

Tr

B A S T L

Tromsø is a combination of 3 basic utility modules: VCO, Comparator and Sample & Hold. Internal normalisation allows you to instantly use it as voltage controllable analog downampler (or sample rate reducer, if you like). The sample rate is set by VCO Rate and a sort of "dry/wet" mix effect which is achieved by adjusting the Threshold when in the Track & Hold mode.

This architecture was inspired by a machine called Distortotron, made in 1994 – arguably the first analog downampler and bit distortion of its kind. That machine came from a collaboration between Norwegian musician Mental Overdrive based in Tromsø and the inventor group Psybe (Svein Berge and Henrik Sundt). It was created from a need to bring back oldschool sampler aliasing and lo-fi effects and it heavily influenced the sound of the album Plugged, which is the landmark of the so called Tromsø sound.

The VCO of the Tromsø module can track one volt per octave when the Attenuator on the FM input is fully open, which makes it possible to have the downsampling effect track the pitch of a played note. All 3 utility modules of Tromsø can also be used independently. Internal normalisations are disconnected when using the input jacks.

instruction

1

Triangle core VCO with Triangle output of +/- 5V amplitude.

2

The rate of the VCO is set by the VCO RATE knob and the Range of the VCO is set by the switch. In VCO Range the frequency goes from 2Hz to 45kHz and in LFO Range from 50s to 50Hz. With strong negative voltages at the FM input, the rate of the VCO can go even lower.

3

The control voltage for the pitch of the VCO is the sum of the position of the VCO RATE knob and the voltage on the FM Input going thru the Attenuator Knob. When the Attenuator knob is fully CW, the FM input tracks 1V/Oct over more than 5 octaves and has an input impedance of 100k ohms.

4

The comparator section has 3 connectors and a Threshold knob. A Comparator is a device which takes two voltages, compares them and outputs a HIGH gate, if one of the voltages is greater than the other. In the case of Tromsø, if the voltage at the CMPRTR IN is greater than the THRESHOLD voltage, it outputs a HIGH gate. The THRESHOLD voltage is the sum of the position of the Threshold Knob (range of +/-6 volts) and the voltage on the CMPRTR THR input. The Triangle output of the VCO is normalised to the CMPRTR IN, which means that the CMPRTR OUT creates a standard pulse waveform from the VCO (with amplitude approx. +/-5 volts).

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The indication LED is driven by the CMPRTR OUT signal.

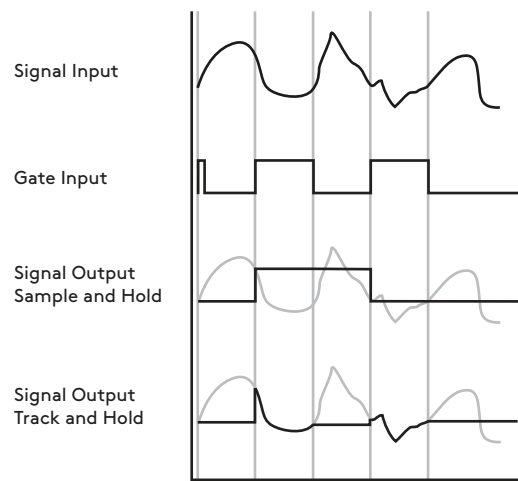
6

Sample and Hold (S&H) is an analog voltage storage device. It looks at voltage at the S&H IN input at a given time (rising gate on the S&H GATE input) and remembers that voltage and keeps it at the S&H OUTput. This simple device is hugely useful for a great amount of unique techniques of modular synthesis, especially when combined with other modules

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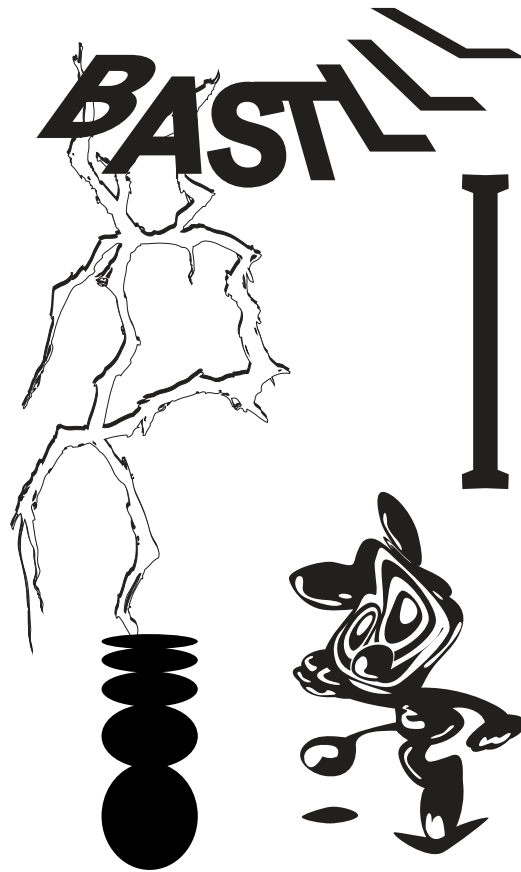
The S&H circuit has two modes, selectable with a switch. S&H mode was described above. The Track and Hold (T&H) mode is a variation of the S&H circuit.

The difference is that while there is a HIGH GATE, it lets the INput signal through to the Output (it tracks the signal) and at the falling GATE, it remembers the last voltage at the input and holds that voltage until there is another HIGH gate. See the diagram to wrap your head around it!



8

Normalisations within Tromsø allow it to be simply used as Voltage Controllable Downampler, but once you plug cables into the normalised inputs you can use the VCO, Comparator and S&H sections independently. The Triangle output of the VCO is normalised into the Comparator input and the Comparator output is normalised to the S&H Gate input. This is indicated by the arrows on the front panel.



Applications of Tromsø

VC downsampler with VC Intensity is achieved simply by plugging the processed signal into the S&H input and listening to the S&H output. Both switches should be in the upper position (VCO, T&H). In this setup the audio rate VCO sets the sample rate at which the S&H circuit is being triggered. Because the T&H mode is used, the Comparator threshold sets the pulse width at which the downsampling is processed and therefore acts as an intensity control. Soundwise it is similar to a DRY/WET mix, but technically different. Both the VCO Rate = Sample Rate and the Threshold=intensity are voltage controllable in this setup. Please note that the VCO tracks 1V/Oct with the Attenuator fully CW, so the downsampling effect can track your main VCO.

Experimental FM VCO with T&H on the input is achieved by plugging the S&H output to the FM input on the Tromsø and feeding (preferably) audio rate modulation signals into the S&H input. With the comparator threshold knob fully CCW, we obtain a classical exponential FM sound, when listening to the Triangle output of the VCO. However, adjusting the Threshold CW brings in a lot of chaotic and rich sound behaviours. When the Comparator is producing very narrow pulses (almost fully CW), it samples the FM input on each full waveform cycle of the Tromsø VCO and outputs the whole waveform and then samples again at the next waveform cycle. This results in very deep and unique FM modulation sound even at very high pitch.

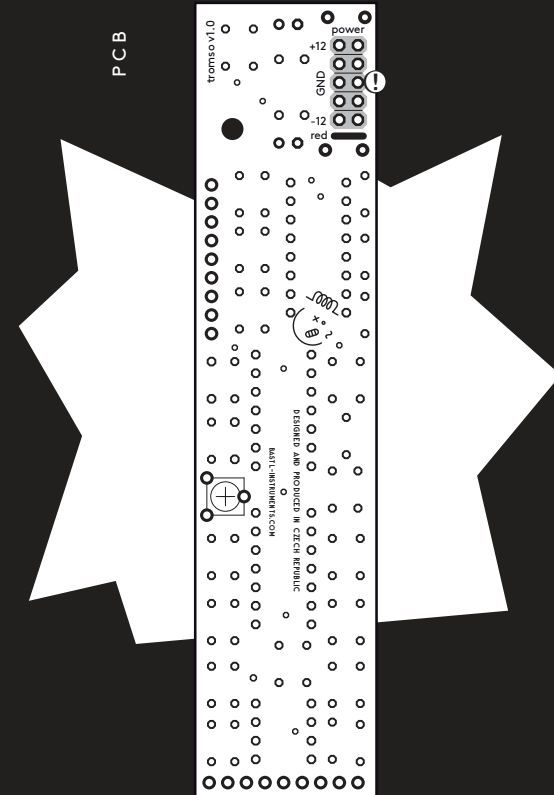
Random stepped voltages & Colorful noise patch is simply achieved by plugging any type of noise signal into the S&H input. When the VCO is in LFO range and in S&H mode it produces stepped random voltages. When the VCO is in VCO range the result is colorful noise. If used at audio rate and in T&H mode, the comparator Threshold gives

a much greater timbral control over the sound. In both of these setups it is more interesting to use different types of noises than white or pink. The Noise Square module of Bastl offers plenty of choices. Especially for the random stepped voltages, sources such as Metallic or Digital noise result in a limited number of voltages at the output, which is very musical.

Classical S&H Staircase LFO waveforms can be obtained by plugging in any LFO type of signal and using the Tromsø VCO to trigger the staircase effect. You should be in LFO and S&H mode. More complex waveforms can be achieved by using the T&H mode and adjusting the comparator Threshold.

features

- Triangle core VCO
- exponential FM input with Attenuator Knob
- tracks 1 volt per octave over about 5 octaves when attenuator is fully open
- switch to change range of the VCO Range – high = 2Hz-45kHz, low=50s – 50Hz
- VCO output is normalised to the Comparator Input, thus the Comparator Output creates pulse waveform for the VCO (Threshold = PWM)
- comparator has a Threshold Knob, CV Input for Threshold and an Input and Output with an indication LED
- S&H section has a gate INput, signal INput and OUTput
- switch to select mode: Sample & Hold (samples at rising gate and then holds) or Track & Hold (at high gate tracks, at low gate holds)
- Sampling time S&H mode <25uS, in T&H mode up to 5uS
- S&H hold drift rate <0.4mV/s
- Hold capacitor charging slew rate 0.5 V/uS



Take it Carefully

technical details

- 5HP width
- PTC fuse and diode protected 10pin power connector
- 45mm deep
- current consumption: +12V: <35mA, -12V: <35 mA

Before connecting the ribbon cable to this module disconnect your system from power !

⚠ Double check the polarity of the ribbon cable and that it is not shifted in any direction. The red cable should be attached to the -12V rail, both on the module and on the bus board side!

please make sure of the following

- you have a standard pinout eurorack bus board
- you have +12 and -12 power rails on that bus board
- the power rails are not overloaded

Although we put protection circuits in the device, we do not take any responsibility for damages caused by wrong power supply connection. After you connected everything, double checked it and closed your system so no power lines can be touched by your hand, turn on your system and test the module.

Connecting module to your system

