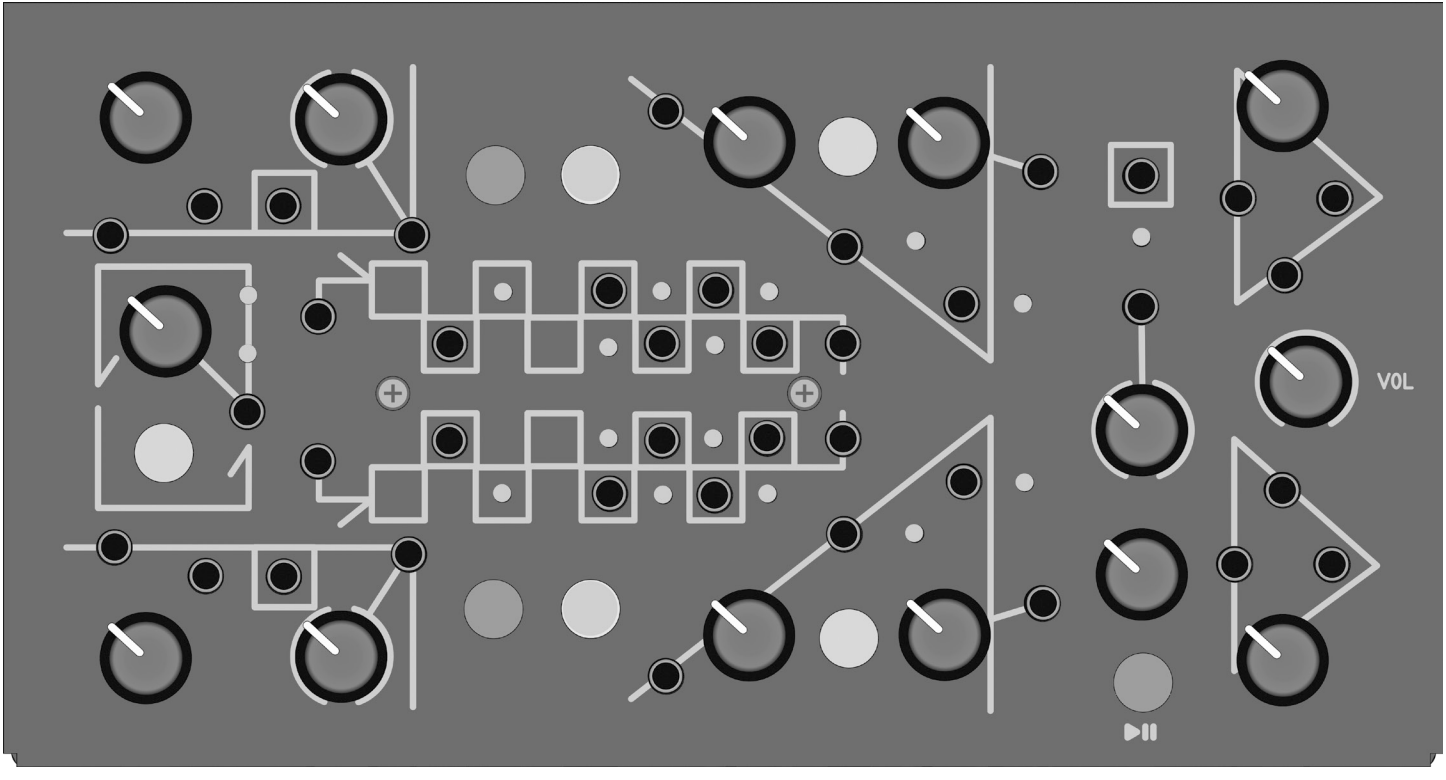

VOL

# *Double Knot v3*

The Double Knot v3 is a small generative synthesizer with two voices and corresponding sequencers. This instrument has a simple architecture which is capable of a wide variety of sounds, including rhythms and drum patterns or textural and grating noise sounds. The interface is made up of knobs, switches, and banana plugs for patching. The two voices of this device each consist of a triangle/square wave oscillator, a shift register sequencer, an enveloper, and a voltage controlled amplifier. A clock sets the tempo of the shift registers.

The voices of the Double Knot are pre-wired, in a linear chain of functional blocks. The patch points are available to route modulations, influencing the simple linear voices. The game of this device is to investigate the relationships between the elements of the synth using the knobs, switches and patchpoints.

This user guide written and illustrated by Will Schorre.
Rendered images by Max Anderson.

Enjoy!

## *Warranty and Warnings*

Please take a moment to read this guide in its entirety before use. Thank you.

3 year full warranty on any manufacturing defects.
Warranty does not cover damage by impact, crushing, water, or any other misuse or mistake.
Must provide proof of original purchase.

No liability is taken for harm that may come to person or device
resulting from misuse of this equipment.

Please be careful of your ears! You only get one pair!



All contents of this manual are subject to change without notice.

lorre-mill.com/doubleknot

## ***Power***

+12V power input is applied by a positive tip 2.1mm x 5.5mm barrel connector. The supply must have an output capable of at least 600mA output current. There is a "soft" power switch next to the power input.

## ***Connections***

- Audio output is a line level signal for connection to an audio mixer or computer speakers.
- Clock input will disconnect the internal clock and advance the shift registers on the rising edge crossing ~2.5v
- Clock output gives a square wave ~1.2v - 8v.
- Banana inputs are high impedance and can handle some signals outside the supply voltage range of the device. +/-8v is safe.
- Banana outputs are low impedance. 1k limiting resistor carrying 0-9v signals. The outputs can handle some voltages outside of the power supply range as well. Such as when a low impedance output (1k) happens to be patched to one of the Double Knot's banana outputs. Maximum safe voltage range for this situation would be +/- 8v. This situation could happen when mixing voltages using banana plugs.

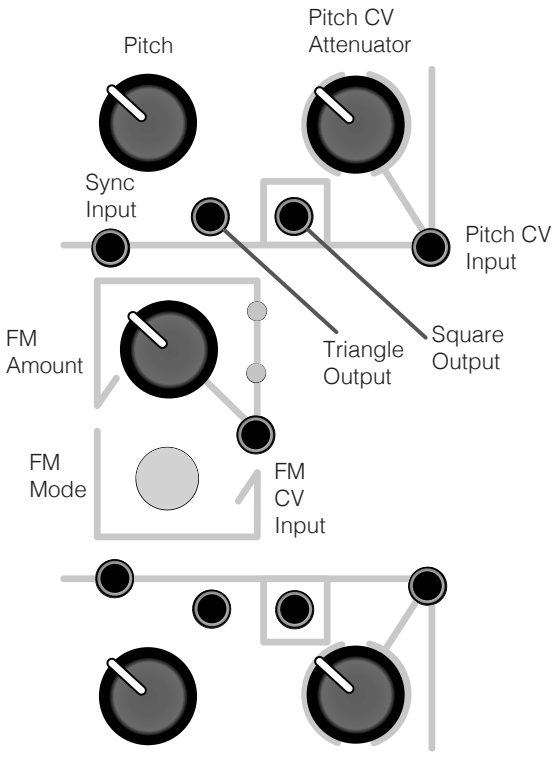
## ***Dip Switches***

Small switches on the back of the synth set these three options for each voice.

| Switch | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| ON | VCSlew | Zero Crossing | Exp | VCSlew | Zero Crossing | Exp |
| OFF | VCA | Phase Irreverent | Lin | VCA | Phase Irreverent | Lin |
| :) | Top Voice ( Left Side ) | | | Bottom Voice (Right Side) | | |

## ***Oscillators***

The main tone sources are two oscillators which have a triangle/square topology. They inherently generate triangular and square wave shapes without any additional circuitry. The pitch range of these oscillators is wide, from below audible range to nearly ultrasonic. Sync input is most usefully patched to the square output of the opposite oscillator for soft sync effects.



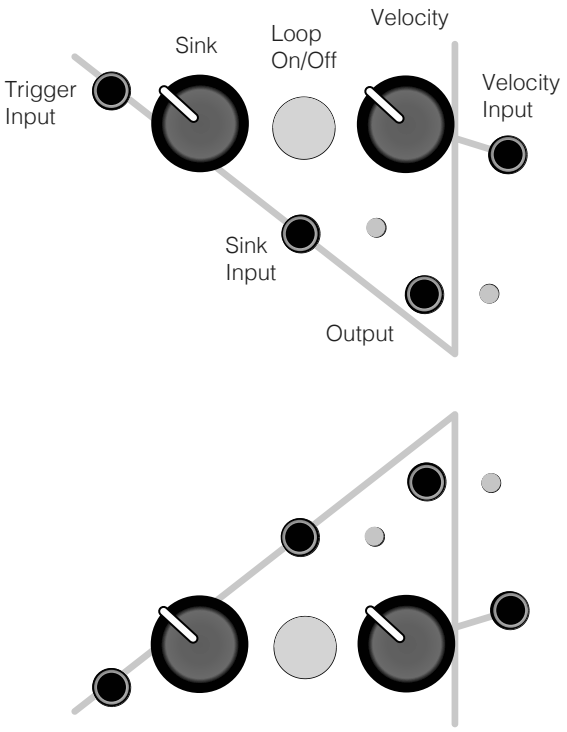

## ***FM Section***

The FM section situated between the two oscillators is used to make timbral changes to the sounds. This section feeds one oscillator output to the opposite oscillator's pitch control input for complex and inharmonic wave generation. The amount knob becomes an attenuator for the signal at CV Input. The yellow button in the FM section cycles through four modes. The modes are off, full on (where both oscillators modulate each other), osc 1 -> osc 2, and osc 2 -> osc 1.

## ***Envelopers***

Zero attack, voltage controlled decay envelopers control the volume of each voice. There are controls for velocity and sink (or decay). Velocity controls the starting voltage of the envelope, sink determines how long it takes for the envelope to fade out. The range on these envelopers is very wide, from short clicks in the full clockwise position of the sink knob to many seconds in the full ccw position.

Yellow buttons toggle on and off a gated loop mode. When the envelope is receiving a high signal at the trigger input, the envelope will loop at a rate set by the velocity and sink controls. Dip switches on the back of the synth select zero-crossing mode/ phase irreverent modes for each enveloper separately. It should be noted that with the dip switch set to zero-crossing mode, if the oscillator never crosses zero, the envelope will not sound. This can happen when using oscillator sync.



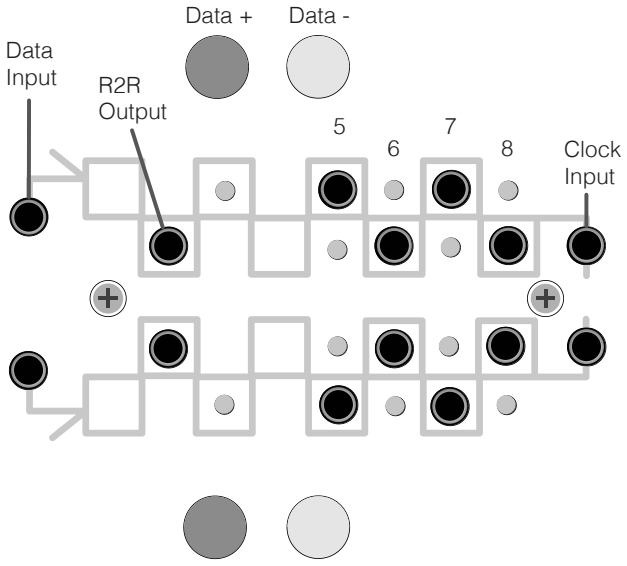

## ***Shift Registers***

The shift registers in this synth can act as 5-8 step rhythm sequencers or random pattern generators. The orange and white buttons are for entering or removing data from the shift register.

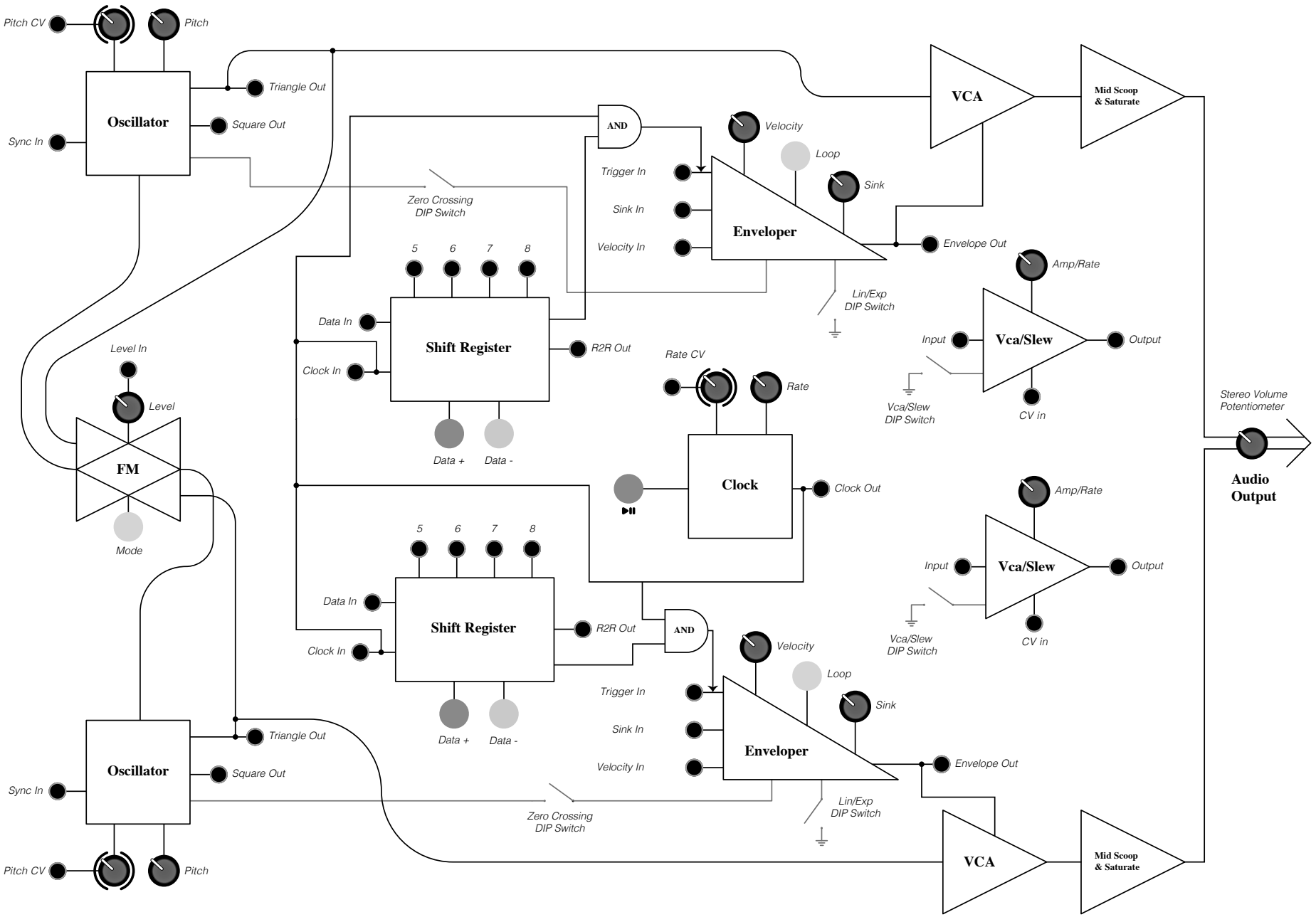
To loop the register, patch the data input to one of the four data outputs (5,6,7,8). Then, type bits in at the rhythm of the clock using the data + and data - buttons. This data will recycle.

To generate random sequences based on interference patterns, patch one of the oscillator square outputs to the data input of one of the shift registers. Data corresponding to the pitch of the oscillator will be entered into the shift register.

The data outputs and the R2R outputs can be used for modulating other parts of the system.



# Block Diagram



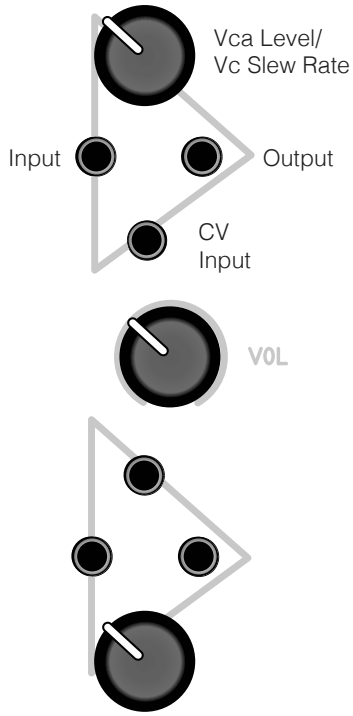
## ***Vca/VC Slew***

These two circuits are the only parts of the Double Knot which are not pre-wired to any other part of the system. These are independent signal processors with one knob two inputs and one output. Signal input is on the left, CV input is in the middle, and output is on the right. The knob sets the slew rate from nearly halted (full CCW) to pretty fast (full CW). When set as a VCA the level goes from off to roughly unity gain.

The CV Input and knob are summed together so when a CV is plugged in, the knob is added with the input signal as an offset control.

Dip switches on the back of the synth select the mode of each of these sections. Please refer to the dip switch table on page 3.

The main stereo volume knob is in between these two sections.



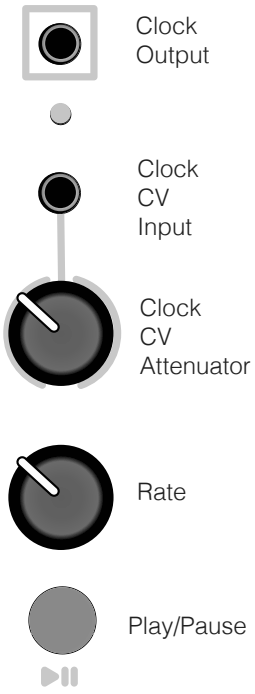

## ***Clock***

The clock is a simple voltage-controlled square-wave generator. The red button starts and pauses the clock.

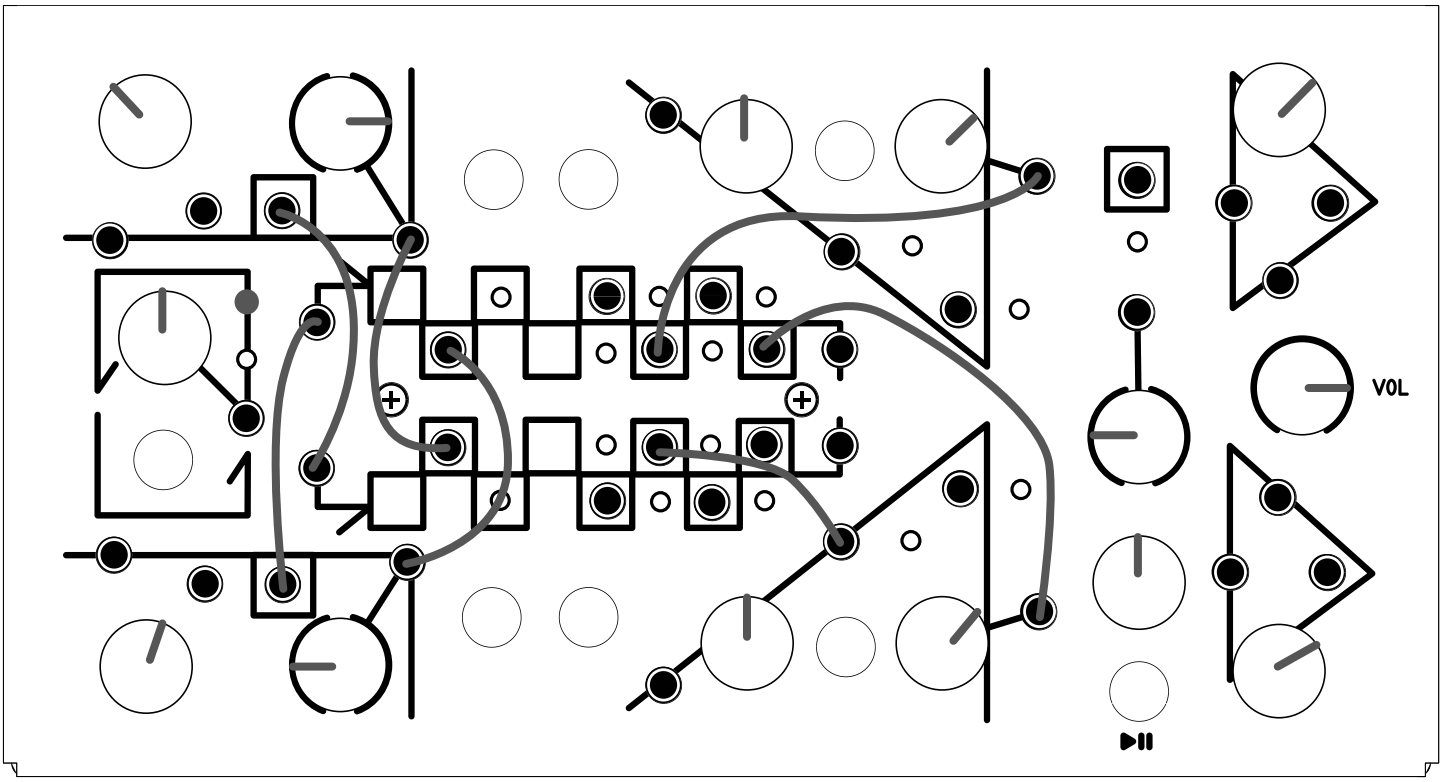
Clock output is available as a modulation source or as a connection to another receptive banana jack synthesizer.

When an external clock is plugged into the 3.5mm jack on the back of the unit, the internal clock is disabled. The play/pause button will still halt the external clock and the output becomes a buffered copy of the clock at the 3.5mm jack.

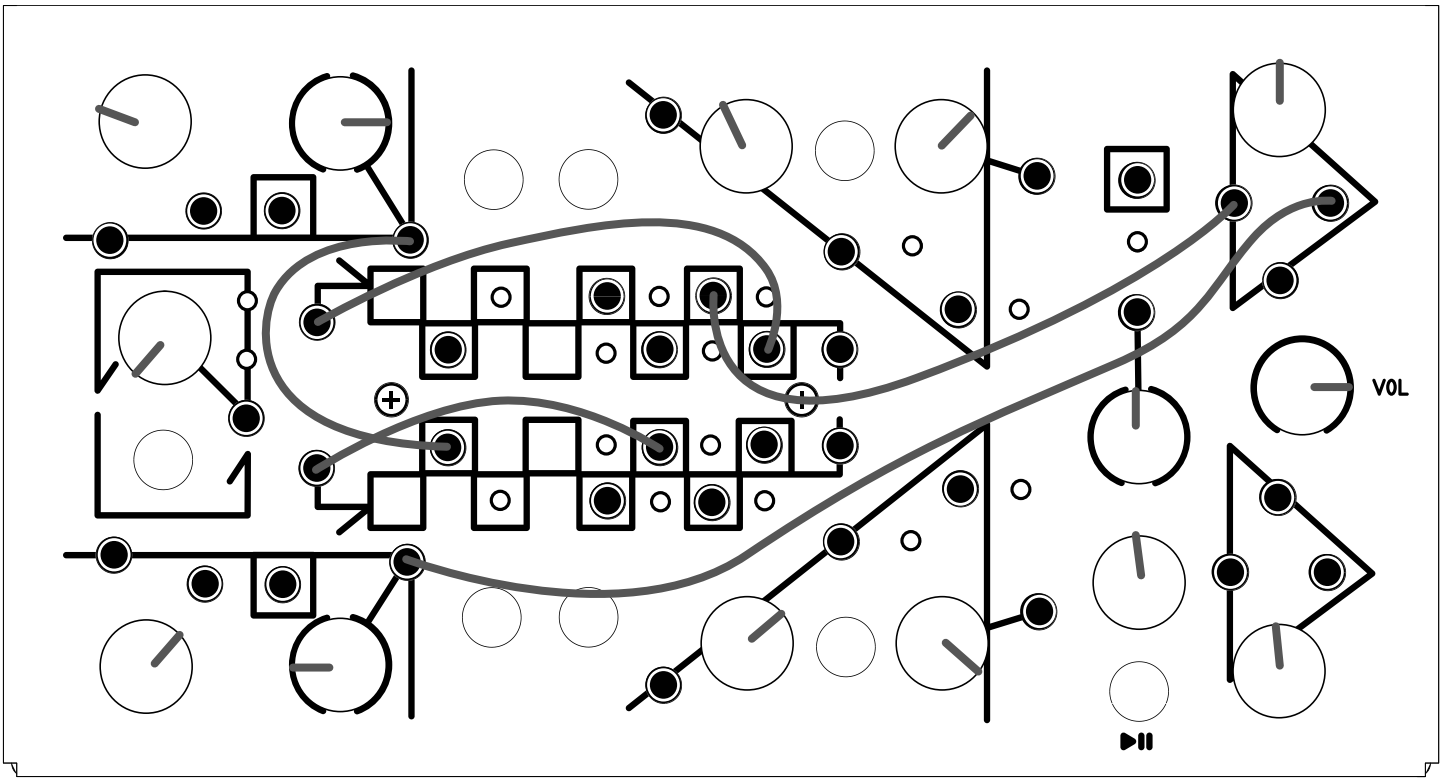
Clock rate is roughly 1Hz to 60Hz without using the CV input. This range is extended when using a signal to modulate the rate of the clock.



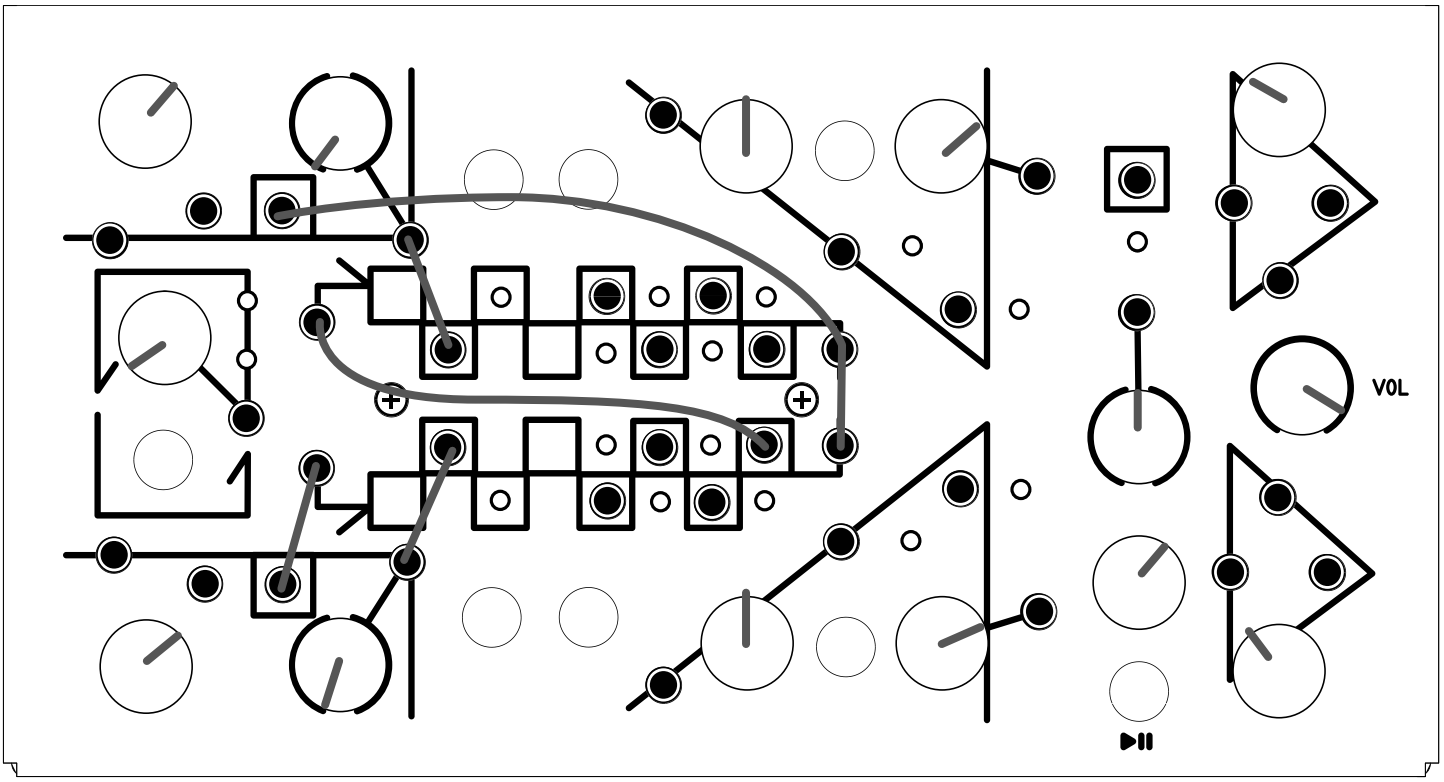
***All Random*** By using the audio oscillators as sources for the shift registers and feeding the shift registers back to the pitch of the oscillators, random rhythmic patterns emerge.




***Phasing Patterns*** The registers here are looping data from the bit outputs back to the data input. Enter data using the red data + button on each sequencer.



***"Rungler" Patch*** How to implement a Rungler, a concept coined by Rob Hordijk. The Double Knot provides a good environment for experimenting with this fun and puzzling technique. Try it!




***Your Patch*** _____