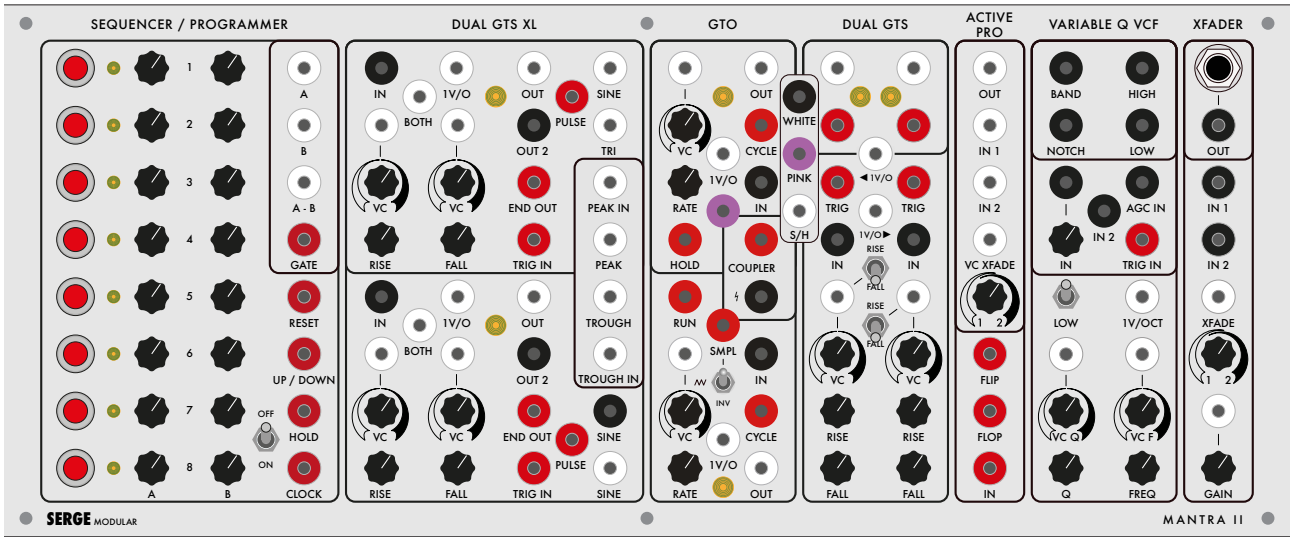
SERGE

MANTRA II

USER MANUAL


SEQUENCER / PROGRAMMER
DUAL GTS XL
GTO
DUAL GTS
ACTIVE PRO
VARIABLE Q VCF
XFADER
A
B
A - B
GATE
RESET
UP / DOWN
HOLD
CLOCK
IN
1V/O
BOTH
OUT
SINE
PULSE
TRI
OUT 2
END OUT
TRIG IN
PEAK IN
PEAK
TROUGH
TROUGH IN
RISE
FALL
VC
RATE
HOLD
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SMPL
CYCLE
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WHITE
PINK
S/H
TRIG
IN 1
IN 2
VC XFADE
FLIP
FLOP
BAND
HIGH
NOTCH
LOW
AGC IN
1V/OCT
VC Q
VC F
FREQ
GAIN
XFADE
SERGE MODULAR
MANTRA II


IN
Q
FREQ
GAIN
MANTRA II

The Serge **MANTRA II** is an evolution of the Mantra panel that is even more powerful than its predecessor. It comprises a number of modules and functions that have never been available before.

- **Sequencer 8 (SEQ8)**: the classic Serge Sequencer optimized for audio speeds and with a new GATE output that allows the pushbuttons to be used asa mini-keyboard.
- **GTS XL**: Serge reinvented his famous Serge DSG module, based on a completely new core for ultimate tracking and speed. GTS now provides slopes as fast as 12us and sawtooth tracking over 6 octaves. The XL version features SINE(oid) outputs, a new TRIanguloid output, additional VC BOTH inputs, a PULSE OUT in the top half plus an integrated Serge PEAK & TROUGH. Most likely the most versatile and powerful Serge module ever.
- **GTO**: another iconic Serge module, the **Smooth & Stepped Generator (SSG)**, reinvented by Serge, optimized for speed and tracking - and of course, audio. The SSG is one of the deepest Serge modules, providing a number of uses: as oscillator / LFO, audio filter, glide, sample-and-hold and many more. The GTS adds 1V(Oct inputs, new oscillator and sample modes for the lower (stepped) sides, SYNC for the smooth side and insane speeds... In combination with the Serge Noise, the SSG can be patched as a Random Voltage Generator.
- **Serge Noise (NOI)**: white noise, pink noise and a crazy saw as S/H source.
- **GTS: the Dual Slopes formerly knows as DSG** a.k.a. “TimeGen Osc” have also been upgraded to GTO, offering the same improved tracking and stability in only 2” width.
- **Active Processor (ACPR)**: The top section is a new 2017 version design by Serge by Serge himself, improving the original linear crossfader. The bottom section is a new FLIP-FLOP module, that takes a pulse sequnce as input and generates alternating gate signals on the two outputs for a number of uses, such as pulse divider (/2) or sub-oscillator.
- **Variable Q Filter (VCFQ)**: the most popular, extremely versatile Serge filter offering simultaneous low-pass, high-pass, band-pass and notch (band-reject) outputs. The resonance (Q) of this filter is dynamically variable by manual or voltage control - now with an attenuverter (integrated CV processor). The VCFQ traditionally has two signal inputs. One incorporates an automatic gain control to prevent the filter from overloading at high Q settings. The second input has a level control so that the percussive effects of overloading the filter can be exploited. For Mantra II, we added an additional (fixed gain) input.
- **X-Fader (XFAD)**: an audiophile version of Serge’s equal-power cross fade unit, featuring a **balanced output**. The exponential VCA section offers the unique Serge VCA response and beautiful overdrive possibilities.

MANTRA II

INTRO TO SERGE MODULAR

Overview

The ...

Color Scheme

One of the most distinctive features of the Serge Modular synthesizer's color scheme is the use of color-coded jacks where each color represents a different type of parameter or signal. It is worth noting that the Serge system generally does not to differentiate between types of signals such as audio or control voltage (CV) or logic - each signal can be (ab-)used for (almost) any purpose, e.g. logic signals used as audio or audio signals as CV.

- **White** (Blue in earlier generations): white jacks denote unipolar (DC coupled, 0V to appr. 5V) signals are often used for control voltage inputs or outputs. These are typically used for modulation signals, such as envelopes, LFOs, and other voltage sources.
- **Black**: represent bipolar signals (AC coupled, often ranging from -2.5V to +2.5V = 5Vpp, but may go to extreme amplitudes up to 24Vpp when using resonance or feedback). Commonly used for audio inputs and outputs. These are used for connecting audio signals, such as oscillators, filters, and other sound sources or processors.
- **Grey**: denotes that something is special, it can mean that the jack can be configured (via a jumper on the back of the module) to be AC or DC coupled. In the Sequencer 8 (SEQ8) the A-B output basically acts like the white (normal) outputs, but can go negative depending on the A and B voltages.
- **Red**: red jacks are associated with logic signals, i.e. sending or expecting DC coupled, 0V to 5V square shaped signals like pulses, gates or triggers. As an input, other signals may or may not work, depending on how hard the incoming flanks of such signals are. For a logic signal to be recognized, the level should be greater than 3V.
- **Yellow**: Yellow-colored jacks are often used for trigger inputs, i.e. to distinguish them from (red) gate inputs - the length of the pulse sent to a yellow input is irrelevant.
- **Purple**: also denotes that something is special, often used for SYNC inputs.

Serge Controls and Knob Types

In the Serge system, knobs are not marked with scales or range indicators. Instead, the function type is indicated graphically.

Function knob. Controls a parameter - in most cases that parameter can also controlled by CV, so the knob acts like adding a DC offset.

VC input with attenuator. The knob controls to what extent (0% to 100%) the CV is applied.

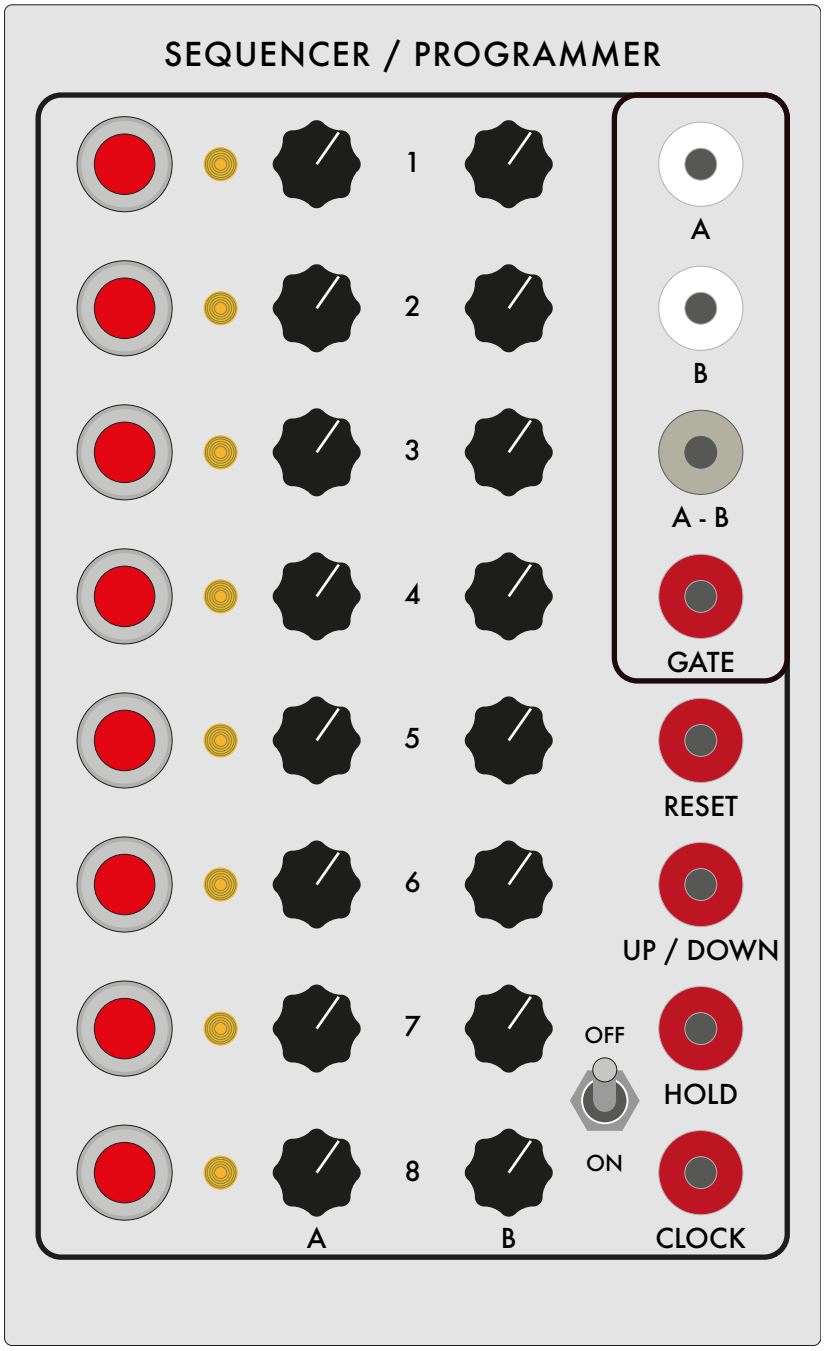
Attenuverter (Processor). Goes from -100% through 0 to 100%. At the minimum position (CCW), the signal is inverted, from (roughly) center position to maximum (CW) the know works like an attenuator.

Crossfader. Blends from one signal to another. At center, each signal is equally present.

(Almost) Everything Goes

- Forget the distiction between CV and audio - any signal in the Serge world can be used as anything.
- Don't worry about patching "wrong". Even though each banana jack is (typically) either an input or an output, don't think too much about a patch and don't be afraid to plug a cord into the wrong jack - you may get unexpected or no results if you do connect jacks, but there's no harm in that.
- The cycle mode of some modules (DSG, SSG) is sensitive and the CYCLING can be stopped if you "drown" or "override" the signal in the cycle (between the output and the input) - e.g. by connecting it to another signal or ground: the right side of the Dual Slopes for instance is designed to be either triggered by the keft side (via the switch) **or** by itself (by connecting the two red jacks) **or** by another pulse signal (e.g. CYCLE from the SSG). If you use the trigger switch **and** another signal at the same time, it is easy to get the left side of the DSG to stop cycling. In such case, you can simply remove that second signal and send another signal into the)black) IN jack of the module to re-animate it - the cycle should then work again.
- The output of the XFADER is balanced and can (depending on GAIN and CV settings) reach very high levels (i.e. get very LOUD!). This could lead to clipping or overload when routing the output into external equipment (ADC converter, mixing console). The best option here is to adjust the input level on the gear receiving the signal - this preserves the best signal to noise ratio. However, you can also scale the output level of the XFADER down with the (top) trimmer on the XFADER pcb.

SEQUENCER / PROGRAMMER 8



Overview

The SEQ8 is a modern yet faithful incarnation of Serge's analog sequencer / programmer. 8 stages. 2 rows of CV output. A - B (A minus B) outouts the difference between A and B (-5 to 5V range). The length of sequences can be set via the pushbuttons - while a sequence is running. RESET, UP/DOWN, HOLD inputs. Switch to start / stop the sequencer. great at audio rates. ALL GATE output goes high when any button is pressed and allows the use of the SEQ8 as a simple mini-keyboard. The SEQ8 covers a wide range of uses from sequencing / storing presets ("programming") to wavetable-like sounds in the audio range.

The Serge Sequencer 8 covers a wide range of uses from sequencing / storing presets ("programming") to wavetable-like sounds in the audio range. The Sequencer 8 is an original Serge design with improved speed and accuracy - clean stepped waveform output up to clock frequencies of 10kHz and above.

Basic Use

- Pressing a button selects the stage and also sets the start point (and length) for sequences.
- While you push that button, the ALL GATE output is high (i.e. send a GATE signal), so you can use it to generate envelopes and have the SEQ8 act like a simple keyboard.
- Feed a pulse or other signal into CLOCK and turn the sequencer (switch) ON to get it running through the stages. A andf B output the voltage (CV) set by the knobs of the active stage. A - B (A minus B) outputs the voltage difference.
- HOLD and (P)RESET (depending on the jumper setting on the back of the module) allow you to control the sequence. PRESET acts like RESET, just the other way round - one lets the sequencer run when the control signal is high, the other when it's low.
- UP/DOWN changes the direction, please note that in order to go down, a stage higher than 1 has to be selected.

Tips and Tricks

- The CV outputs A, B and A-B generate quite precise output steps (sharp edges) and can be used at audio rates for wavetable-like or bitcrushing sounds by e.g. using a Serge NTO as a clock.
- Two sequencers are more fun than one - try combining the SEQ8 with a TKB or another SEQ8 or an NCOM for rhythic effects and complex sequences.
- Let us know if you find a great patch or post a video!
- Have fun!

SERGE GTS XL

Overview

The Serge GTS XL is the extended version of the latest generation of Serge's famous slew generator, the Universal Slope Generator (USG). Essentially it is an integrator or slew generator that alters the rate of change of a signal. While thaz spunds simple, it can serve a wide range of functions, for instance

- **Envelope Generation**: One of the primary uses of the GTS is to generate envelope shapes for controlling the dynamics of sound signals. The USG can produce both simple and complex envelope shapes, including traditional ADSR (Attack, Decay, Sustain, Release) envelopes as well as more intricate shapes with multiple stages and looping capabilities. These envelopes can be used to shape the amplitude, timbre, and other parameters of sound signals, allowing for expressive and dynamic sound design.
- **Low-Frequency Oscillation (LFO)**: The GTS can also function as a low-frequency oscillator (LFO) for generating cyclic modulation signals at sub-audio frequencies. By adjusting the parameters, such as the rise and fall times, you can create a wide range of LFO waveforms, including sine, triangle, sawtooth, and square waves. These LFO signals can be used to modulate various parameters of other modules in the synthesizer, such as oscillators, filters, and amplifiers, to create evolving and rhythmic modulation effects.
- **Function Generator**: The GTS can function as a general-purpose function generator for generating and shaping control voltage signals. In addition to generating envelopes and LFOs, the USG can be used to create a variety of complex voltage waveforms, including ramps, pulses, and arbitrary shapes. These voltage waveforms can be used to modulate parameters in the synthesizer, trigger events, or control the behavior of other modules, offering flexibility and versatility in patch programming.
- **Voltage-Controlled Amplifier (VCA) Control**: The USG can be used to control the amplitude of sound signals through a voltage-controlled amplifier (VCA). By using the output of the GTS to modulate the gain or amplitude of a VCA, you can create dynamic amplitude modulation effects, such as tremolo, amplitude modulation (AM), or amplitude shaping.
- **Clock and Trigger Generation**: The GTS can also be used to generate clock signals or trigger pulses for synchronizing and triggering events in the synthesizer. By adjusting the rise and fall times, you can create precise timing signals for sequencing, triggering percussive sounds, or synchronizing sequencers or modulation sources.

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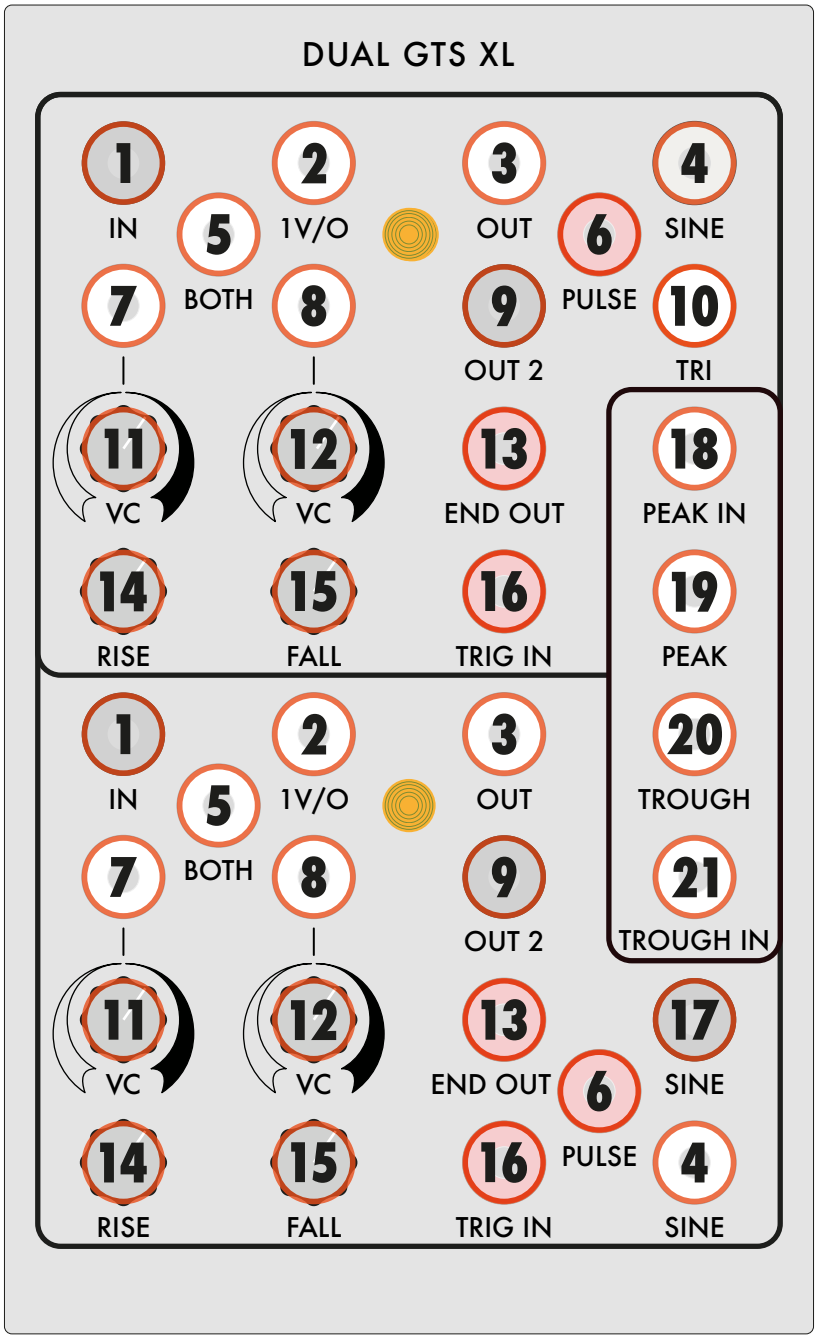
GTS XL - User interface

The GTS XL has two sides which are widely, but not entirely identical. The top section features a new TRI(anguloid) waveshaper (**10**) while the SINE output (**4**) is by default unipolar (DC coupled, 0-5V), but can be configured via a jumper on the back of the pcb to bipolar (AC coupled).

The bottom section has the SINE available both as unipolar (**4**) and bipolar (**17**).



Serge GTS - Basic Slope Operation

MAIN OUT (**3**)

Connecting **END OUT (13) to TRIG IN (16)** puts the GTS in **CYCLE mode**: 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 (1) with the speed set by RISE and FALL.

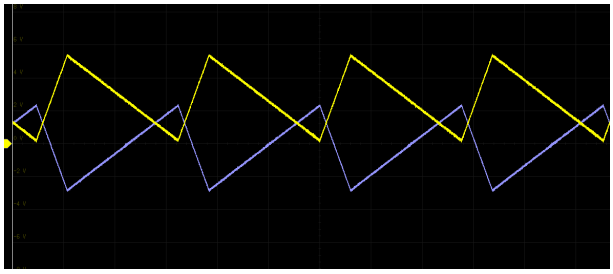
RISE (14) and FALL (15) knobs go from very slow (CCW) to very fast (CW). Both knobs cover an enormous range - at minimum settings the change in output is so slow that the module may appear not to be working(!). Fastest rise and fall times are about 13us, giving a **max frequency of about 29kHz** (not audible any more!).

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.

BIPOLAR OUT (**9**)

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)

END OUT (**13**)

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).

PULSE OUT (**6**)

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.

SINE OUT (**4, 17**)

Sinoid version of the MAIN OUT. When the main waveform is set to a (symmetrical) triangle, the SINE OUT resembles a sine wave. When the waveform is asymmetrical, the sinoid version will appear more pronounced on the slower side. Nice for FM, ring modulation etc.

TRI OUT (**10**)

Waveshaped signal that again depends on the MAIN OUT waveform. When the main waveform is set to sawtooth (for best tracking), the TRI OUT will provide a triangle waveform of the same frequency, hence another nice oscillator output. However when the waveform changes to triangle or similar, the TRI out will outpout a folded waveform - turning each flank into a triangle, making a more complex, overtone-rich waveform.

INPUT (**1**) 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).

1V/OCT (**2**) 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.

TRIGGER IN (**16**) A logic signal (gate or trigger) sent to this input triggers the circuit—regardless of what's happening at the INPUT (1) and generates an envelope at the MAIN OUT (4), 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.

CV BOTH (**5**) 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.

CV RISE (**7**) 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.

CV FALL (**8**) 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.

RISE AV (**11**) 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).

FALL AV (**12**) 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).

RISE RATE (**14**) 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 2 minutes to appr. 12µs**.

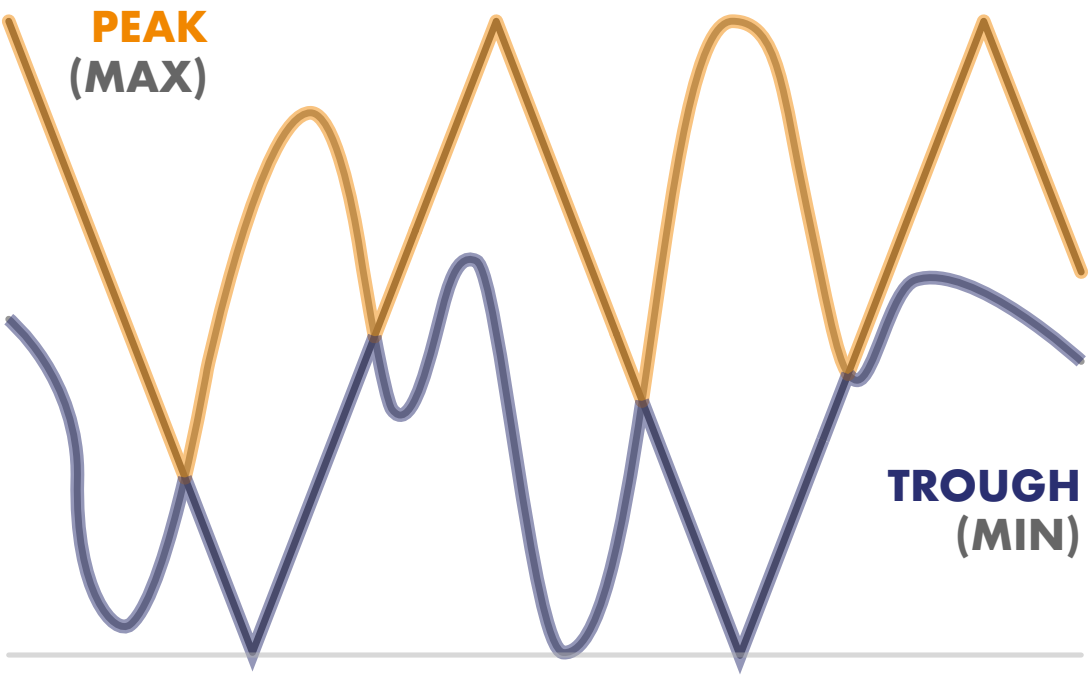
FALL RATE (**15**) Knob controlling the speed of the FALL, i.e. sets the time it takes for the MAIN OUT to ramp up. Clockwise rotation increases speed / frequency. Knob cover an enormous **range of more than 2 minutes to appr. 12µs**.

PEAK and TROUGH (#11, #12)

The PEAK and TROUGH section contains a mathematical comparison that yields the MAXIMUM (PEAK) and MINIMUM (TROUGH) of 2 signals:

PEAK OUT (**19**) Compares the **MAIN OUT of the top section** with the signal present at PEAK IN (**18**) and provides the largest value of these waveforms at any time.

TROUGH OUT (**20**) Compares the **MAIN OUT of the bottoms section** with the signal present at TROUGH IN (**21**) provides the smallest value of these waveforms. Please note that if there is not a signal present at the TROUGH input (**21**) that input sits flat and “kill” “drown”



SERGE CARNIVORE II

The Serve “Carnivore II” section is an extremely potent and condensed combination of 3 Serge signature modules in only 4 inch: GTO, Noise Source and GTS.

SERGE GTO

Overview

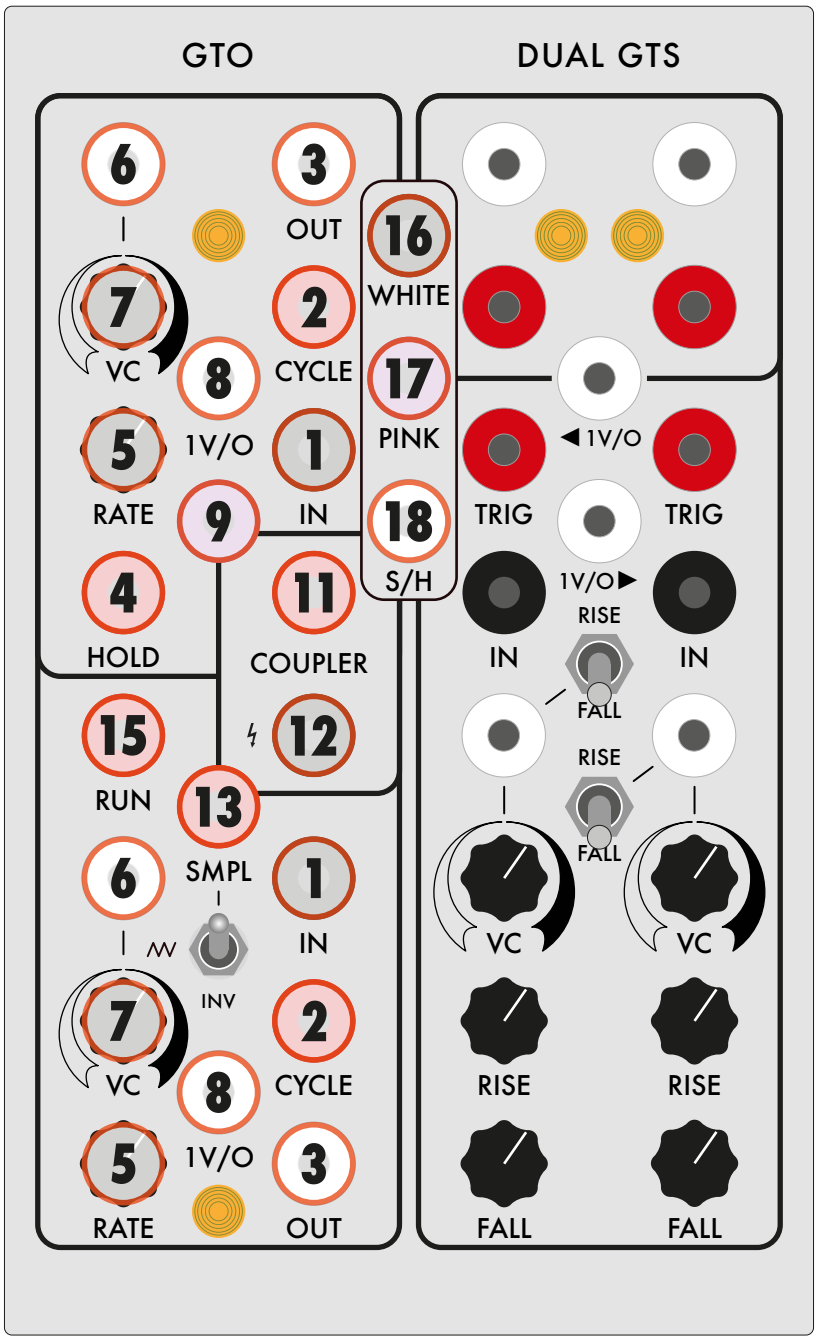
The Serge GTO is an evolution of the famous Serge Smooth & Stepped Generator. As its predecessor, it has two sides, that are not identical, but differ in some aspects. The top section was traditionally the “Smooth Side” while the bottom section was the “Stepped Side”. In the GTO, however, the bottom section can to some extent - in particular when the SMPL switch (14) is in CENTER position - behave like a “smooth” side.

The GTO is a dual “lag and hold” device that can be quite a few things, depending on how you use it. It can be patched as a slew, portamento, oscillator, LFO, metallizer, triggered staircase generator, subharmonic generator/ divider, VCA, lowpass-gate, sample and hold, track and hold, set of comparators, trigger delay, one-shot, envelope follower, quadrature function generator, “bit-crusher” and much more.

What’s new? What’s different?

The Serge GTO is not just an improved SSG, but almost a complete redesign with the focus on stability, precision and speed. Each GTO section has a **temperature-compensated 1V/Oct** input for use as an oscillator with a **frequency range of up to 20kHz** (top) and **8kHz** (bottom). Each section tracks over 5 or 6 octaves. The lower sides offer 3 different Sample modes plus a RUN input that vastly extend the track-and-hold possibilities of the classic SSG.

GTO - User Interface



Top section /// SMOOTH mode

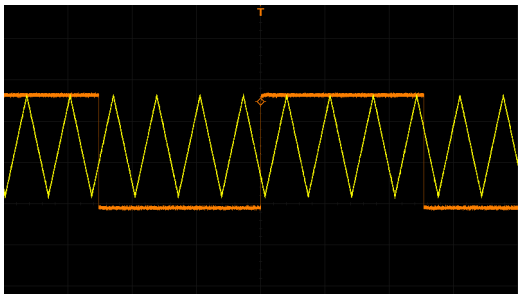
In **CYCLE mode** (CYCLE OUT connected to IN), the OUT produces a nice triangle wave. The RATE knob controls an enormous **frequency range of appr. 26s/CYCLE to appr. 20(!) kHz**.

In **INPUT mode** (CYCLE mode is off), the OUT follows the IN as quickly as the RATE parameter allows. A high at the HOLD input will freeze the OUTPUT.

Bottom section /// STEPPED mode (and more)

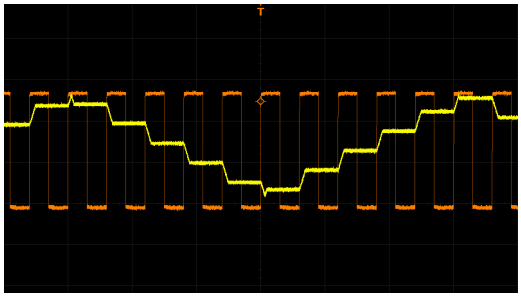
The bottom sections also have a **CYCLE mode** (CYCLE OUT connected to IN). However, the OUT depends on the Sample (SMPL) input and the corresponding MODE switch as well as on the RUN input:

- **Smooth Mode**: Set the SMPL switch to center to let the bottom section run freely - both the SMPL input and the RUN input are ignored. The Stepped side now pretends to be “smooth”, producing a triangle wave at the OUT. The RATE knob controls a **frequency range of >1min/CYCLE to 8 kHz**.

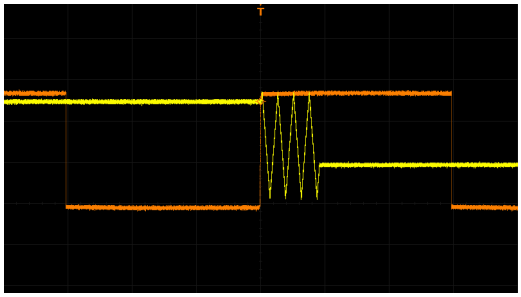


A PULSE wave (orange) into SMPL or RUN does not affect the Cycle.

- **Sample Mode**: When the SMPL switch is up, the GTO moves (cycles) only for a very short period of time when a pulse wave triggers the SMPL input - irrespective of the pulse length:



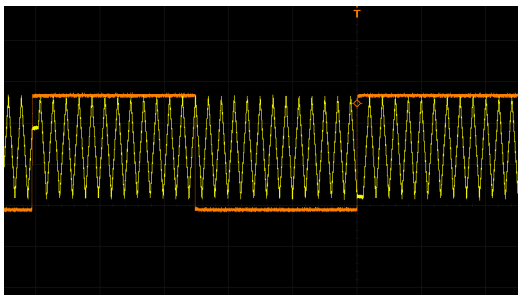
A PULSE wave (orange) into SMPL allows the GTO to run for a moment before being frozen again.



If the RATE is very fast, the few full cycles can occur before being frozen again.

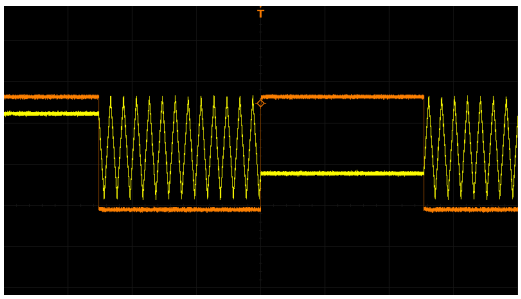
The moment in which the waveform can run freely is fixed in length (about 0.5ms) - this **limits the maximum speed the SMPL input can digest - if the clock signal is faster that about 2.2kHz, no more triggering occurs** and the waveform goes flat (i.e. the CYCLE dies).

- **INV Mode**: When the SMPL switch is down, the SMPL input works exactly the other way around: the GTO is free except for that small moment when the trigger occurs:



The CYCLE is held for a brief moment.

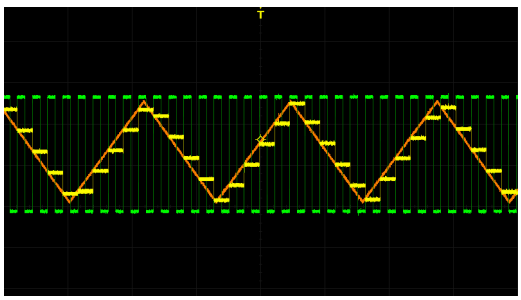
- **RUN Mode**: If all of this is not flexible enough for you, the RUN input comes into play. Here, the GTO runs freely while the signal is high and is held when the signal is low, i.e. the duty cycle of the pulse signal determines the ratio of running to stopping. The RUN mode gives you essentially a SMOOTH mode with HOLD:



The CYCLE is running as long as RUN is low.

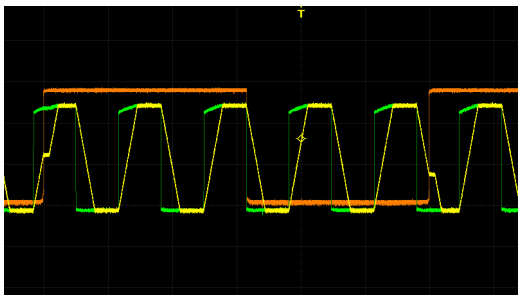
In **INPUT mode** (CYCLE mode is off), the OUT of the bottom section of the GTO tries to follow the IN as quickly as the RATE parameter allows, with the restraints set by the SMPL mode.

- If the SMPL switch is in center position, SMPLE in and RUN are ignored, the bottom section is in **SMOOTH MODE** (without a HOLD).
- **Sample Mode**: When the SMPL switch is up, the GTO moves only for a very short period of time when a pulse wave triggers the SMPL input - irrespective of the pulse length.



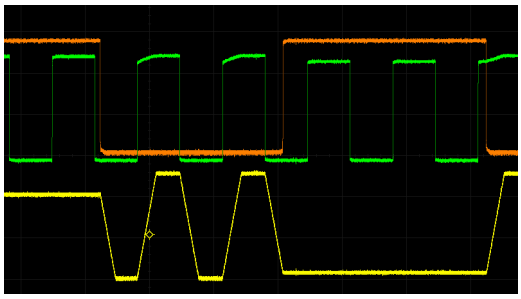
High clock rate into SMPL (green) and a fast RATE creates quantizing / aliasing / bitcrushing (yellow) of the input signal (orange).

- **INV Mode**: When the SMPL switch is down, OUT is almost like in SMOOTH MODE, but the SMPL input halts the signal for a very short moment:



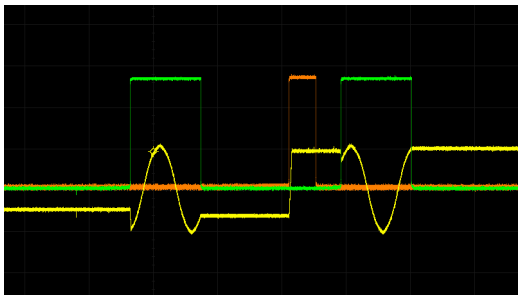
Note the tiny step in the OUT (yellow) whenever SMPL IN goes high (orange). Green is the IN signal.

- **RUN Mode**: Here again the signal is frozen as long as the RUN input is high - the GTO acts like the top section (SMOOTH MODE with HOLD):

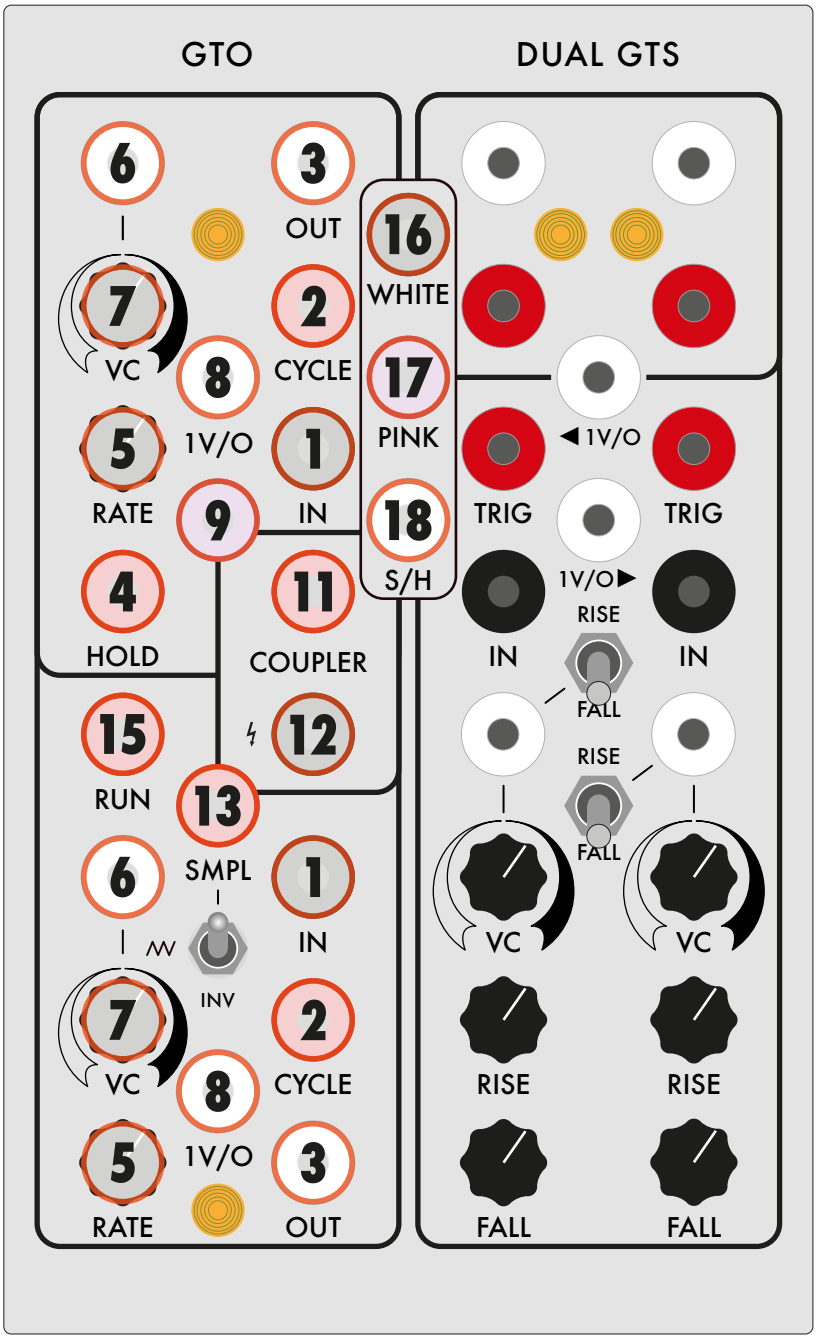


GTO (yellow) acts as in SMOOTH mode, RUN (orange) acts like HOLD.

Please note that RUN and SMPLE IN can be combined for even more complex waveforms and modulations:



GTO output (yellow) as affected by RUN (green) and SMPL (orange).



1V/Oct Input (#8)

Each side of the GTO can be used as an audio source/oscillator (in SMOOTH MODE) and has an additional CV input that has been calibrated to follow the 1V/Oct standard. Both sides are **temperature compensated** and **track 5 octaves or more (up to 2 kHz or above)**.

Sync Input (#9)

As you'd expect, the SYNC input causes the waveform (CYCLE) to restart. In the audio range, this gives you a typical Sync effect, however, the SYNC also works far below audio in the CV range and allows you to reset the GTO as an LFO.

The Coupler (#11, #12)

The COUPLER is an internal comparator comparing the outputs of both side.

Whenever the bottom section is HIGHER in voltage than the top section, the output of the COUPLER goes HI. Otherwise the output is LO. The COUPLER has two outputs, one of which switches between 0V and +12V, the other switching between -12V and +12V. This is useful for generating complex control voltages and for patching a random voltage generator. In fact, the Random Voltage Generator module is a Smooth & Stepped Generator internally patched to function exclusively as such. Note that a Noise Source is needed for use of the GTO as a random voltage generator. The red COUPLER OUT (**11**) is 0 to 5V, the black ("hot", **12**) one goes rail to rail (roughly -12V to +12V i.e. 24V pp). **Please be careful when using the black Coupler**, e.g. when routing to a ADC converter or similar.

GTO - First Steps

The GTO is a complex, highly versatile module which allows for a wide range of uses and abuses both in the audio and CV range, so it may require some time and experimenting to familiarize oneself with it - don't expect the module to reveal its secrets and power in a few minutes after you first power it up. Here are some very basic ideas to start with:

1. Patch the Smooth side of the GTO to cycle by connecting the **Cycle** jack into the **Input**. The Smooth side then produces a triangle wave from about 0V to 5 V (amplitude slightly depends on frequency), the LED should indicate that. The **Rate** pot determines the frequency of the cycle / output - the range is very wide, going from below 1 Hz to appr. 4 kHz. The **Cycle jack** provides a corresponding Pulse wave output.

2. Set the Stepped side to cycle as well by patching Cycle to IN (or turning on the **Cycle switch** in the eurorack module). Unlike the Smooth side, the Stepped side will not generate an output in Cycle mode (=LED stays dark or seems frozen) unless a Puls wave is fed into the **Sample** jack. Patch a pulse wave - e.g. the **Cycle** output of the Smooth side - into the **Sample** jack to bring the stepped side to life. The stepped side is essentially a sample-and-hold circuit, the **Rate** knob determines how long each step is at the Stepped output. Changing the frequency of the pulse going into the **Sample** input and/or changing the **Rate** affects the output.

3. The Smooth Side can be used as a **Lowpass filter**. Feed an audio signal (e.g. a saw or pulse wave from an oscillator) into the **In jack** (Cycle switch turned off) and listen to the signal coming from the **Smooth out** while you turn the **Rate knob**. At maximum position (full CW) the signal should sound pretty much unfiltered, turning the Rate down (counterclockwise) the harmonics get filtered / smoothed out, at minimum position the signal will disappear altogether.

Using the VC input jack in the same setup as before, this filter effect can be used to achieve the effect of a **Lowpass Gate / VCA**. Send an CV envelope (e.g. from a DUSG or an Extended ADSR module) into the VC jack and turn the VC knob sufficiently high. Tune the Rate pot to a position so that the output is silent when no CV is applied but clearly audible when the envelope is high. This causes a VCA effect, but the envelope not only determines the amplitude, but also the amount of filtering applied (like a lowpass gate).

4. Try whatever you can think of and try not to distinguish between CV and audio - while originally the SSG was primarily for control voltages, very interesting results can be found by going into audio range.

Serge Noise Source

The Noise Source generates both **white** and **pink** noise waveforms.

The **S/H Source** output produces the necessary input for a sample and hold function to produce equi-probable random voltages, similar to a 1/F distribution function. This signal is requred to patch the GTO as a Random Voltage Generator (RVG):

Random Voltage Generator (RVG) Patch

The Random Voltage Generator is the patched version of the generator in the classic Random Source module. The GTO needs a special random signal to make that work: the S/H SOURCE. Simply patch:

- S/H SOURCE ➡ STEPPED IN
- COUPLER (hot) ➡ SAMPLE (STEPPED)
- COUPLER (hot) ➡ SMOOTH IN

The Smooth random voltages are available at SMOOTH OUT, the stepped ones are at STEPPED OUT, and random pulses are available at the COUPLER.

With the Stepped (bottom) RATE knob at maximum, varying the RATE knob of the Smooth section changes the rate of BOTH the Smooth and Stepped random voltages. Varying the RATE of the Stepped side changes the amplitude of your Smooth and Stepped random voltages ... so turning the Stepped RATE knob down reduces the amplitude of the signal at the OUT jacks.

Of course, the Smooth RATE and the Stepped RATE can be voltage-controlled, too.

Please note that the RVG was meant as a CV generator, working at sub-autio frequencies. When you turn the (top) RATE up, you can reach (low) audfio rates, too (up to about 300-400Hz), however, the signal will then max out and turn into a (clean) triangle wave - and should go back to random when you turn the rate down again.

Serge GTO - Patch Ideas

Sync'd VCO

Using both sides combined as one tracking oscillator.

- CYLCE both sides of the GTO.
- Set SMPL switch to center ("free").
- Keyboard 1V/OCT ➡ left and right 1V/OCT of the GTO.
- Adjust the RATE of the top section to tune the top section to be one octave (or 2 octaves, or 5 semitones or ...) higher than the bottom section.
- Right CYCLE out ➡ left SYNC input.
- Listen to left OUT or red COUPLER.

Metallizing VCA

Use a PCO or NTO (or another GTO) as a sound source, the bottom section of GTO as filter / VCA, however, scrambled by the left GTO:

- SAW (or PULSE, TRI) ➡ GTO bottom section IN.
- CYLCE top section of GTO
- CYCLE out (left) ➡ RUN on the right
- Keyboard 1V/OCT ➡ PCO 1V/OCT and left GTO 1V/OCT
- Keyboard GATE OUT ➡ ExtADSR (or DSG) for Envelope
- ExtADSR OUT ➡ VC RATE of right GTO, VC RATE attenuverter fully CW
- right GTO: Rate knob at about 40%

Variations:

1. SYNC: Send PULSE OUT of PCO to GTO SYNC input.
2. (b) Send 2nd output of PCO to 1V/Oct of right GTO
3. (c) Send envelope from ExtADRS also to VC-RATE of GTO (left), VC-RATE attenuverter near center.

Geometric Waveshapes:

- Send a SAW wave from a PCO or NTO or DSG ➡ GTO top section SYNC and ➡ GTO bottom section SMPL.
- Keyboard 1V/OCT ➡ PCO 1V/OCT and left GTO 1V/OCT
- CYLCE top section of GTO
- Do not CYLCE bottom section of GTO

- CYCLE out (left) ➡ IN on the right
- Set SMPL switch to SMPL (top)
- RED Coupler ➡ RUN on the right
- Keyboard GATE OUT ➡ ExtADSR (or DSG) for Envelope
- ExtADSR OUT ➡ VC RATE of right GTO, VC RATE attenuverter fully CW
- Right GTO: Rate knob at about 50%
- Listen to right GTO OUT.

SYNC FM

- CYLCE both sides of the GTO.
- Set SMPL switch to Cycle (center) or INV
- Right OUT ➡ left VC RATE (RATE attenuverter set to about 2 p.m.)
- Keyboard 1V/OCT ➡ both left and right 1V/OCT (but don't expect the patch to track!)
- Right CYCLE out ➡ SYNC

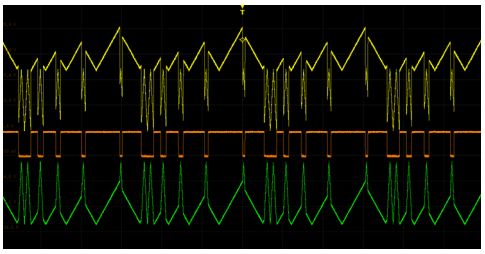
Variations:

- Send left GATE OUT to RUN and set SMPL switch to SMPL or INV

SYNC DRONE

Again, using both sides combined as one massive oscillator.

- CYLCE both sides of the GTO.
- Left CYCLE ➡ RUN
- Right CYCLE out ➡ SYNC
- Right CYCLE out ➡ right VC RATE
- Set SMPL switch down ("INV").
- Keyboard 1V/OCT ➡ left and right 1V/OCT of the GTO.
- Adjust the RATE of the top section to tune the top section to be one octave (or 2 octaves, or 5 semitones or ...) higher than the bottom section.
- Send ADSR or LFO to left VC RATE with VC RATE knob close to center.
- Alternatively, send black COUPLER to left VC RATE with VC RATE knob close to center.
- Use right RATE knob to adjust pitch.
- Listen to left OUT (green) or red COUPLER (orange) - yellow wave is a mix of left OUT and COUPLER:



SERGE GTS

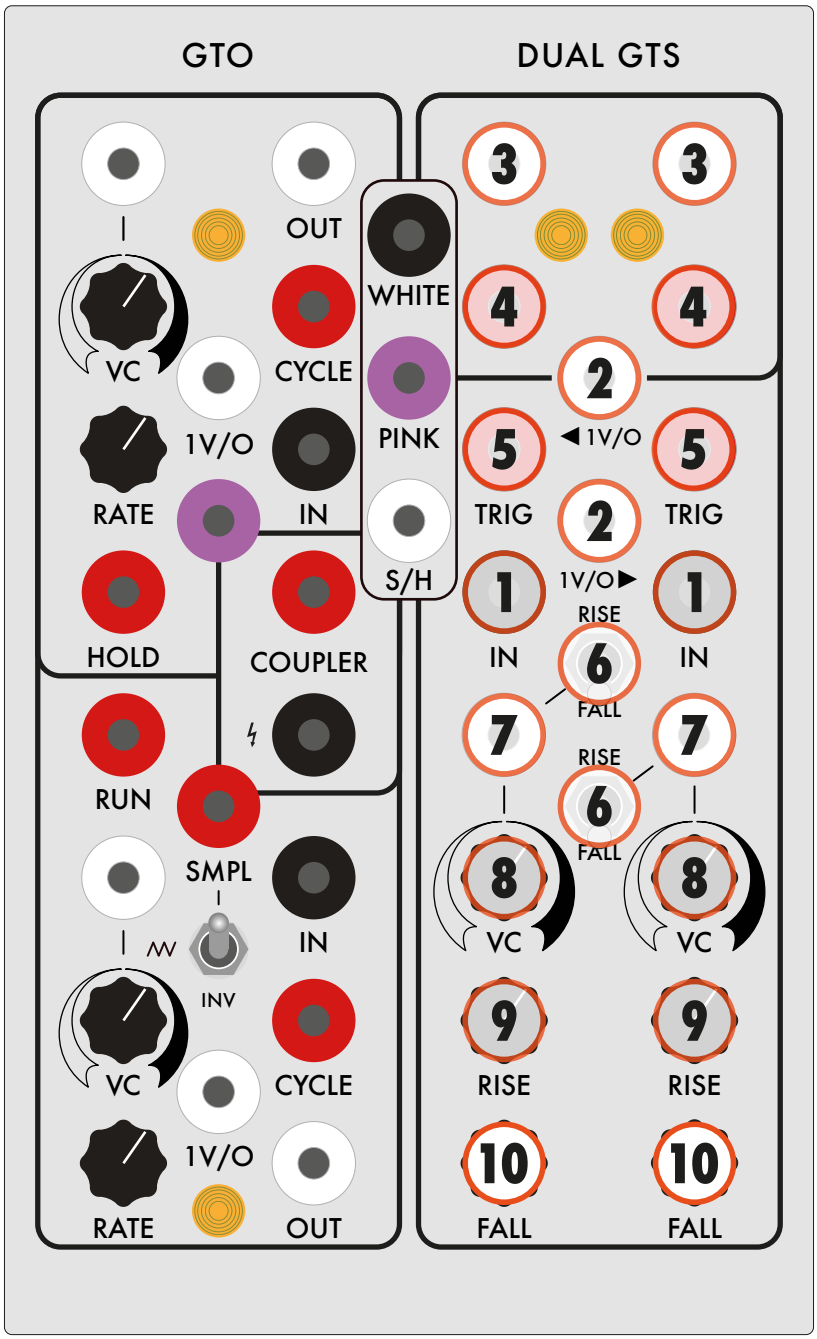
Overview

The Serge GTS XL is the extended version of the latest generation of Serge's famous slew generator, the Universal Slope Generator (USG). Essentially it is an integrator or slew generator that alters the rate of change of a signal. While thaz spunds simple, it can serve a wide range of functions, for instance

- **Envelope Generation**: One of the primary uses of the GTS is to generate envelope shapes for controlling the dynamics of sound signals. The USG can produce both simple and complex envelope shapes, including traditional ADSR (Attack, Decay, Sustain, Release) envelopes as well as more intricate shapes with multiple stages and looping capabilities. These envelopes can be used to shape the amplitude, timbre, and other parameters of sound signals, allowing for expressive and dynamic sound design.
- **Low-Frequency Oscillation (LFO)**: The GTS can also function as a low-frequency oscillator (LFO) for generating cyclic modulation signals at sub-audio frequencies. By adjusting the parameters, such as the rise and fall times, you can create a wide range of LFO waveforms, including sine, triangle, sawtooth, and square waves. These LFO signals can be used to modulate various parameters of other modules in the synthesizer, such as oscillators, filters, and amplifiers, to create evolving and rhythmic modulation effects.
- **Function Generator**: The GTS can function as a general-purpose function generator for generating and shaping control voltage signals. In addition to generating envelopes and LFOs, the USG can be used to create a variety of complex voltage waveforms, including ramps, pulses, and arbitrary shapes. These voltage waveforms can be used to modulate parameters in the synthesizer, trigger events, or control the behavior of other modules, offering flexibility and versatility in patch programming.
- **Voltage-Controlled Amplifier (VCA) Control**: The USG can be used to control the amplitude of sound signals through a voltage-controlled amplifier (VCA). By using the output of the GTS to modulate the gain or amplitude of a VCA, you can create dynamic amplitude modulation effects, such as tremolo, amplitude modulation (AM), or amplitude shaping.
- **Clock and Trigger Generation**: The GTS can also be used to generate clock signals or trigger pulses for synchronizing and triggering events in the synthesizer. By adjusting the rise and fall times, you can create precise timing signals for sequencing, triggering percussive sounds, or synchronizing sequencers or modulation sources.

GTS - User interface

The GTS in the Carnivore section has two identical sides. Unlike the 2 inch wide DSG versions of earlier Serge generations, both sides of the GTS have 1V/Octave inputs and (among many other things) are suited for use as oscillators.



MAIN OUT (**3**)

Connecting **END OUT (4) to TRIG IN (5)** puts the GTS in **CYCLE mode**: the MAIN OUT provides a triangular waveform the symmetry of which can be adjusted from sawtooth to triangle to ramp using RISE (**9**) and FALL (**10**) knobs. Range is 0-5V when Cycling. Otherwise, this output tries to follow the amplitude of the input (1) with the speed set by RISE and FALL.

RISE (14) and FALL (15) knobs go from very slow (CCW) to very fast (CW). Both knobs cover an enormous range - at minimum settings the change in output is so slow that the module may appear not to be working(!). Fastest rise and fall times are about 13us, giving a **max frequency of about 29kHz** (not audible any more!). **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.

END OUT (**4**)

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.

INPUT (**1**)

Signal Input: Direct Coupled input to the GTS. Use for Lag, Portamento, (pseudo-)filtering, ASR (Attack Sustain Release) type envelopes.

1V/OCT (**2**)

CV input calibrated for use of the GTS as **sawtooth oscillator**. When the GTS is set to CYCLE and **RISE knob (9) is turned all the way up (fastest rise)** and FALL (**10**) 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.

TRIGGER IN (**5**)

A logic signal (gate or trigger) sent to this input triggers the circuit—regardless of what's happening at the INPUT (1) and generates an envelope at the MAIN OUT (4), 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.

CV MODE (**6**)

Switch that determines if a control voltage (CV) sent to the CV INPUT (**7**) affects RISE, FALL or Both (center position).

CV INPUT (**7**)

Linear control signal input for RISE and/or FALL depending on the CV Mode Switch (**6**).

CV AV (**8**)

Attenuverter Control: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into CV INPUT (**7**).

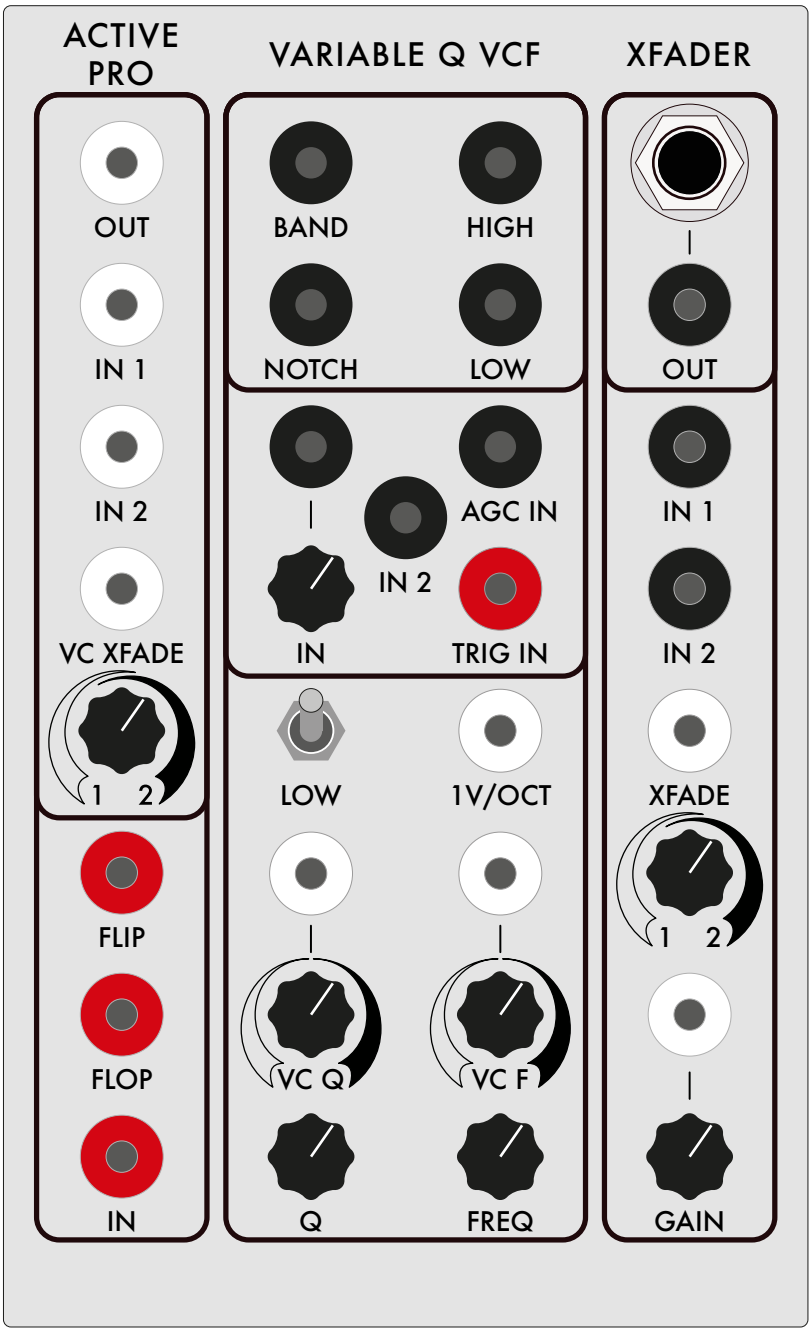
RISE RATE (**9**)

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 2 minutes to appr. 12µs**.

FALL RATE (**10**)

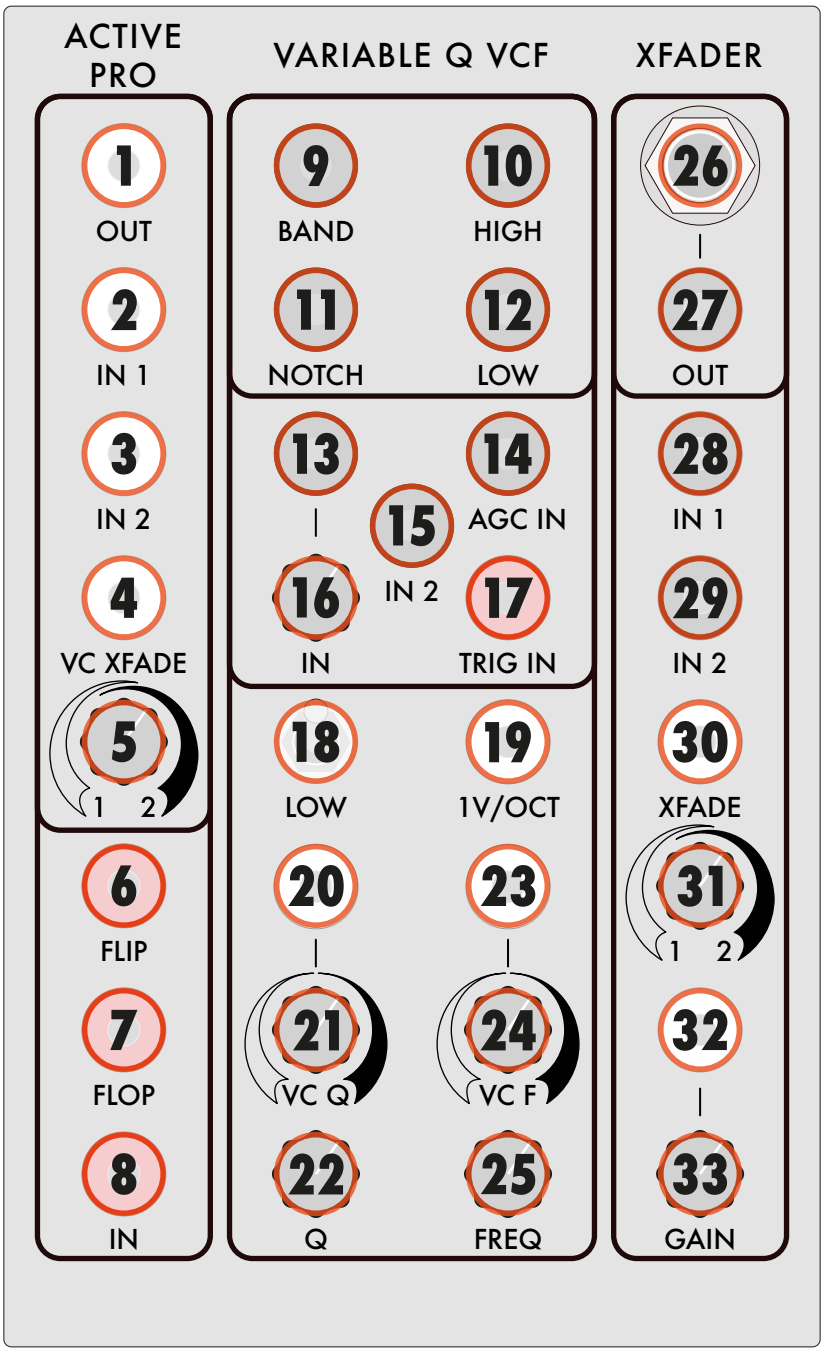
Knob controlling the speed of the FALL, i.e. sets the time it takes for the MAIN OUT to ramp up. Clockwise rotation increases speed / frequency. Knob cover an enormous **range of more than 2 minutes to appr. 12µs**.

ACTIVE PRO / VCFQ / XFADER



Overview

The Active Processor (ACTIVE PRO) is the latest generation of Serge's linear crossfader, offering unparalleled precision. It is here supplemented by a FLIP FLOP which can be used both for lagic signals and audio. The Variable Q VCF (VCFQ) is an enhanced version of the classic Serge filter. It now features an additional input and an attenuverter for Q. The XFader is a multi-purpase module that can act as exponential VCA, equal power crossfader and (balanced) output module.



ACTIVE PRO

OUT (**1**)	Direct Coupled (linear) blend of the two input signals IN 1 and IN 2.
IN 1 (**2**)	Signal Input: Direct Coupled input 1.
IN 2 (**3**)	Signal Input: Direct Coupled input 2. If no signal is patched here, then the module acts like a linear VCA for IN 1.
VC XFADE (**4**)	CV control of the fade.
XFADE (**5**)	Manual control of the fade.

FLIP FLOP

The Flop Flop section acts like a 1-Bit memory or a toggle switch. Each pulse sent into IN (**8**) toggles the state of the two outputs FLIP (**6**) and FLOP (**7**), one of which is always high and the other one low. Can be used as a pulse divider (/2).

IN (**8**)	Logic Input - pulse width is irrelevant.
FLIP (**6**)	Logic output. Switches every time IN gets clocked.
FLOP (**7**)	Logic output. Inverted, also switches every time IN gets clocked but has the opposite state.

VARIABLE Q FILTER (VCFQ+)

The most versatile filter in the Serge cosmos has been updated and improved in some key aspects. It uses 3 **high-end THAT2180 VCAs** for superior audio performance.

This SE version has also been **optimized so that there is no resonance at all when VC Q is turned down** - the classic Serge design has a little bit of resonance even when turned all the way down. When you set the Q knob to about 8%, you get exactly the response you get from the classic version at minimum. This way the SE version extends the sonic range to cover a very soft and smooth (resonance-free) area.

Unlike its predecessors, the VCFQ now has a **processor (attenuverter) for Q** CV so that Q can be pushed down by using a positive control voltage. It also features an **additional (unattenuated) input** so that multiple signals can be mixed and filtered.

BAND (**9**)	Bandpass output.
HIGH (**10**)	Highpass output. Patch back into IN, turn GAIN and Q up to get the VCFQ to self-oscillate.
NOTCH (**11**)	Notch output.
LOW (**12**)	Lowpass output.
IN (**13**)	Main input, level controlled by GAIN knob (**16**).
AGC IN (**14**)	AGC input (Automatic Gain Compensation). Aims to control Q to reasonable levels.
IN 2 (**15**)	Additional input, like **13** but without attenuation control.
IN GAIN (**16**)	Attenuator for main IN (**13**).
TRIG IN (**17**)	Trigger input. Ideal for pinging and ringing the filter. Triggers applied to the TRIG in will cause the filter to go into damped low frequency oscillations, controlled by the Q and the filter's FREQUENCY.
LOW Switch (**18**)	Turns the VCFQ into "LOW" (= sub audio!) range. The filter may then be used to filter / generate low-frequency control voltages. Most likely you will hear nothing as long as the VCFQ is in LOW mode!
1V/OCT (**19**)	CV Input for frequency, roughly 1V/Octave.
VC Q (**20**)	CV Input for resonance.
Q AV (**21**)	Attenuverter control for resonance: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into VC Q Input (**20**).
Q (**22**)	Knob controlling te resonance (Q). Q can (by design) go very high and depending on the input signal might lead to clipping/distortion when sweeping the filter.

VC Q (**20**) VC FREQ (**23**) CV Input for frequency.

FREQ AV (**24**) Attenuverter control for frequency: provides for scaling, attenuation, amplification and inversion of the CV signal(s) sent into VC FREQ Input (**23**).

FREQ (**25**) Knob controlling the filter frequency.

XFADER

The XFader combines an equal power (audio) crossfader with a high-end VCA and a balanced ouput.

Balanced Out (**26**)	Output balanced in TLS format to connect to ADC, professional mixing consoles or similar. Beware: **output can (depending on VCA use) reach very high levels, up to >20V pp. Make sure any external equipment you connect can safely handle these levels**.
Out (**27**)	Output signal in banana format.
IN 1 (**28**)	Signal Input: Direct Coupled input 1.
IN 2 (**29**)	Signal Input: Direct Coupled input 2.
VC XFADE (**30**)	CV control of the crossfade.
XFADE (**31**)	Manual control of the fade.
VC GAIN (**32**)	CV control of the gain (VCA). Exponential character. Adds to the gain (level) set by the GAIN knob (**33**), levels can easily reach the rails (and generate beautiful clipping / distortion) - as a safety measure **turn down GAIN (33) before applying any voltage control!**
GAIN (**33**)	Manual control of the output level.

- Let us know if you find a great patch or post a video!
- Have fun!