

Serge Voltage Controlled Slope

for music synthesizers.

This is a licensed adaptation of the classic Serge DTG/DUSG

The Serge VCS module released in conjunction with from bananalogue.com is an extremely versatile control voltage generator and audio source. In the early 1970s, Serge Tcherepnin developed the Positive Slew and Negative Slew modules for the original Serge synthesizer. In time these merged into the classic Dual Universal Slope Generator. The Bananalogue VCS/CGS775 is an adaptation of Serge's original circuit with a few new features.

The VCS is a unity gain voltage follower. The rising and falling slopes are independently and jointly voltage controllable over a wide range.

VC Transient Envelope Generator

A pulse at the trigger input will start the envelope, or a gate input will sustain the level and the envelope will fall when the gate goes low. Rise and fall are independently and jointly voltage controllable, with variable linear and exponential wave shapes.

VC Portamento

Voltage is slewed according to the rise and fall times.

VC LFO

When the cycle switch is thrown, the trigger input is connected internally to the end trigger output, creating a VC clock with variable waveform and independent rise and fall times.

VC Oscillator

While not as wide ranged, or accurate as a dedicated oscillator module, the VCS is still an excellent audio source. The Exp CV input is scaled approximately to the 1v/oct standard. The Output wave can be swept from triangle to saw with linear and non-linear waveforms. End Out also produces a pulse waveform.

VC Non-Linear Audio Processor (Low-Pass Gate)

If an audio rate signal is slewed, the module responds like a VCF, and a rough VCA. The signal is low-pass filtered down to silence, similar to a low-pass gate.

Envelope Follower

Positive and negative peak detection envelope follower.

VC Pulse Delay

Trigger input starts the envelope and a trigger will be produced again at the **End Out** when the envelope completes its cycle.

Sub-Harmonic Generator

If a series of triggers are applied to the VCS faster than the total rise and fall times, the module will divide the incoming signal by a whole number. In the audio range the output will be the sub-harmonic series.

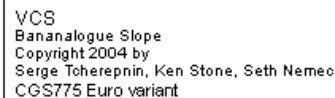
(Description taken from the former Bananalogue site)

A little on how it works.

Closing switches EXP. RISE or EXP. FALL feeds some of the output back into the voltage controlled inputs, changing the curve of the response - i.e. allowing for increasing or decreasing rates of change of the output, thus allowing the output waveshape to be non-linear.

AC out gives the non-inverted signal, but centered around 0V.

For those interested in the theory of operation, I recommend [Tim Stinchcombe's page on the subject](http://www.stinchcombe.com/synth/modules/cgs775_vcs.html).



Construction



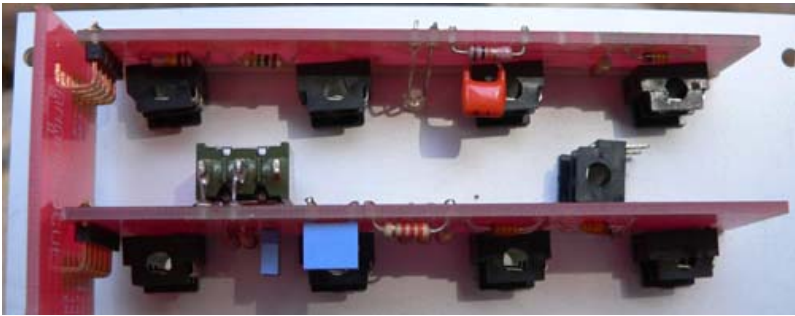
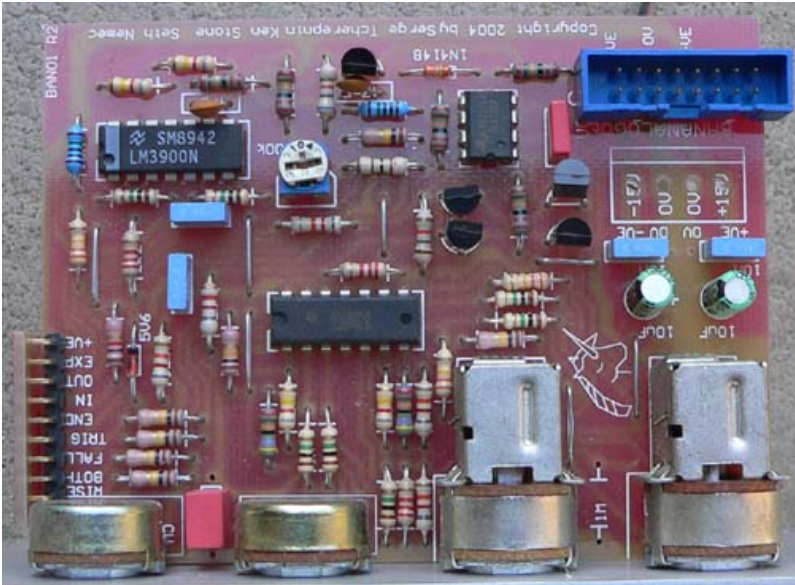
- It is a good idea to match the transistors of the same type in the core with each other. At least use transistors from the same batch.
- CGS775 VER1.0 main PCB incorrectly labels one 2N3906 as a 2N3904, however the associated symbol on the PCB itself does show a PNP transistor. This is lone transistor near the rear of the PCB.

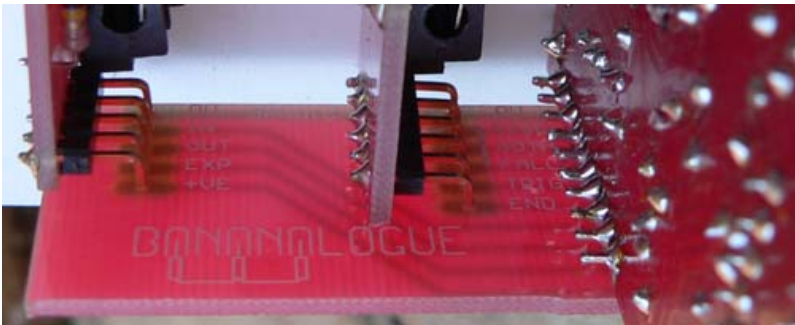
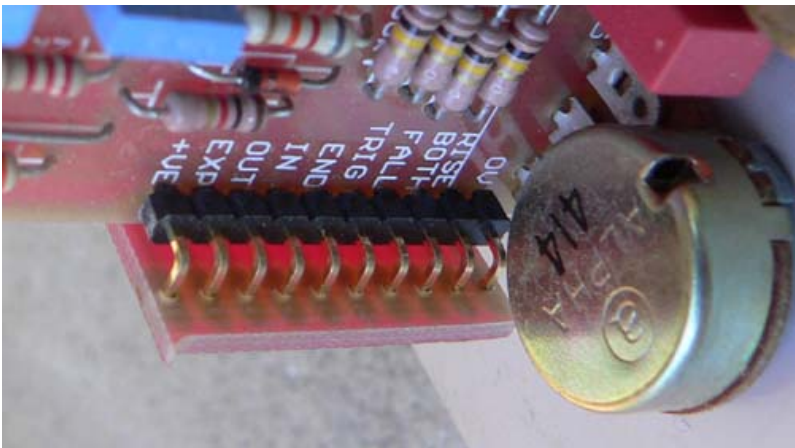
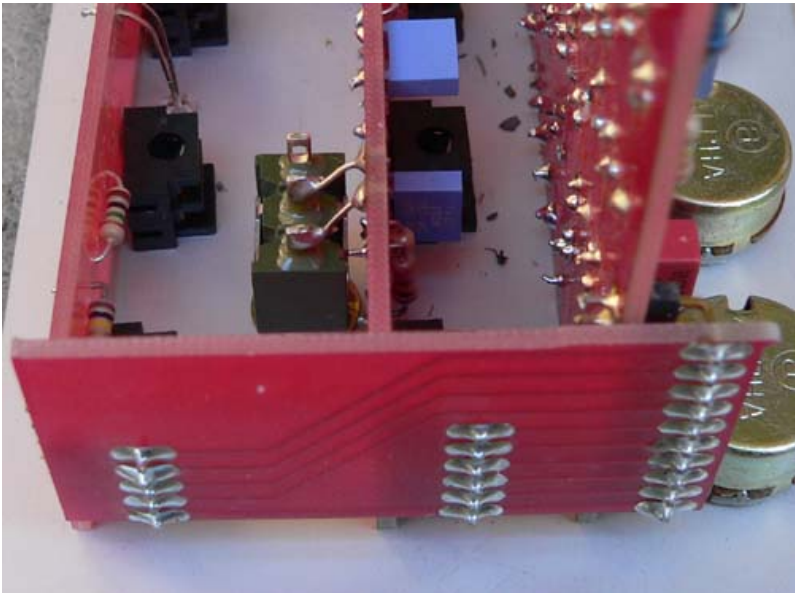
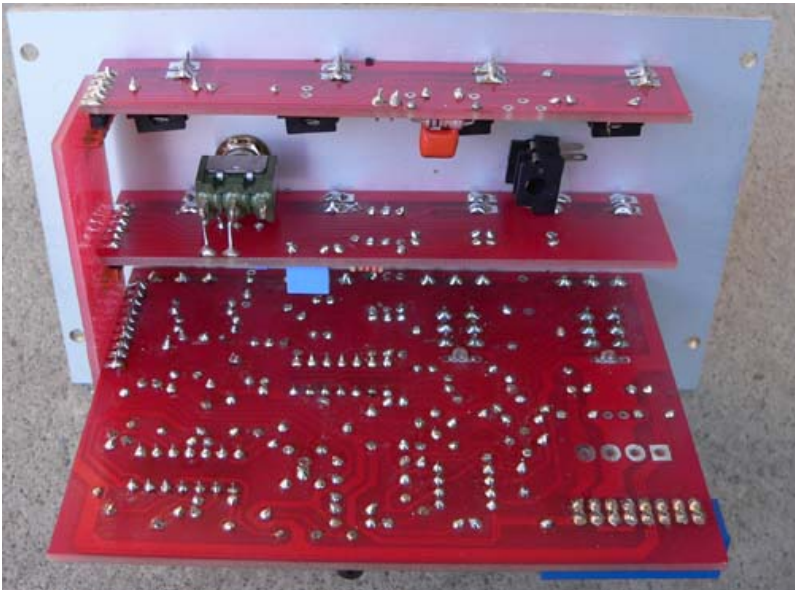
When you are happy with the printed circuit boards, construction can proceed as normal, starting with the resistors first, followed by the IC socket if used, then moving onto the taller components.

When inserting ICs into sockets, take care not to accidentally bend any of the pins under the chip. Also, make sure the notch on the chip is aligned with the notch marked on the PCB overlay.

The 90deg; single row headers that are used to connect the sub PCBs to the bus board should be soldered with the plastic carrier against each of the sub PCBs. If you solder them on the wrong way around, the plastic carrier will force the bus board up, and risk fouling with the case.

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Setting up

Adjustments on the VCS board are set to obtain a 0 to +5 volt level when the unit is cycling, producing a 100Hz triangle wave. An oscilloscope is required for this adjustment. In an oscilloscope is not available, adjust for the least distorted sounding waveshape.

Notes:

- Pot values are not critical. 100k lin could be substituted for both the 50k lin and 10k log pots.
- Will run on +/- 12 volts or +/-15 volts.
- Please [email me](#) if you find any errors.

Parts list

This is a guide only. Parts needed will vary with individual constructor's needs.

Classic Serge style knobs can be purchased from

[Small Bear Electronics LLC](#)

[phenolic clone of Davies 1900H](#)

[ABS clone of Davies 1900H](#)

[Colored ABS clones of Davies 1900H](#)

If anyone is interested in buying these boards, please check the [PCBs for Sale](#) page to see if I have any in stock.

Can't find the parts? See the [parts FAQ](#) to see if I've already answered the question. Also see the [CGS Synth discussion group](#).

Part	Quantity
Capacitors	
47pF	6 (C3-6 optional)
1n	2
10n	4
22n	1
100n	3
10uF 25V	2
47uF 25V	1
Resistors	
100R	1
1k	2
1k8	1
2k2	3
22k	1
33k	2
68k	1
82k	5
100k	12
150k	1
220k	4
330k	3
470k	2
820k	4
1M	9
10M	2
100k trimmer	1
50k lin pot with switch MouserP/N: 313-1600F-50k	2
10k log pot 16mm Alpha or sim)	2
Semi's	
LED	1
1N4148	6
2N3904	3
2N3906	3
5V6 400mW Zener	1
TL072	1
TL074	1
LM3900	1
Misc.	
90° 5 pin header	1
90° 6 pin header	1
90° 10 pin header	1

Ferrite Bead	2
SPST switch	1
16 pin IDC 90° box header	1
CGS775 PCB set	1
CGS775 Panel	1

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