SERGE

GTS

FOR EURORACK

USER MANUAL

V1.0

RANDOM*SOURCE

GTS

GTS

Installation

Always turn the eurorack case off and unplug the power cord before plugging or unplugging any eurorack power cable. Do not touch any electrical terminals when attaching any eurorack power (bus board) cables.

The Serge GTS is an electronic music module requiring about 85mA of +12VDC and 80 mA of -12VDC regulated voltages and an appropriate power connector to operate. It must be properly installed into a eurorack format modular synthesizer system case.

POWER YOUR CASE OFF before installing the module. Please use the power cable provided to connect the small end of the power cable to the module: RED STRIPE to “-12V”, as indicated on the back of the module. Carefully install and secure the module in your case. Power on, and flip the CYCLE switches to the DOWN position. Turn all the RATE knobs (RISE, FALL) to center position theYou should see an LED flashing on each side. If either side seems constantly ON or OFF, turn the RATE knob to the center position or slightly below to see each side cycling. Your module should be ready to go now :-)

Please beware: Powering the module on anything more (or less) than +/-12V is not recommended and may damage the module. Feeding any of the inputs (or outputs) with voltages outside a +/-12V range may damage the module. This type of damage is not covered under warranty.

Overview

For the GTS, Serge has completely redesigned his famous Serge Dual Universal Slope Generator (DUSG) - with a new core, temperature compensation and optimized for speed and tracking.

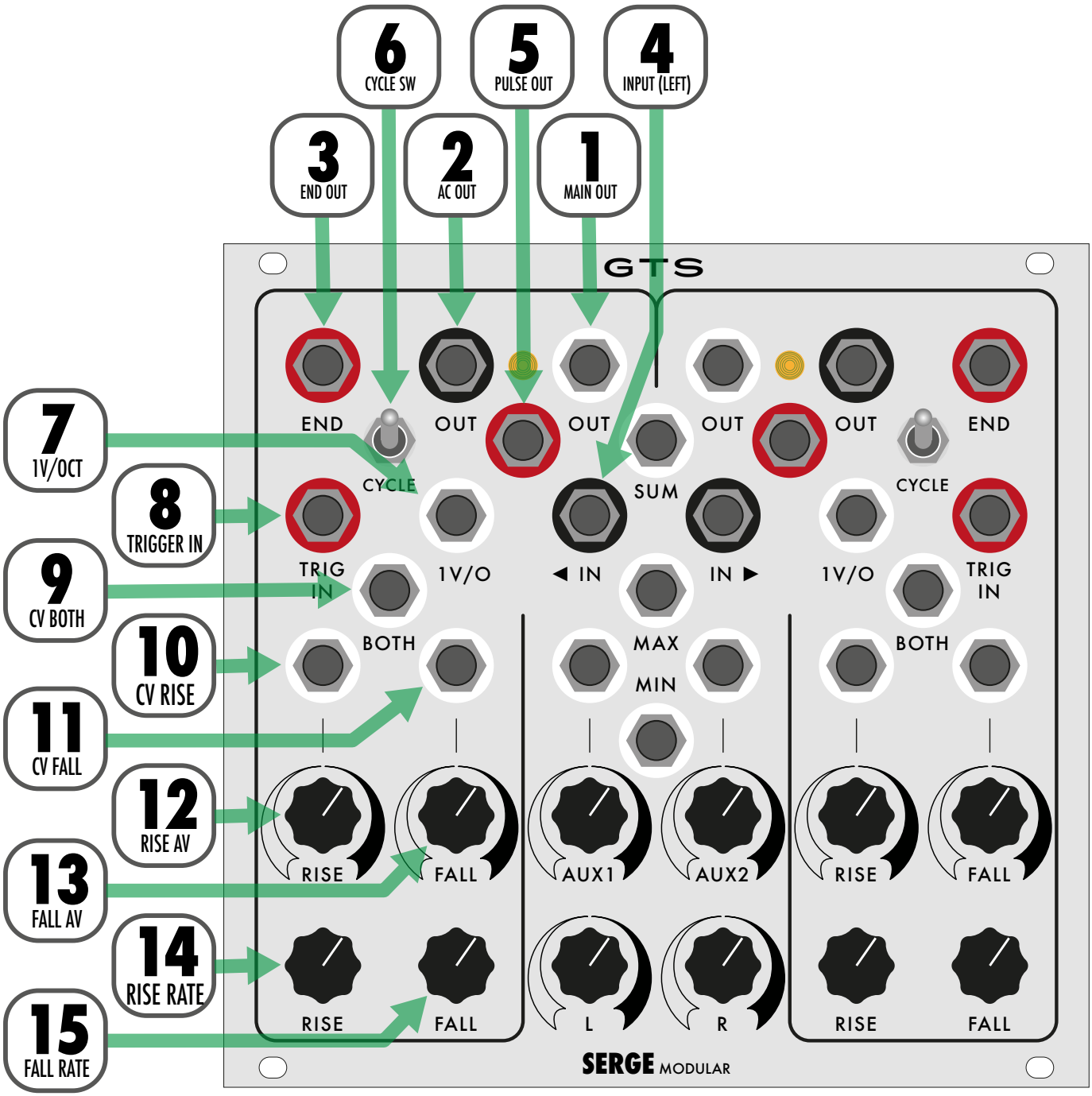
The first version of the DUSG which was part of the 3rd generation of Serge symthesizers came out in 1976 and became one of the mose versatile and iconic Serge modules. The original design, which was copied in the popular Maths module, was primarily intended for control voltages and - due to the low frequency range - of limited use for audio.

The GTS can still be used for CV - due to the enormous range, cycles of an hour or more are possible - and still provides all the functions of the original version. However, it now also provides exceptional audio performance: transient rise and fall times as fast as 12µs and a maximum cycle speed of about 27kHz. In addition, 1V/Octave inputs have been added, providing **exceptional tracking when the waveform is set to sawtooth** (RISE knob turned all the way up), turning the GTS into a complex oscillator.

As its predecessor, the GTS is still the combination of **two identical slope generators**. However, these have been combined with a **CV processor / mixer** as well as a **Serge Peak & Trough (Minimum and Maximum functions)**.

The Slope Generators

The two slope generators in the GTS are identical. For more clarity, only the left side is shown here with numbers:



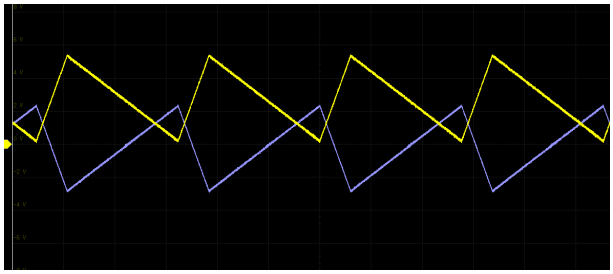
Serge GTS - Basic Slope Operation

1. MAIN OUT — In **CYCLE mode** (switch down or CYCLE OUT connected to IN), the MAIN OUT provides a triangular waveform whose symmetry can be adjusted from sawtooth to triangle to ramp using the RISE (14) and FALL (15) knobs. Range is 0-5V when Cycling. Otherwise, this output tries to follow the amplitude of the input (4) with the speed set by RISE and FALL.

Set the waveform to sawtooth (Rise = max, Fall at about 2 o'clock) to achieve the best tracking of the 1V/Octave input (up to > 2.5kHz).

The LED next to the MAIN OUT visually indicates the voltage level.

2. BIPOLAR OUT — Inverted version of the MAIN OUT that has an AC range of appr. -2.5V to 2.5V when Cycling.



MAIN OUT (yellow) and BIPOLAR OUT (purple)

3. END OUT — Logic signal - goes high at the end of the fall (and stays there for about 80% of the rise time). Pulse width depends on RISE and FALL settings - pulse width is extremely short when Rise is fastest (knob at max). Patched back to TRIG IN starts the Cycle (this is what the switch does).

4. INPUT — Signal Input: Direct Coupled input to the GTS. Use for Lag, Portamento, (pseudo-)filtering, ASR (Attack Sustain Release) type envelopes. Also input to the middle section when not Cycling (CV-Processor, MAX, MIN).

5. PULSE OUT — Logic signal has a fixed duty cycle of about 50-60%, i.e. does not get as thin as the END OUT. When the MAIN OUT is set to sawtooth for oscillator use / best tracking, this output provides an alternative (pulse) waveform with the same tracking.

6. CYCLE SWITCH — connects TRIG IN to GATE OUT and saves you a patch cord.

7. 1V/OCT — CV input calibrated for use of the GTS as **sawtooth oscillator**. When the GTS is set to CYCLE and **RISE knob (14) is turned all the way up (fastest rise)** and FALL (15) is set so that the base frequency - no CV applied - is set to (roughly) C1 (32.7 Hz), best tracking is achieved: the **pitch of the GTS will follow the input over 6 octaves up to more than 2.5 kHz**. Chaning the waveform to anything else (e.g. triangle wave) will affect RISE and FALL, but not provide good tracking.

8. TRIGGER IN — A logic signal (gate or trigger) sent to this input triggers the circuit—regardless of what's happening at the INPUT (4) and generates an envelope at the MAIN OUT (1), the shape of which is defined by the RISE and FALL settings (and any CV applied). Uses include Envelope generation, Pulse Delay, Clock Division etc.

9. CV BOTH — Linear control signal input for RISE and FALL equally. Effect is less pronounced than with CV RISE (**10**) and CV FALL (**11**) - this allows using the input for subtle modulation, vibrato / tremolo effects etc. Control voltage applied here is as if it hd been attenuated and then sent to both **10** and **11** individually.

10. CV RISE — Linear control signal input for RISE. Positive control voltage (CV) makes the rise faster, negative slows the rise time down (taking into account the RISE RATE (**14**) setting. Patch the BIPOLAR OUT (**2**) back here for exponential or logarithmic rise shapes.

11. CV FALL — Linear control signal input for FALL. Positive control voltage (CV) makes the fall faster, negative extends the fall duration (taking into account the FALL RATE (**14**) setting. Patch the IPOLAR OUT (**2**) back here for exponential or logarithmic fall shapes.

12. RISE AV — Attenuverter Control for the **rising** slope: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into CV BOTH (9) and/or CV RISE)10).

13. FALL AV — Attenuverter Control for the **falling** slope: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into CV BOTH (9) and/or CV FALL (10).

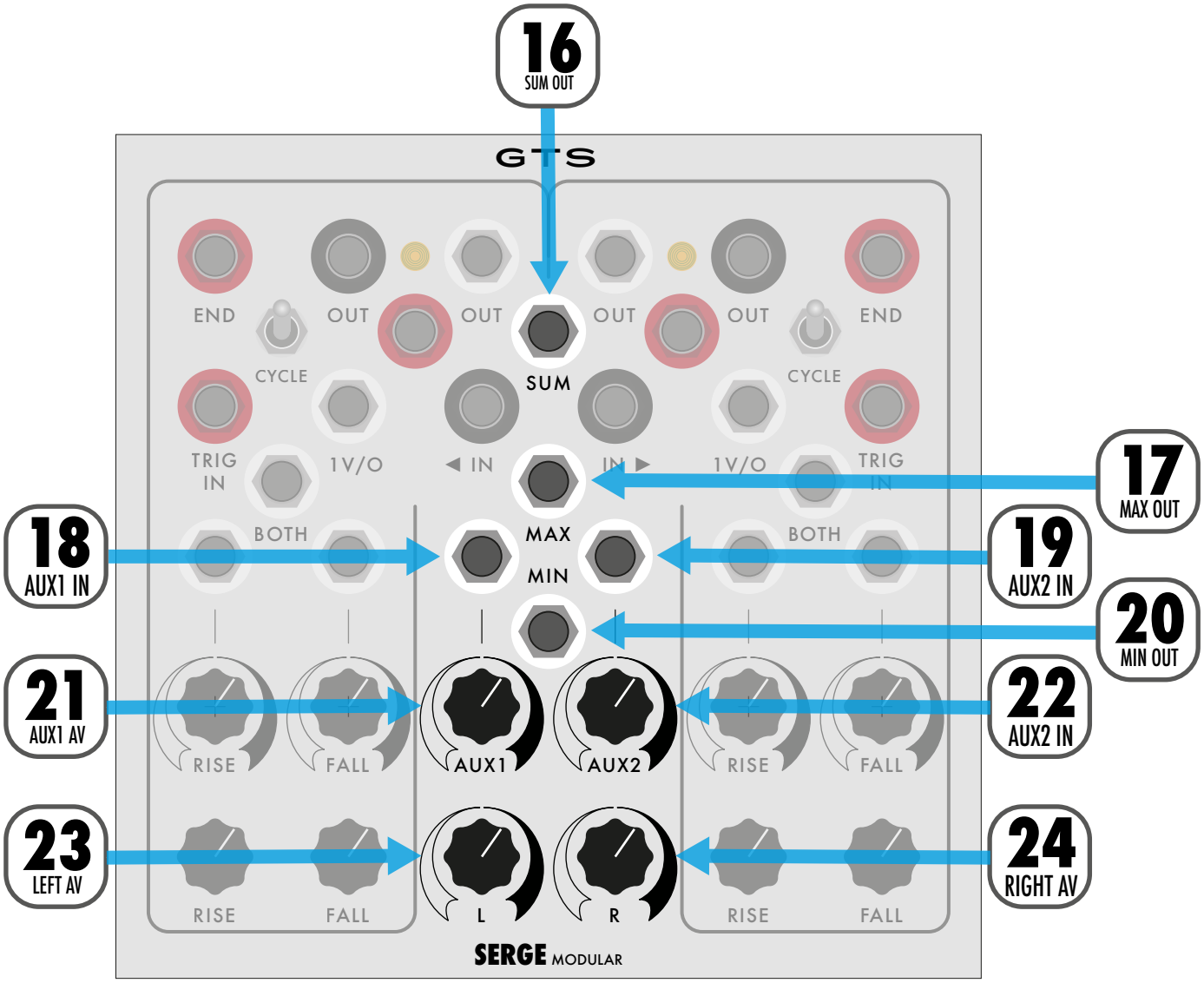
14. RISE RATE — Knob controlling the speed of the RISE, i.e. sets the time it takes for the MAIN OUT to ramp up. Clockwise rotation increases speed / frequency. Turn all the way up to max for a supercrisp sawtooth and best tracking. Knob cover an enormous **range of more than an hour to appr. 12µs**.

15. FALL RATE — Knob controlling the speed of the FALL, i.e. sets the time it takes for the MAIN OUT to ramp up. Clockwise rotation increases speed / frequency. Knob cover an enormous **range of more than an hour to appr. 12µs**.

The highest frequency is about 27kHz.

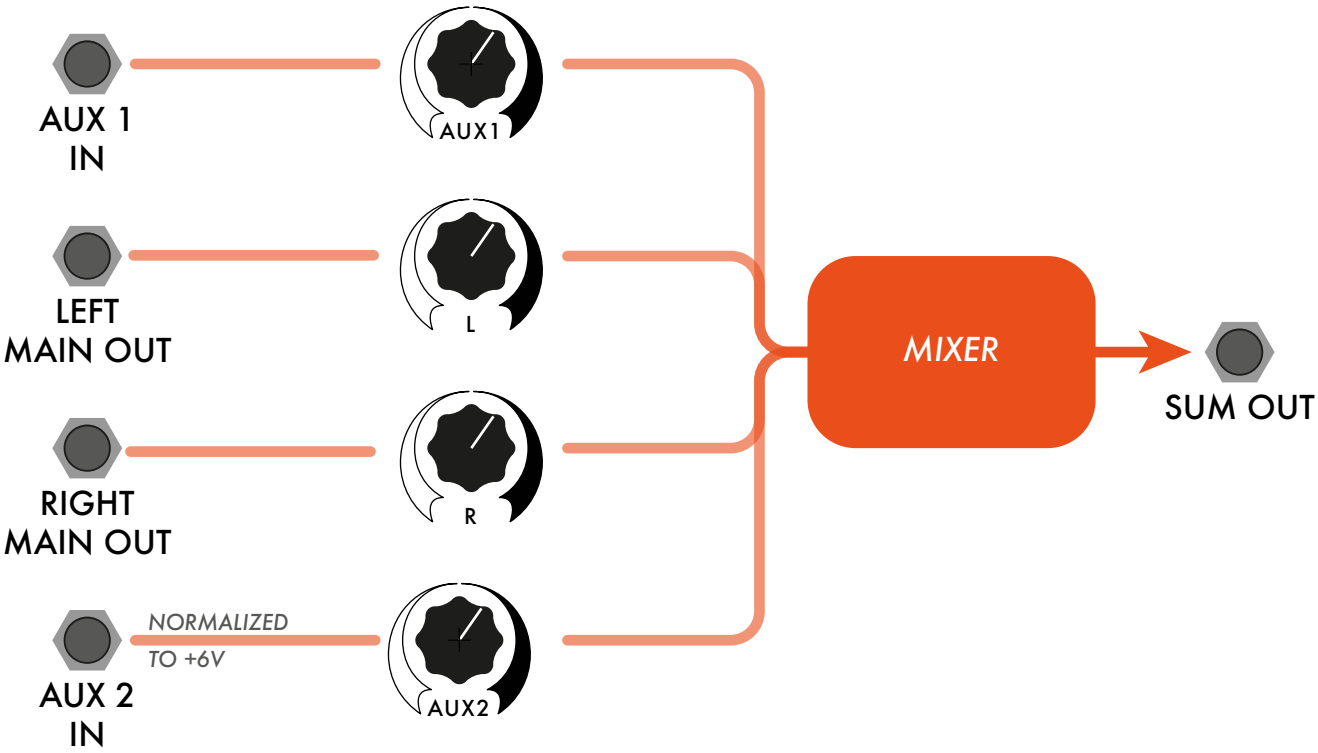
The Middle Section

Both slope generators meet in the middle section: a **4 channel processor / mixer** (CV PRO) where 2 channels are hardwired to the MAIN OUTs and a **Maximum and Minimum** function (PEAK&TROUGH).



MIXER (SUM)

A **4 channel CV (or audio) processor / mixer** combines the 2 MAIN OUTs - prewired as channels **L**(eft) and **R**(ight) - plus 2 AUX inputs into the SUM OUT (**16**). Each channel has an attenuverter, i.e. turning the knob to the left inverts the signal.



16. SUM OUT — Sum of the voltages of the 4 channels, each as scaled or inverted with the relevant attenuverter control.

18. AUX1 IN — Direct Coupled AUX 1 Signal Input. Routed via Attenuverter to SUM and MAX.

19. AUX2 IN — Direct Coupled AUX 1 Signal Input. Routed via Attenuverter to SUM and MIN. Normalized to +6V for generation of voltage offsets.

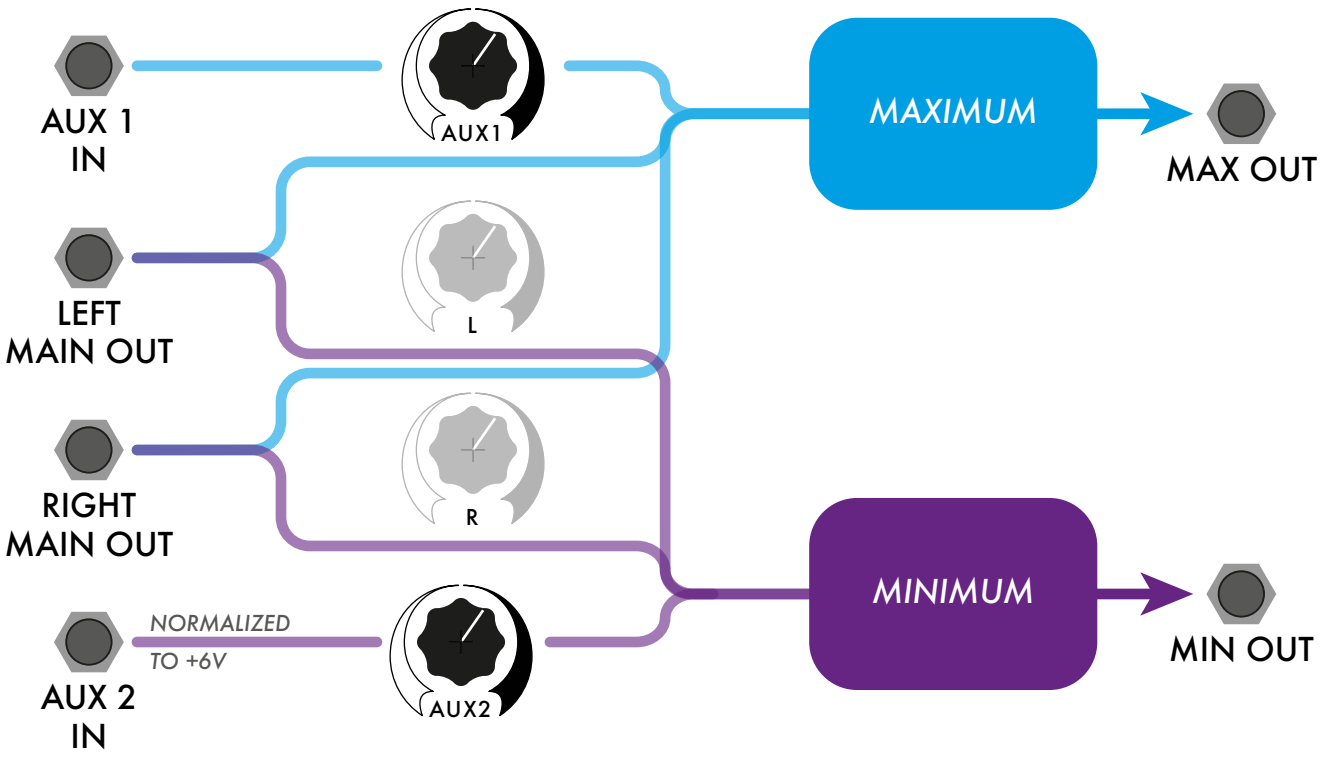
21. AUX1 AV — Attenuverter Control for AUX1: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into AUX1 input (18). Used for SUM and MAX function.

22. AUX2 AV — Attenuverter Control for AUX2: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into AUX2 input (19). Used for SUM and MIN function.

23. LEFT AV — Attenuverter Control for LEFT channel, i.e. the MAIN OUT of the left side. The processed signal is routed into the SUM output. Not used for MAX or MIN.

24. RIGHT AV — Attenuverter Control for RIGHT channel, i.e. the MAIN OUT of the right side. The processed signal is routed into the SUM output. Not used for MAX or MIN.

MAX and MIN



17. MAX OUT — Compares the MAIN OUTs and **AUX1** and provide the largest value of these waveforms at any time.

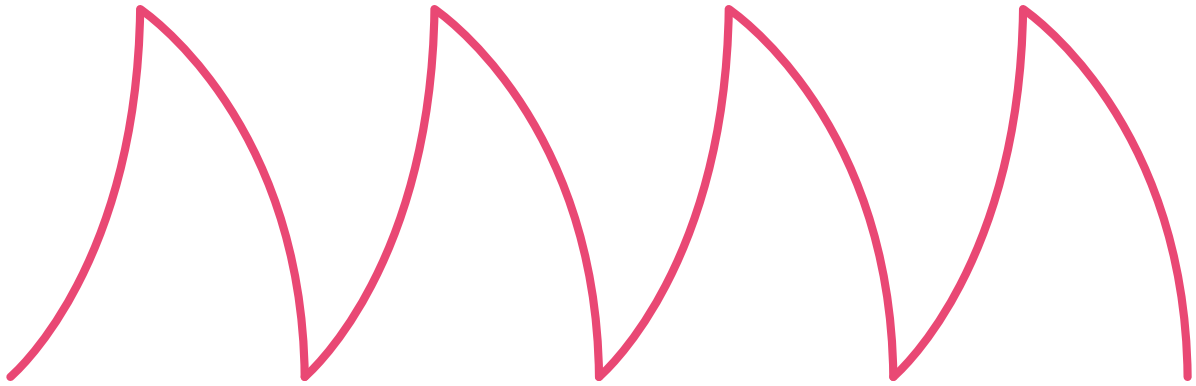
20. MIN OUT — Compares the MAIN OUTs and **AUX2** and provides the smallest value of these waveforms. **AUX2 IN** (**19**) is normalized to 6V and therefore acts as an upper threshold when no cable is plugged into AUX2. **So it's important to turn the AUX2 knob (22) all the way up to get a full signal when nothing is patched into AUX 2 IN (19).**

Patch Ideas

Simple Voltage Controlled Triangle Function (Triangle LFO)

Uses eiter side of the GTS.

- Turn CYLCE ON (switch down) or patch END OUT to TRIG IN.
- Set RISE and FALL to about 10 o'clock.
- MAIN OUT will provide a triangle wave of about 1Hz (1 cycle per second)
- Turn RISE and/or FULL up to make the corresponding slope steeper (faster). If y<ou turn up RISE all the way the rise time will be only about 12µs long.
- Patch BIPOLAR OUT into BOTH IN and aus the RISE and FALL attenuverters to shape the slopes (independently) into exponential or logarithmic form:

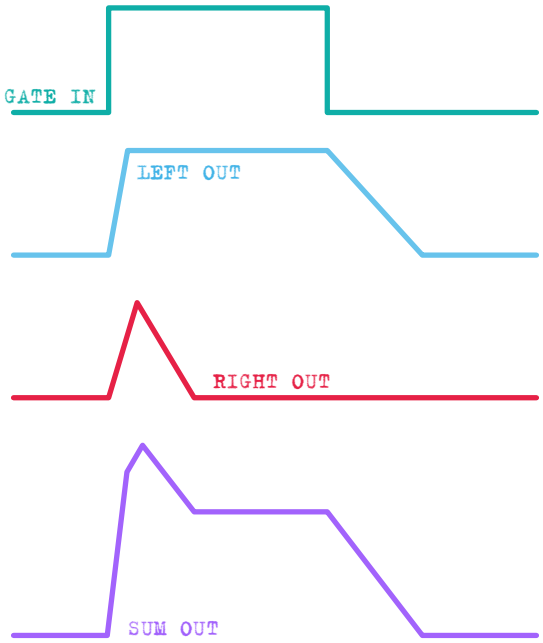


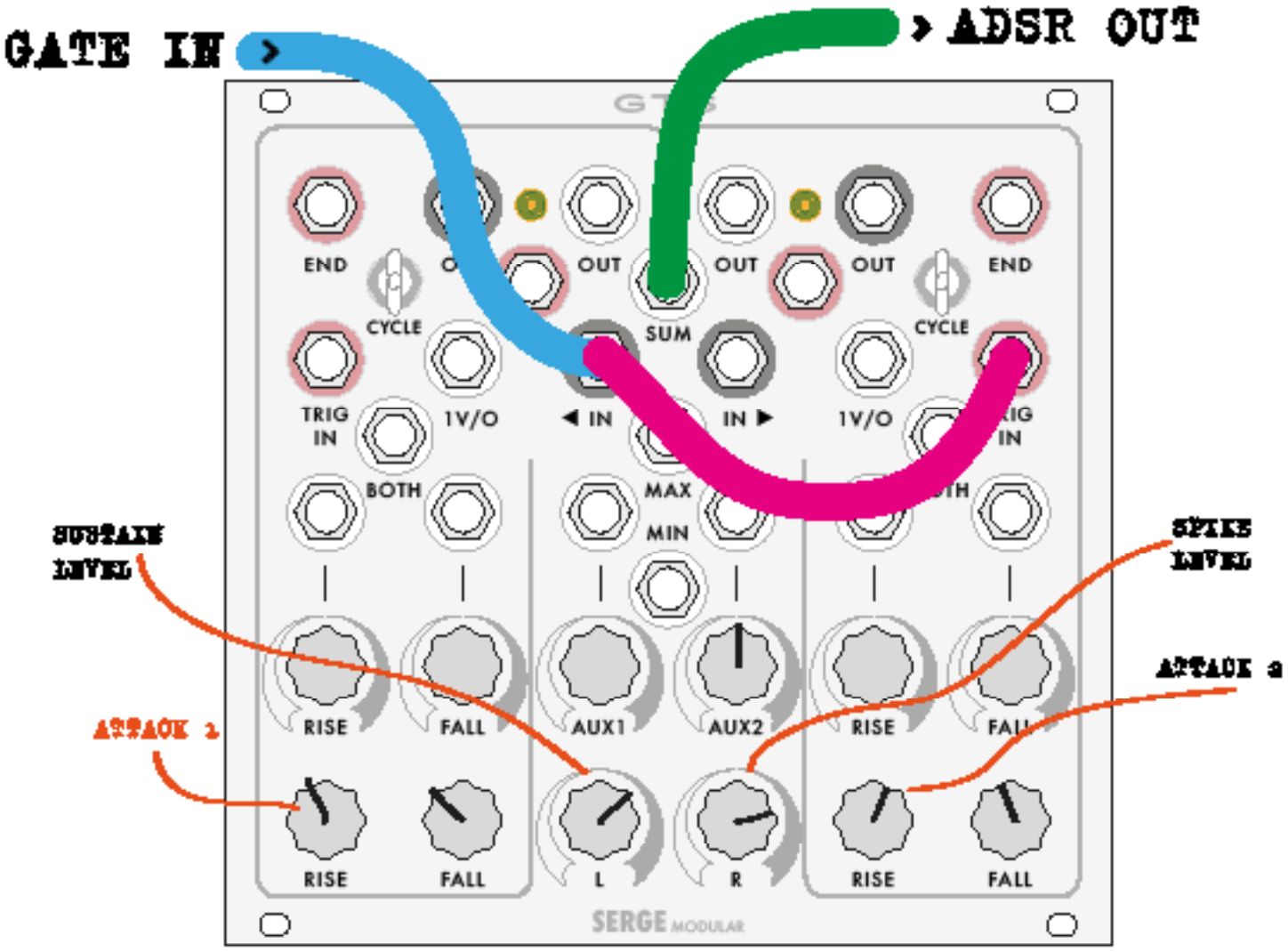
- To get more extreme log / expo forms, patch the BIPOLAR OUT into RISE CV and/or FALL CV and adjust the RISE and FALL attenuverters (starting from center position).

(Version 13 Feb 2024)

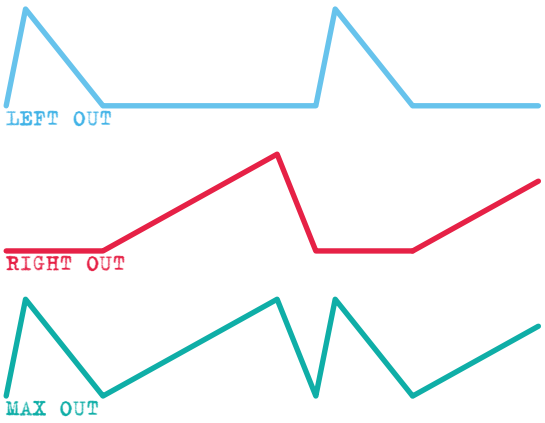
GTS Patch Sketchbook

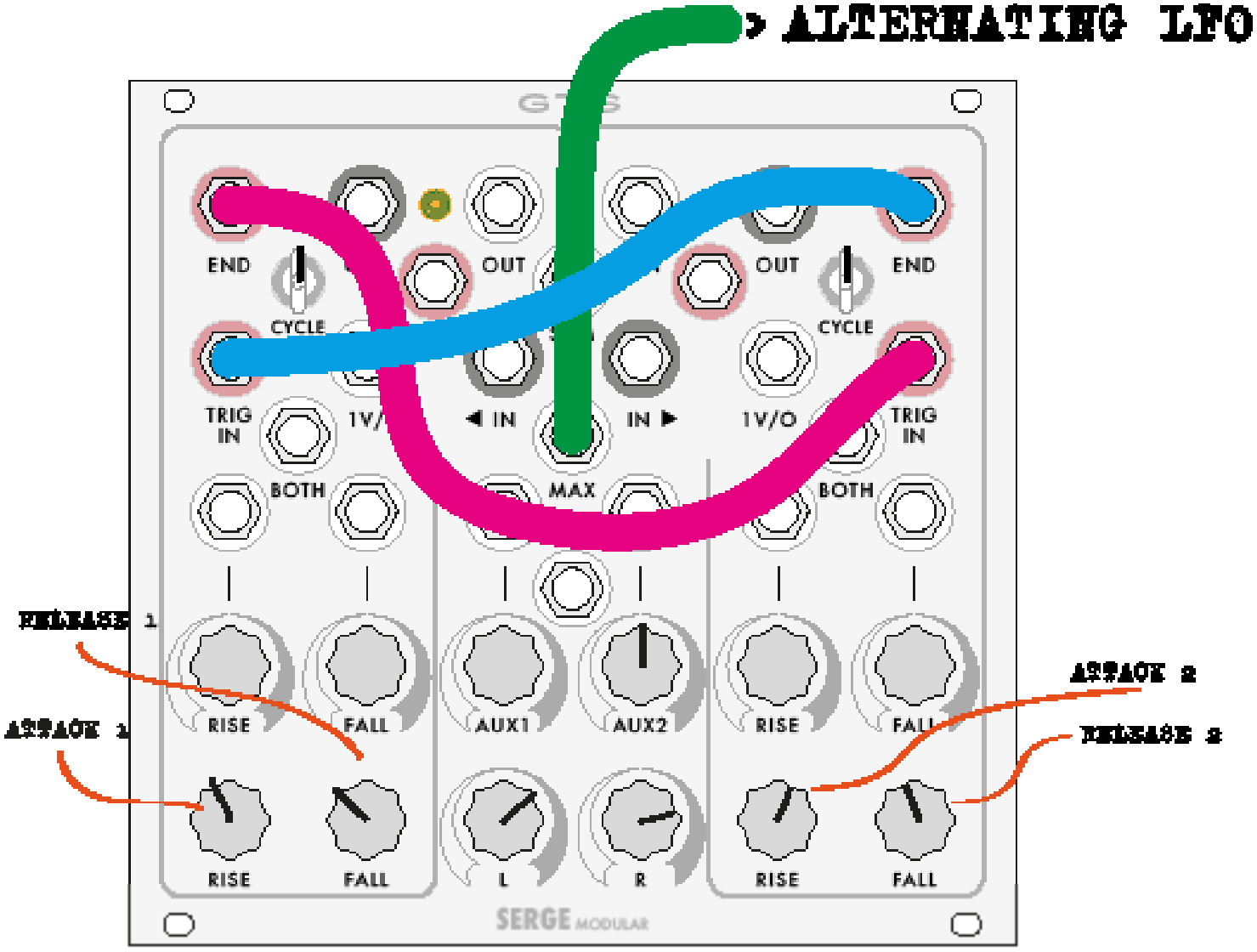
Patchname	**A(A)DSR Envelope**
Created	2024-02-13
Notes	Send GATE signal (e.g. from a keyboard) to both IN of the left side and TRIG IN of the other side. This causes the left side to generate a trapezoid whose flanks are controlled by Rise and Fall and the right side a triangle (again controlled by Rise and Fall right). Adding these 2 shapes using the L and R attenverters in the center makes an interesting A(A)DSR shape at the SUM OUT.



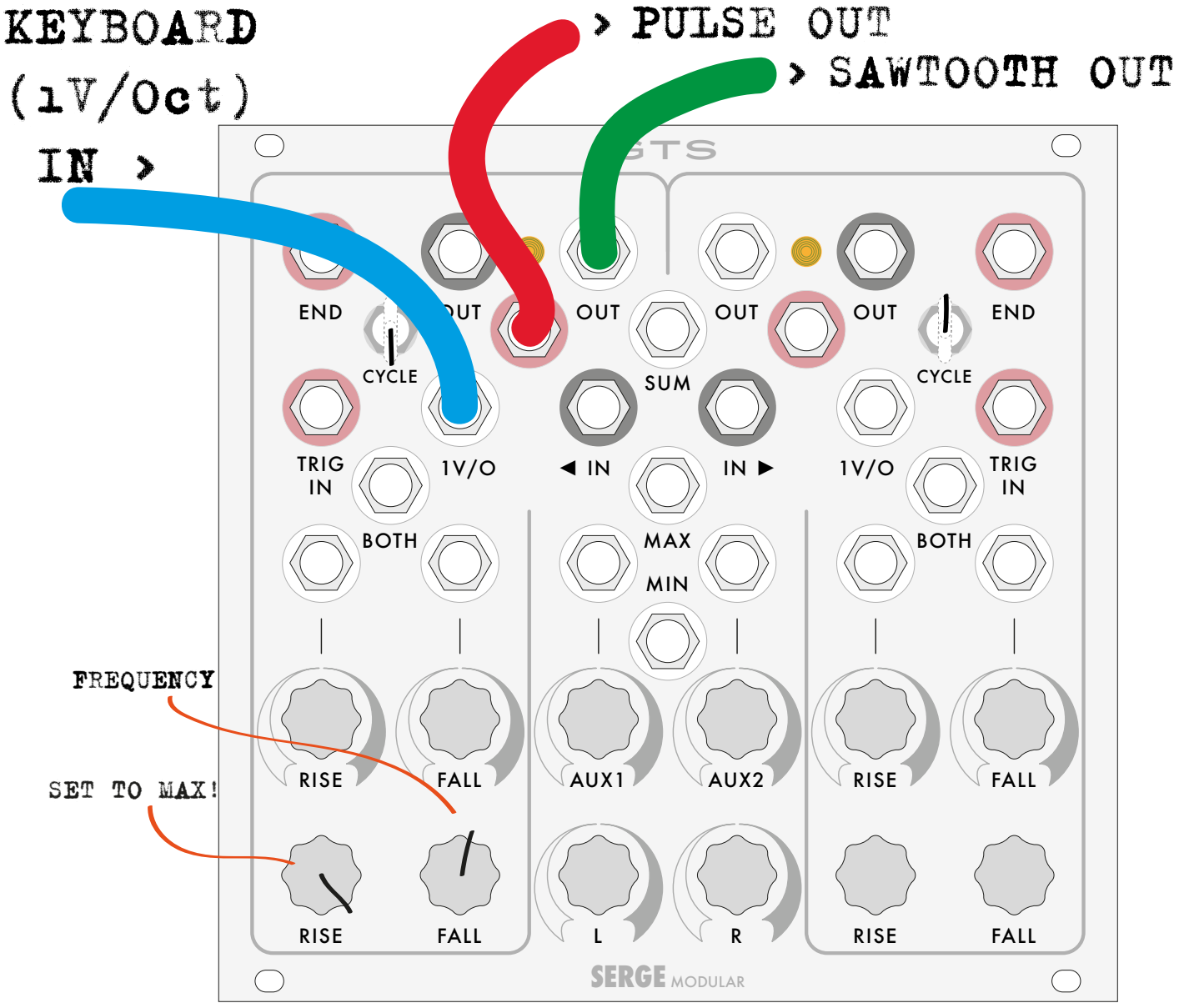


Patchname	**Alternating Slopes**
Created	2024-02-13
Notes	Cross-patching each END OUT to the TRIG IN of the other side lets each side run a single cycle, then hand over to the other side to do the same - and so on. The MAX OUT provides the combined waveform. Patch the BIPOLAR (black) OUT to BOTH or RISE / FALL CV on either side





Patchname	**Sawtooth & Pulse Oscillator**
Created	2024-02-14
Notes	Turn CYCLE ON and set RISE to MAX (fastest). FALL controls the frequency. GTS is calibrated for best 1V/Oct conformity (tracking) when Midi Note 60 is set between 440Hz (A4) and 523.25Hz (C5). MAIN OUT provides the Sawtooth wave. END OUT then has an extremely thin Pulse wave while PULSE OUT has a more versatile duty cycle. FALL CV can be used for FM.



Patchname

Created

Notes