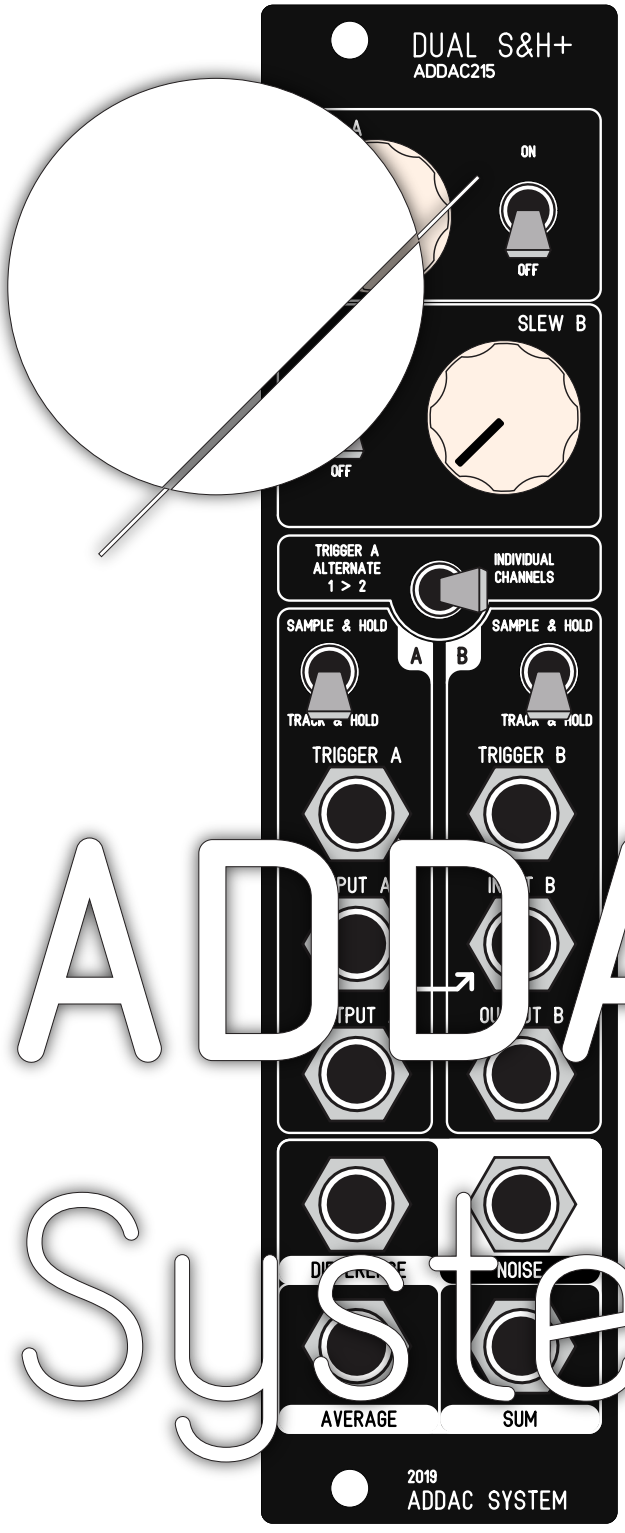


ADDAC System

ADDAC215 DUAL S&H+

USER'S GUIDE . REV02

October.2019

Welcome to:
ADDAC215 DUAL S&H+ USER'S GUIDE

Revision.02October.2019

OVERALL FEATURES

This module should not be judged by it's size, at 6hp it's packed with features.

At it's core it features a noise source and two precision Sample & Holds with 0.01% of maximum deviation from the Input which allows for quantized signals to be sent through without any noticeable detuning or the typical over time voltage drop.

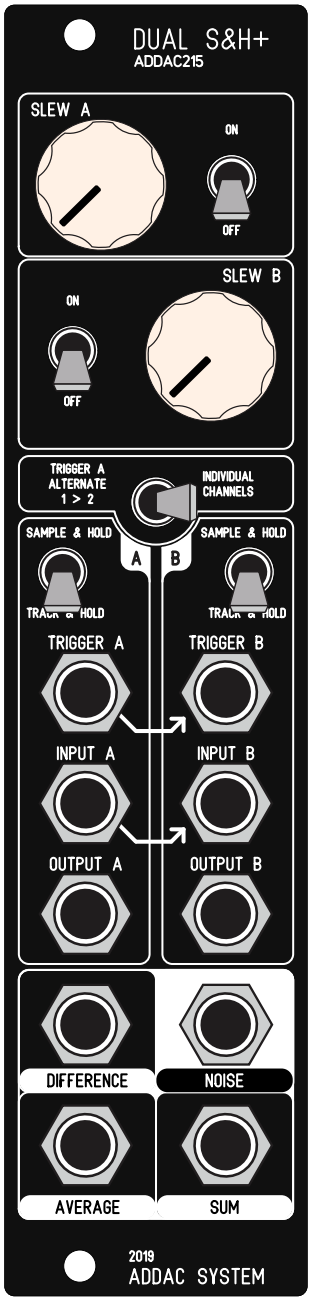
The Sample & Hold sections can also be used as a Track & Hold meaning it holds the incoming input while the Trigger input is ON and lets the input flow to the output when the Trigger input is OFF.
Each section also features it's own slew processor with a single control over attack/decay and an ON/OFF switch.

The noise signal is normalled to both sections inputs, meaning that without a jack plugged into the Input the sample and hold function will act upon the incoming noise signal generating random CV values.

The [Trigger A Alternate] switch allows to Link both sections so that any trigger input in Trigger A will alternate between triggering the A and B section.

Besides each section output there's also 4 extra outputs: Noise, Difference, Average and Sum. The [Noise] output is coming from the noise source, the [Difference] output is the subtraction of section A minus section B, the [Average] output is the sum of both A plus B and then divided by 2 and finally the [Sum] output is the sum of both A plus B sections.

CONTROLS DESCRIPTION



Section A SLEW
Set the Slew Decay ammount
applied to the S&H A signal

Section A SLEW switch
Sets the DECAY Slew On or Off

Section B SLEW switch
Sets the DECAY Slew On or Off

Section B SLEW
Set the Slew Decay ammount
applied to the S&H B signal

ALTERNATE/SEPARATE
Sets overall operating mode

SAMPLE/TRACK & HOLD
Sets the operating mode of each
section

SAMPLE/TRACK & HOLD
Sets the operating mode of each
section

Section A Trigger Input:
Any CV type is accepted Trigger/Gate/CV
(Normalled to Trigger B)

Section B Trigger Input:
Any CV type is accepted Trigger/Gate/CV

Section A Input
(Normalled to Input B)

Section B Input

Section A Output

Section B Output

Section (A-B) Diference Output

Noise Output

Section (A+B)/2 Average Output

Section (A+B) SUM Output

CONTROLS IN-DEPTH DESCRIPTION

Inputs Normalization

There are 3 normalled inputs in this module, meaning that some inputs are physically connected to another input until a jack is patched in breaking the physical connection.
1. Noise is normalled to [INPUT A]
2. [INPUT A] is normalled to [INPUT B]
3. [TRIGGER A] is normalled to [TRIGGER B]

Slew

Slew is applied at the output of each S&H sections and will influence all outputs. The [ON/OFF] switch activates or de-activates the Slew circuitry. The control knob sets both the slew's Attack and Decay.

Trigger A Alternate 1>2 vs. Individual Channels

This switch sets the overall operation mode of the module.
In [Individual Channels] position the module behaves as a dual S&H with normalled inputs for trigger and signal.
In [Trigger A Alternate 1>2] with nothing patched to Trigger B input, trigger A will work as a flip flop between triggering section A or B, in other words at any trigger input at section A it consecutively trigger section A or B.
if the Trigger B input is patched then the Alternate action won't work any longer and it will work as a clock divider (divided by 2) for Trigger A.

Sample & Hold vs. Track & Hold

This switch sets the operation mode for each channel.
In Sample & Hold mode any voltage rise (from 0 to +5v) at the Trigger input will hold the momentary state of it's input until a next voltage rise is detected.
In Track & Hold mode any incoming signal will be flowing directly to the ouput until a +5v signal is detected at the Trigger input, at this time and while the signal is HIGH the momentary state of it's input will be held until the signal goes LOW.

Trigger Inputs

Trigger inputs can be used with a Trigger, Gate or any CV source, the comparator works at about +3v so any CV above this voltage will be considered a Trigger for the S&H.

Input & Output

Plug any source to the Input and take the processed signal from the Output.

Difference, Average & Sum

These outputs use the 2 independent outputs and combine them in diferent ways.
Difference is section A minus section B with a full wave rectifier making sure all results are positive.
Average is a mix between section A plus B and attenuated by a factor of 2, avoiding higher voltages if summing 2 +5v signals.
Sum is the simple mix of both A&B output signals.

Noise

This is the output for the noise generator that is normalled to the [INPUT A].

BEYOND SAMPLE & HOLD

Dual Analog Random:

We included a noise generator in the module so that it can work as a dual S&H random, the noise source is normalled to [INPUT A] which in turn is normalled to [INPUT B] this allows that with no patch cable at the signal inputs any Trigger input will hold the momentary noise value at the output.

Sample Rate Reducer:

Another interesting feature is to use it at audio rates as a Sample Rate reducer. Using an Oscillator at the Trigger input will control the Sample Rate of the incoming signal, at 20khz any incoming audio signal will pass through without any noticeable artifacts, reducing the Oscillator frequency will lower the sample rate at which the S&H is "holding" the signal generating a more "steppy" signal and introducing all those typical Bit Crusher artifacts.

Rate of Change (RoC):

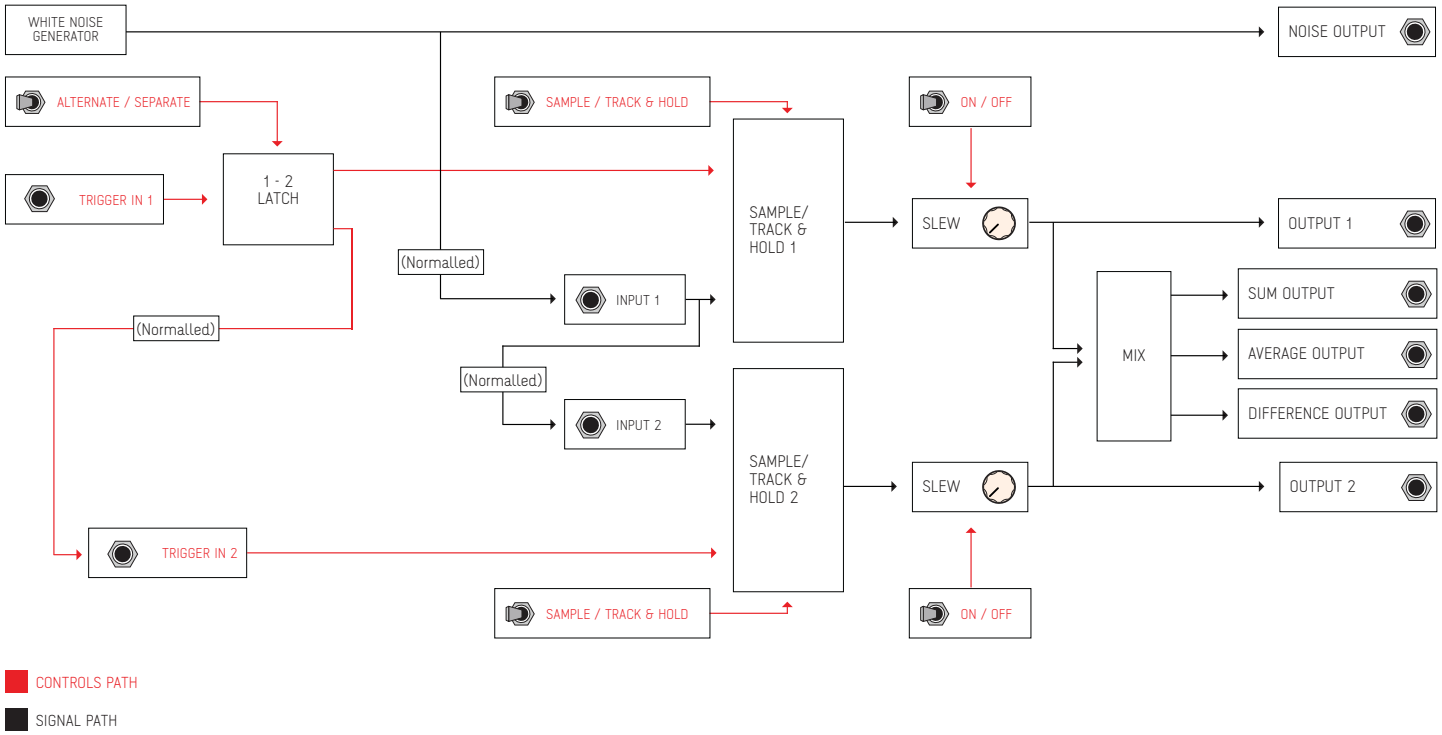
This module allows you to easily patch up what we call a Rate-of-Change patch. This patch tracks how quickly an incoming CV signal is changing over time and outputs this speed as a CV value between 0 and +5V. This output signal will be proportional to the speed which the incoming CV is changing: faster changes of the incoming CV will generate higher voltages, while slower CV changes will generate lower voltages.
To achieve this, we'll be using both Sample-&-Hold sections alternating at a constant clock rate. This way we are always "holding" voltages from two points in time: the last clock and the new clock. Subtracting one value from the other, gives us the difference between the two held voltages. A fast incoming signal moving within a specific voltage range will output a bigger difference, compared to a slower incoming signal moving within the same voltage range.

This difference will always be a positive signal (e.g. if the incoming CV changes goes from 1V to 3V or 3V to 1V, the absolute difference is always 2V).

Utilizing the [Slew] sections has a drastic impact. It allows to get a fully dynamic output instead of steady voltages at every clock tick.

RoC patch:
Use both sections, taking advantage of the normalizations of the module!
1. Patch the incoming CV to be analyzed, to [INPUT A]. This is normalized to [INPUT B].
2. Set the switch to [TRIGGER A ALTERNATE] position to let your clock at [TRIGGER A] input trigger section A and then section B in an alternate fashion.
3. Patch a clock at [TRIGGER A] input, and set it a steady frequency that gives good results. This is the Sampling Rate that sets how often we're sampling the voltage changes (our analysis time window).
4. Set both slews at a desired value and get your output signal from the [DIFFERENCE] output.

ADDAC215
DUAL S&H+ SIGNAL FLOW DIAGRAM



POSSIBILITIES:
Dual Sample / Track & Hold
Dual Sample and Hold Analog Random
Dual Slew Processor
Stereo or Dual Mono Analog Decimator (Bit Crusher)
Rate of Change : compares a CV input over time and outputs a CV proportional to the speed which the incoming CV is changing

For feedback, comments or problems please contact us at:
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