicate the Memory locations are being reset.

Randomizing Memory

To randomize the contents of all Memory locations, hold the Save button and press the Scatter button.

All LEDs will perform a white fading animation to indicate the Memory locations being randomized.

5. Inertia

Adds slew to the change in cross fade levels.

Affects changes in Memory location, as well as changes to the cross fade channels' knobs and CV inputs.

Range is from 0 to 5 seconds.

6. Internal Modulation

Synapse features a set of internal triangle wave LFOs.

LFO Amplitude

Each cross fade channel's LFO amplitude can be set by holding the Scatter button, and turning the channel's cross fade knob.

When the cross fade knob is set fully counter-clockwise, the channel's LFO amplitude will be set to 0, disabling the LFO for that channel.

When the cross fade knob is set fully clockwise, the channel's LFO amplitude will be set to its maximum, and the LFO will cover 2x the entire cross fade range.

To set the LFO to fade evenly between both inputs, set the cross fade knob to center and then set the LFO amplitude to center.

LFO Frequency

All four LFOs are linked and share a common frequency.

LFO Frequency can be set by holding the Scatter button and adjusting the Inertia knob.

When the Inertia knob is fully counter-clockwise, the LFO frequency will be 0.03Hz (30 seconds).

When the Inertia knob is fully clockwise, the LFO frequency will be 1kHz (1ms).

LFO Relationships

Holding the Scatter button and turning the Memory knob will change the relationship of the LFOs.

Upon any change to the LFO relationship, the LEDs will light up green to indicate the selected relationship on the top row of LEDs. This indication will persist until the Scatter button is no longer held down.

Phase relationships:

- Phase Offset - Each Channel is 90 degrees out of phase with adjacent channels.
- Alternating - Channel 1 + 3 and 2 + 4 have same phase. Even channels are 180 degrees out of phase.
- Cascading - Each LFO performs one cycle and progresses to the next channel.
- Synchronous - All LFOs are phase synced with each other.

LFO Edit Functions

Resetting Internal Modulation

To reset the LFOs to their default state, hold the Scatter button and click the Terminal encoder.

All LEDs will blink blue to indicate the LFOs are being reset.

Randomizing Internal Modulation

To randomize the amplitudes and frequency of the LFOs, hold the Scatter button and press the Save button.

All LEDs will perform a green fading animation to indicate the LFOs are being randomized.

7. Factory Reset

To restore the state of the module to its default settings, hold the Terminal Encoder and press the Save button.

All LEDs will blink green to indicate that the LFOs are being reset.

By default: - DC offset is disabled - Click-less switching is enabled - Cross fade curve is set to linear - LFOs are disabled - Master volumes are set to their maximum - Switch positions are reset - Memory locations are set to increment from A to B across the range of the Memory control.

State Recall

The following things will be stored to permanent memory for recall between power-cycles.

Saving takes place when any button is pressed.

- Memory Locations
- Switch Positions
- LFO frequency
- LFO relationship
- LFO amplitudes
- +5V DC Offset State
- Click-less Switching State
- Crossfade Curve State
- Per-channel Master Volume

8. Edit Function Overview

Holding Scatter

Related to Internal Modulation

Animations will be Green

- Save: Randomize LFOs
- Terminal: Reset LFOs
- Memory: LFO Relationship control
- Inertia: LFO Frequency control
- Cross fade knobs: LFO amplitude controls

Holding Save

Related to Memory

Animations will be White

- Terminal: Clear Memory
- Scatter: Randomize all memory positions.

Holding Terminal

Global Settings

- Save: Factory Reset
- Scatter: Linear/Constant Loudness curve setting
- Memory: +5V DC Offset
- Inertia: Click-less Switching
- Cross fade knobs: Per-channel Master Volume control