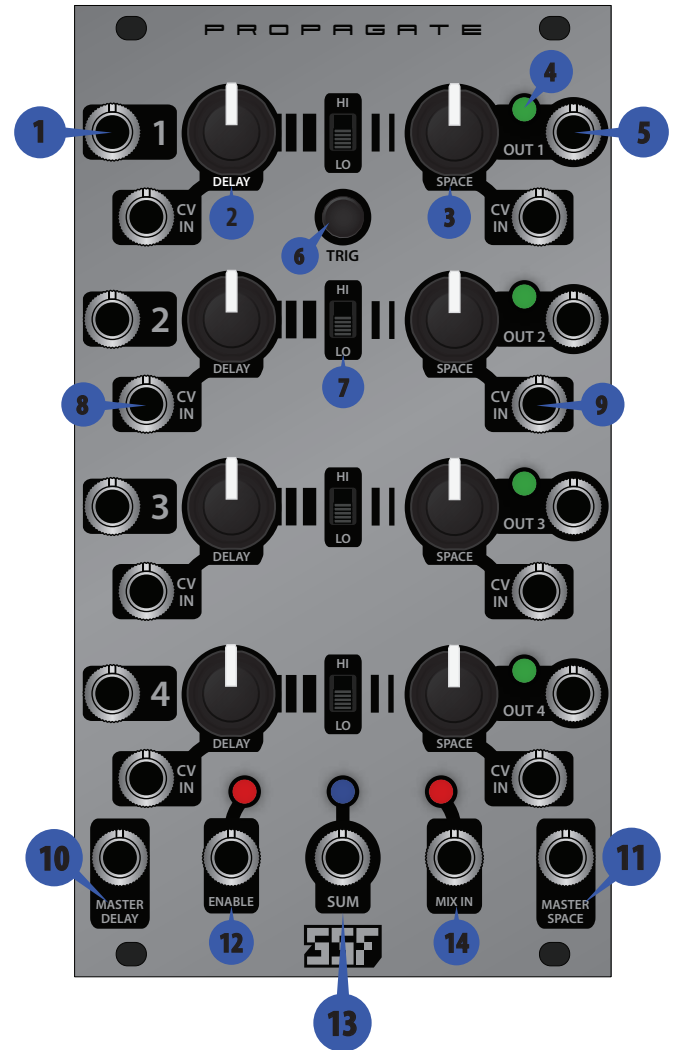




# PROPAGATE

## Control and function reference guide

Thank you for purchasing the Steady State Fate Propagate: quad voltage controlled gate delay. Propagate takes the classic gate delay synthesizer function to a new level as an entirely new concept for your modular synthesizer. To get the most out of Propagate, please use this guide to familiarize yourself with the controls and features. There are 4 delay units, each with independent inputs/outputs, delay and gate length (space), CV inputs and speed mode switches. The signal and controls flow from left to right and the delay stages are stacked vertically and labeled 1 - 4, starting at the top. There are master CV inputs, a Sum output as well as some special function jacks located at the bottom. take a minute to study the image of the panel to the right. Once you become somewhat familiar with the layout, please refer to the detailed description below...



**1 GATE/TRIGGER INPUT**  
Each of the 4 delay stages has a gate/trigger input labeled from 1-4. They are fast rising edge sensitive and will activate when the applied signal reaches ~1.2V. They are tolerant of very fast and extremely short pulses. The manual TRIG button (6) is hardwired to input 1. Each of the following stage inputs are *normaled* to the previous stage's output (5) so that longer delays and delay sequences/trills can be created. Inserting a jack into the input jack(s) will break the normal.

**2 DELAY CONTROL**  
The DELAY control is used to set the delay time. When activated by the onset of a fast rising edge at the relevant input, the delay stage begins a count based on the current delay setting. When the count is complete, the output immediately fires a pulse with a duration (pulse width) set by the SPACE control (3). The delay time is dependent on the speed mode (7). In LO mode, the range is approximately 20ms - 5s without CV and up to ~13s with +5V CV applied. In HI mode, audio rate delays are possible. The delay range becomes approximately 200uS - 100ms without CV and up to ~300ms with +5V CV applied. Please note that once the a delay sequence is initiated, any signal present at the GATE/TRIGGER INPUT will be ignored until the count is complete - the delay will then immediately re-trigger upon the next rising edge transition.

**3 SPACE CONTROL**  
SPACE determines the width of the delayed output pulse; despite the duration or amplitude of the input pulse. The width is variable from roughly 5ms - 3s in LO mode and 200us - 100ms in HI mode. Longer pulse durations are possible by cascading two or more stages with short delays and long pulse widths. Other methods for achieving longer widths are also possible\*\*\*. Try experimenting with the super fast triggers that Propagate produces. The max level of the trigger (+rail voltage) remains constant until reaching ~ 90us (when CV is applied). The trigger may drop a few volts in amplitude at this impressive threshold. The minimum possible pulse when CV is applied is ~10us!

**4 OUTPUT INDICATOR LED**  
The green LEDs will fire with the output and are indicative of the output pulse duration.

**5 PULSE OUTPUT**  
These are the pulse output jacks for the delay stages. As mentioned previously, the outputs are hardwired to the normalling switch on the following stage's input jack. The normal is broken when a patch cable is inserted into an input jack but will not affect the signal flow at the output jacks. Outputs will swing to the +rail voltage. Please note that the rails voltage will vary from system to system as voltage drops will occur and depend on how heavily a system is loaded and well regulated.

**6 TRIG**  
This is a manual trigger button that is normaled to the first delay stage input jack. Use this button to manually fire Propagate, to initiate oscillation when Propagate is patched for self feedback or for general trigger duties.

**7 SPEED MODE SELECTOR SWITCH**  
Use this switch to select either HI or LO speed delay mode for each stage. HI mode turns Propagate into a quad PWM tone generator. The user is encouraged to experiment with this unique feature.

**8 DELAY CV INPUT JACK(S)**  
Voltage control over delay time is possible using the DELAY CV IN jack(s). The response is linear for all signals within the range of +/-5V and tapers off logarithmically for CV upwards of +8V. This region is perfectly safe for high amplitude transients. Any voltage less than -5V will disable the individual delay stage indefinitely until the voltage returns to -5V or greater. When control voltages are applied, use the DELAY potentiometer to set the baseline delay level. The delay time will roughly double the baseline at +5V and half the baseline at -5V. Please note that the delay time will *not* decrease further when the control is set fully CCW and negative CV is applied. It will however increase when the control is set fully CW and positive voltage is applied. The increase in delay time will eventually taper off as the input level increases beyond +5V.

**9 SPACE CV INPUT JACK(S)**  
Voltage control over output pulse width is possible using the SPACE CV IN jack(s). The CV response is also linear for +/-5V control voltage. The pulse width will decrease substantially when the control is set fully CCW and negative CV is applied. In LO mode, the minimum pulse possible is ~250us and in HI mode less than 10us - equivalent to a 100kHz pulse! CV less than -5V will disable the output - so be mindful when using negative control voltages. As you may have already guessed, you can also use the SPACE control to set the baseline pulse width. Just like the DELAY CV, SPACE CV can handle any level of positive control voltage and will increase the pulse width linearly before tapering off quickly with a logarithmic curve upwards of around +8V CV.

TECH SPECS	
Width.....	14hp
Depth, Max.....	23mm
<b>Current Draw</b>	
Quiescent.....	+49mA
	-34mA
Peak.....	+85mA
	-34mA
Average.....	+67mA
	-34mA
<b>SIGNAL LEVELS</b>	
Gate Inputs tolerate any signal level. Activate on positive polarity, fast rising edge amplitudes of ~1.2V or greater.	
Outputs are ~12V (rail to GND)	
Nominal CV response range: +/-5V	
CV inputs will tolerate all levels. Levels below -5V will disable the delay. Above +5V the CV response is limited but will not disable the delay.	
DC input impedance: ~10Mohms	
Output impedance: ~1kOhms	
<b>Rev Polarity Protected RoHS &amp; CE compliant</b>	

\*\*\*A circuit modification is possible if longer pulse widths are preferred. Please contact SSF @steadystatefate@gmail.com for mod instructions or send us your Propagate to modify for a modest fee. Delay timing can also be modified if desired.



## 10 MASTER DELAY CV INPUT

Controls all the DELAY CV inputs simultaneously. If any of the individual DELAY CV inputs are used, the master and individual CVs will sum together for that particular input. Keep this in mind when summing negative voltages so as not to unintentionally disable the input. This jack simplifies controlling global delay time. If longer permanent delays are preferred, apply 5VDC with GND CTRL or the PTG +OUT in bias mode to the MASTER DELAY input. This will increase the global maximum delay to ~13s while still providing voltage controlled delay via the individual CV inputs.

## 11 MASTER SPACE CV INPUT

Works just like the MASTER DELAY but for global control over output pulse width.

## 12 ENABLE INPUT

This is a gate sensitive global enable input. The default mode is ON. When a jack is inserted, the enable becomes sensitive to the applied signal. When 0V is applied, Propagate will be in the OFF state. When OFF, the inputs will not respond nor will the outputs function in the absence of an input signal. When 1V or greater is applied, Propagate will be enabled and will immediately return to the ON state, functioning normally.

## 13 SUM

One of the best features of Propagate. In addition to the individual outputs of the delay stages, all the outputs are combined into a single dedicated pulse train **SUM** output. The combined gate signals are OR'd together and will merge into longer gates if they happen to overlap one another. Use the **SUM** output for gate sequences and trills. Also try attenuating the individual outputs through MIXMODE or other quad mixer to control the pitch of a VCO - then use the **SUM** output to gate an envelope; controlling a VCA to AM the VCO. Also try using **SUM** as an ENV gate and any of the individual outputs as an ENV accent for modulating filters or whatever you like. This output also plays a special role when multiple Propagate modules are chained together. Every subsequent Propagate module in the chain will output the previous module's delayed gates followed by its own set of 4 gates and so on from the **SUM** output.

## 14 MIX IN

Novel external gate/clock input. Here you can Input gates, clocks, randoms or any pulsed signal to this jack. The signal applied here is logically OR'd with the SUM output **13** even when Propagate is disabled, the **MIX IN** signal will output from the **SUM** jack. When enabled, Propagate's output merges with the signal applied to this jack. **MIX IN** has many creative uses. For instance, you might apply a gate signal controlling a snare drum. With Propagate disabled, the snare hits on the 2 and 4. Then with propagate set up appropriately, it is enabled on the 8th measure and the delay signals merge with the applied gates to produce a fill or break.

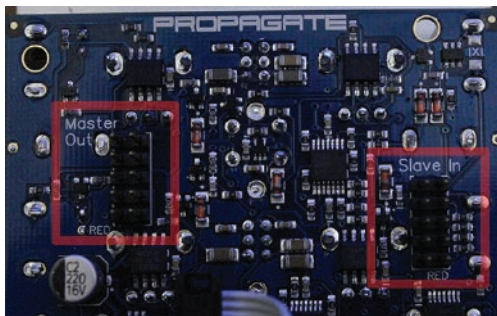
## CHAINING MULTIPLE PROPAGATE MODULES TOGETHER

An indefinite number of PROPAGATE modules can be chained together via the MASTER Out and SLAVE In expansion headers on the rear of the modules. When multiple modules are chained, the first PROPAGATE in the chain will output 4 pulses, the next one will output the same 4 pulses in unison with the first and then it's own set of 4 pulses. The following modules will output 12, 16, 20 pulses and continue for as many modules are connected. The expansion cable normals the last output of the previous module to the following module's INPUT 1 and the previous module's pulse train **SUM** is combined with the following module's pulse train **SUM**. New individual delay patterns can be programmed for each subsequent stage and then combined with the previous stage patterns. Each stage can be triggered by the last pulse of the previous stage or at any time if a jack is inserted into INPUT 1; breaking the expansion normaling scheme.

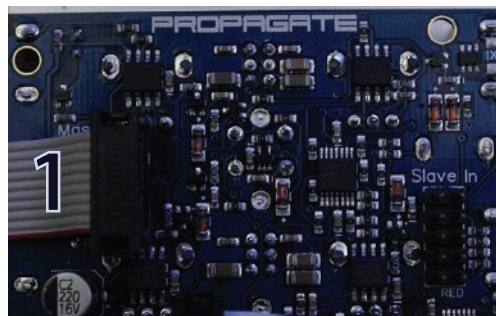
### EXPANSION:

Connect the ribbon cables to the proper headers oriented with the RED STRIPE down. To correctly connect 2 or more modules together, the first module in the chain gets a ribbon cable connected to the MASTER Out header only (**ribbon cable 1**). Now connect that same ribbon cable (**ribbon cable 1**) to the SLAVE In header on the next module. Be sure that the power cable is connected on **ALL** modules. If using only 2 PROPAGATES, you're done! If using more than 2, simply connect a new ribbon cable to the MASTER Out header of the last module so that both headers are now occupied and repeat the process for all subsequent modules that you would like to chain together. The last module in the chain will only have the SLAVE In header occupied. Please reference the last group of images below, taking note of the numbered ribbon connections. Connect the power normally for every module in the chain. The gate delay propagation flows from left to right when the modules are connected together as shown below.

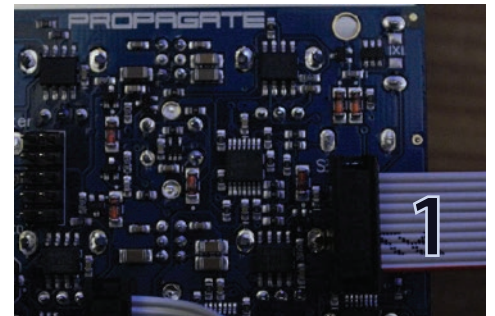
## CHAINING TWO PROPAGATE MODULES TOGETHER



Locate the MASTER Out and SLAVE In expansion headers. Note the location of the word RED. Align the RED stripe of the expansion cable so that it is closest to this position, facing towards the bottom of the PCB.



The first PROPAGATE module should have the ribbon cable labeled "1" connected as shown to the MASTER Out header. No other connections should be made besides the power cable - which should be attached and left alone.



The 2nd PROPAGATE module should have the ribbon cable labeled "1" connected as shown to the SLAVE In header. No other connections should be made besides the power cable - which should be attached and left alone. If connecting only 2 modules, connect the power cables to the power bus and install the modules in your rack or case.

## CHAINING MORE THAN TWO PROPAGATE MODULES TOGETHER - (5) are connected in the following example



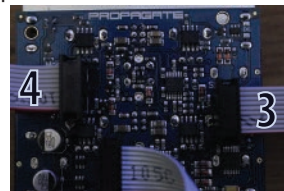
The first PROPAGATE module should have the ribbon cable labeled "1" connected as shown to the MASTER Out header. Connect power as you normally would.



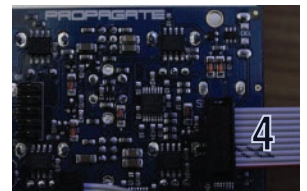
The 2nd PROPAGATE module should have the ribbon cable labeled "1" connected to SLAVE In and ribbon "2" to the MASTER Out header as shown. Connect power normally.



The 3rd PROPAGATE module should have the ribbon cable labeled "2" connected to SLAVE In and ribbon "3" to the MASTER Out header as shown. Connect power normally.



The 4th PROPAGATE module should have the ribbon cable labeled "3" connected to SLAVE In and ribbon "4" to the MASTER Out header as shown. Connect power normally.



The 5th and final PROPAGATE in the chain should have the ribbon cable labeled "4" connected to SLAVE In. Connect all power cables to the power bus and install the modules into your case. They should be installed in numerical order from left to right