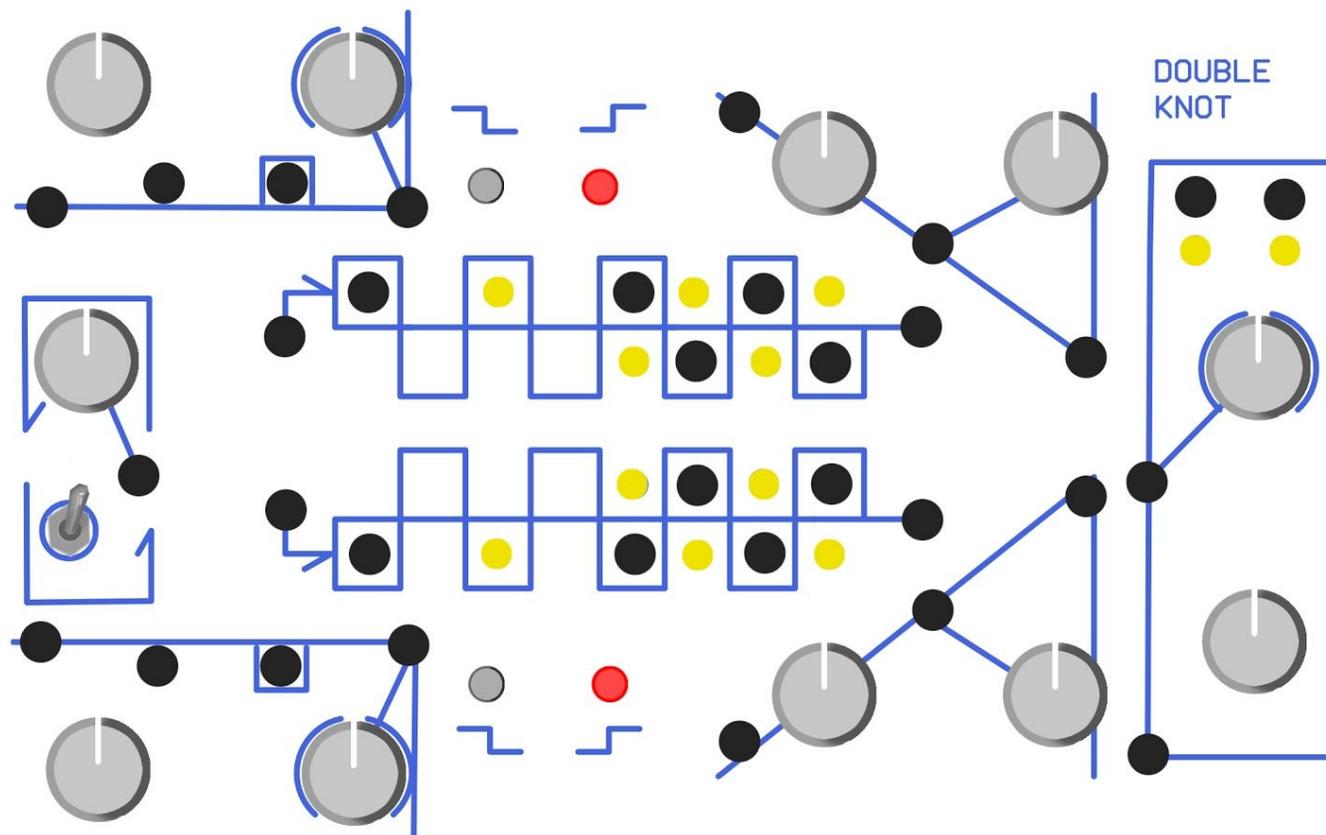


Lorre-Mill

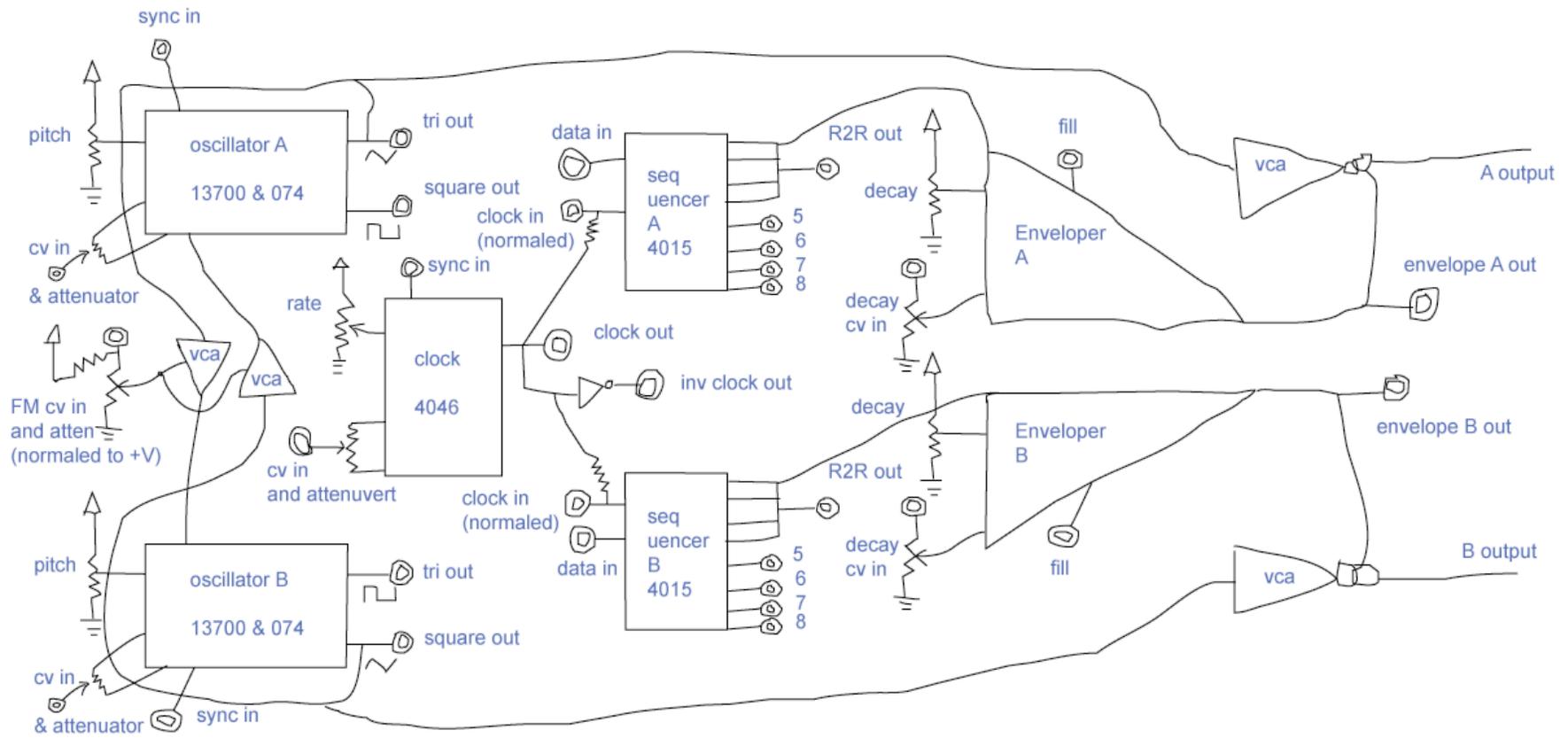
User's manual  
Version 1.0

Double Knot

Thanks



Double Knot synthesizer is an instrument for removed gesture, like any drum machine or sequencer-based system, where the playing of the instrument is in its completion with patch cables, programming, and knob-tweaking... an entirely analog “groovebox” with an eye toward building tumbling and oblong arrangements. Modulation patch points are available to non-linearize the base state linear architecture of vco, vca, envelope, and sequencer. Aspects of this instrument are inspired by techniques used in the designs of Rob Hordijk, Ciat-Lonbarde, and Serge synthesizers.



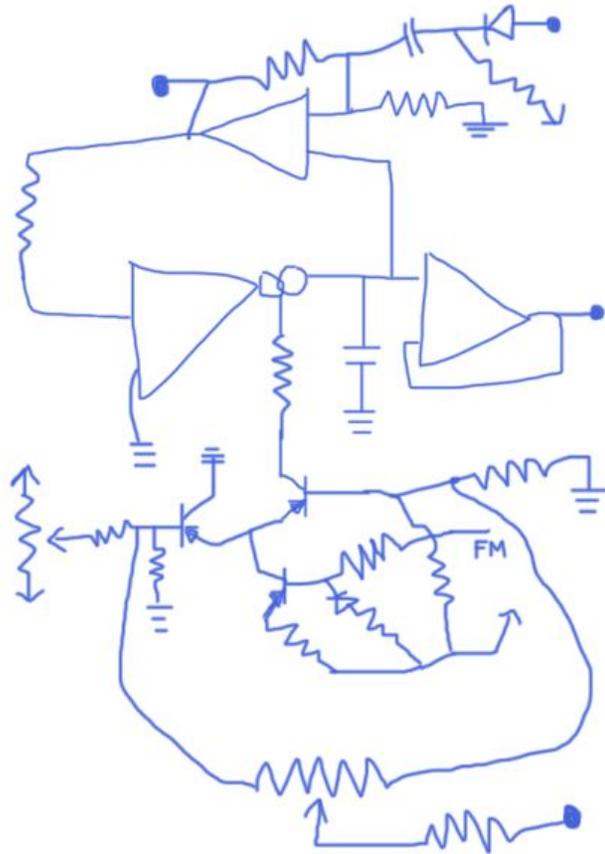
~~~~~Connection Considerations~~~~~

- Please use the power supply which came with your synth or one similar with a 12v DC positive tip 2.1mm x 5.5mm power adapter with at least 500ma. \*\*\*Please do not use daisy chain cables\*\*\*or power supplies which are mains earth referenced\*\*\*
- Audio output is provided at a 3.5mm stereo line level jack on the back of the instrument, this is suitable for plugging into effects, mixer, powered speakers, or stereo receiver.
- Clock in and out jacks are next to the stereo line out with clock in closer to power jack and clock out closer to the line out. The clock out is somewhere around 5v and clock in can handle 12v pulse...
- Banana connectors are putting out signals of 0 to 8v and looking for the same at inputs... please avoid using negative cv signals
- You may note that all INPUTS are on a line and OUTPUTS are inside of line...

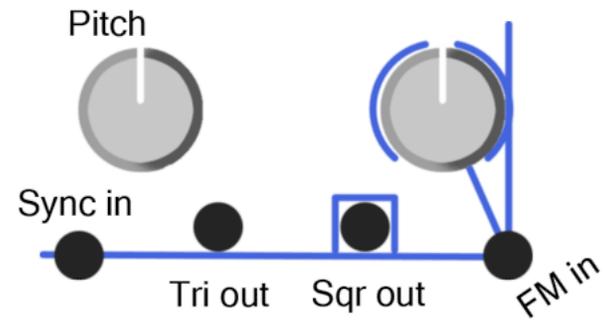
*Liability note*

I am not responsible for loss of life or damage to instrument or person that may come from any misuse of this instrument. Follow the connection considerations. I do not encourage touching circuits which are powered from the wall!

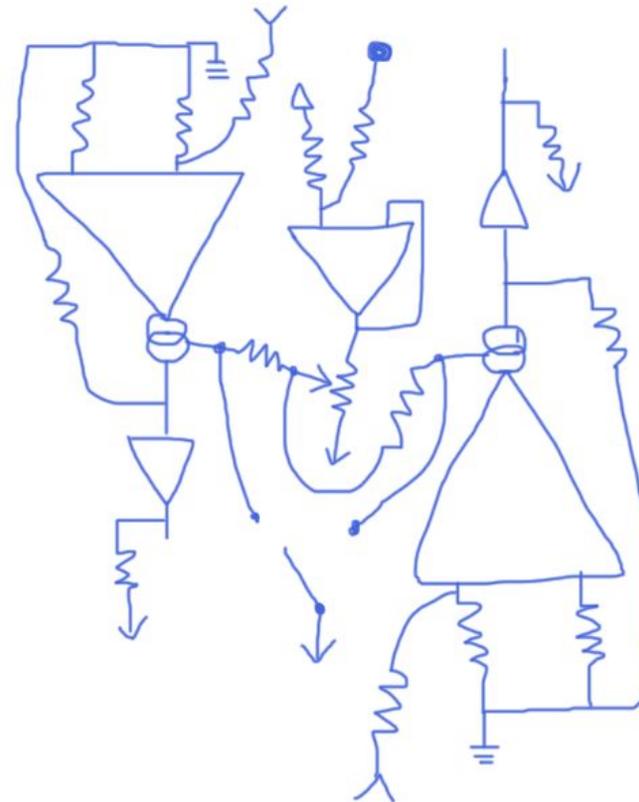
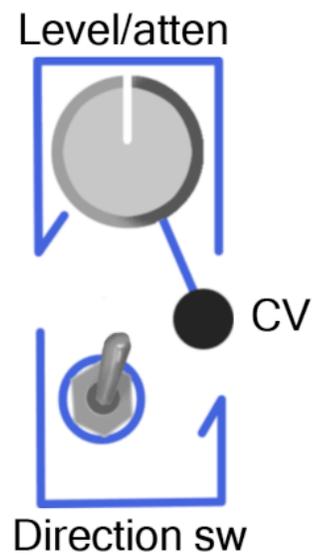
# Oscillators



Oscillators are made of OTA and Opamp schmitt trigger with a special resistor-diode-capacitor network at the schmitt trigger for making a “sync” effect. These work in the way of a relaxation oscillator where both triangle and square outputs are generated as natural products of the design, no waveshaping. The current source for the OTA is a modified one of serge synthesizers found in schematic for an old VCA, this can be found by googling “serge vca schematic”. The range is very wide (something fairly low to around 40khz) and the pitch knob is very sensitive.

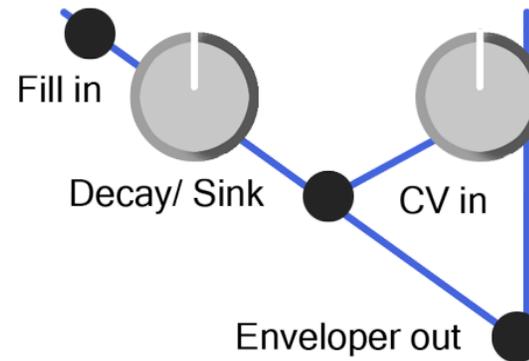
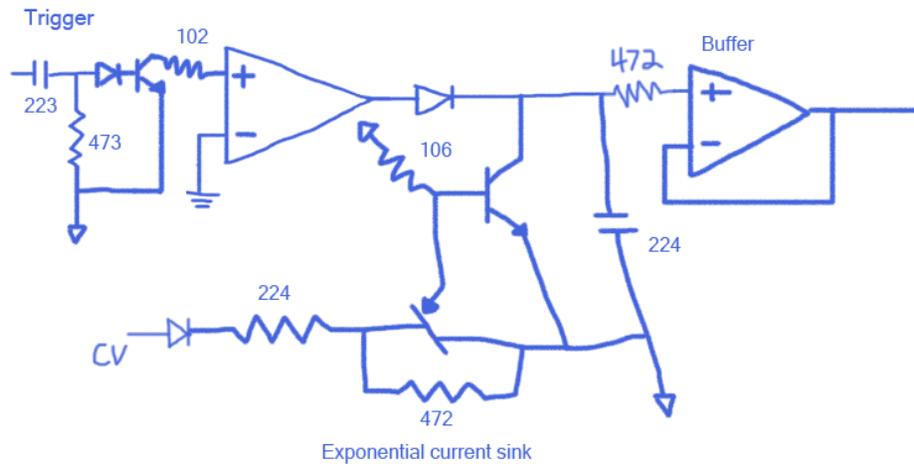


# FM



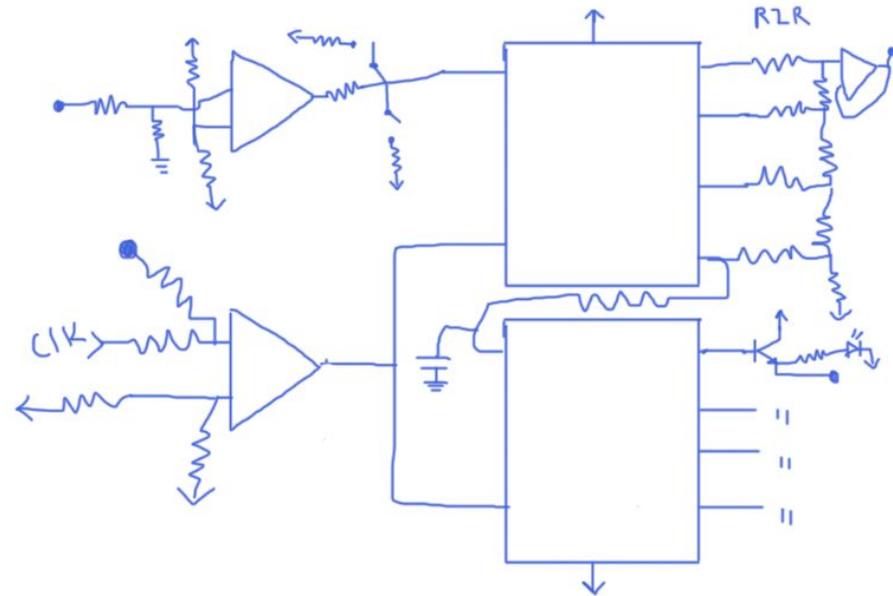
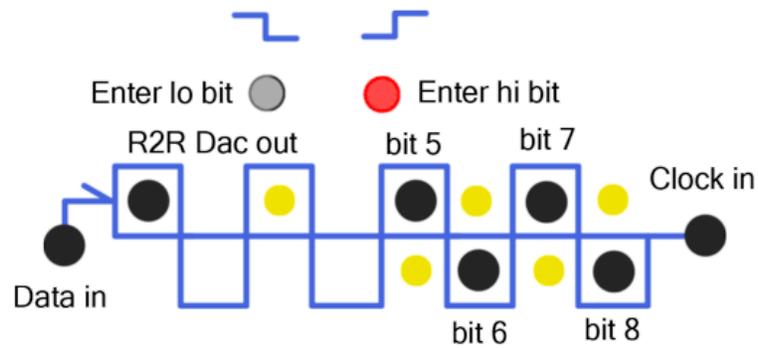
The FM section is essentially two VCAs facing opposite directions both taking at their input a triangle wave of one of the oscillators and feeding it to the opposite oscillator. The toggle switch is a "center off" switch which when up or down mutes the control voltage to one or the other vca...

# Envelopers



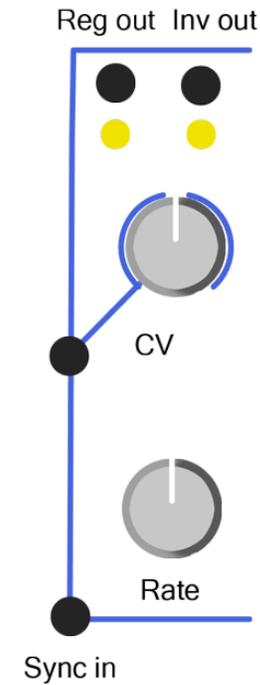
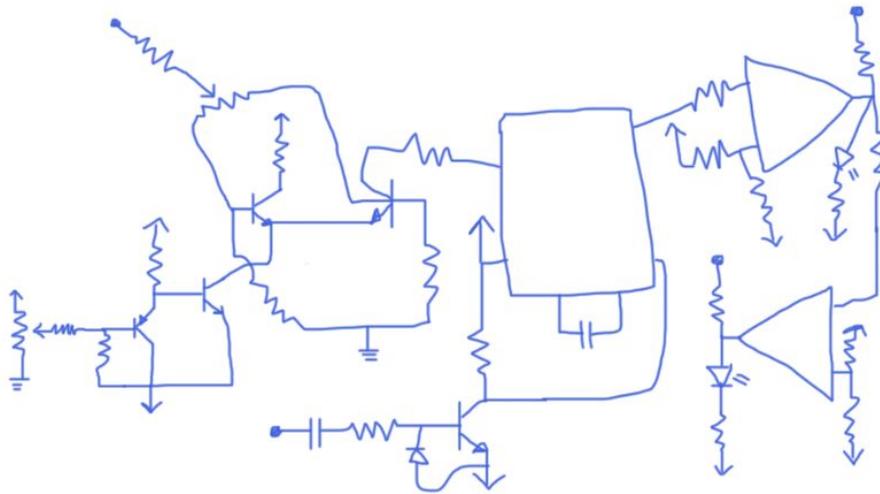
The envelopes are simple voltage controlled decay only circuits which give a sharp attack and a falling voltage based on the decay and decay cv settings. There is an article about the design of the envelope circuit [here](#) These are automatically triggered when using the sequencer sections.

# Sequencers



Sequencers are both halves of the 4015 dual 4 stage shift register. With the first four steps of the sequence mixed in an R2R DAC giving a stepped CV wave and the last four steps available through transistor buffers as logics for recirculation or other uses. The clock put is sensitive and if you are feeding data out back to the data in looping a pattern, touching the clock in or feeding it a new clock can buck your bits off of the pulse and they will not recirculate.

# Clock



The clock is the vco section of the 4046 PLL chip. There are resources online which address this technique using the chips with a current sink attached to one of the frequency setting "r" puts. A resource I found helpful for this was Thomas Henry's page about building a vco using the 4046. Certain varieties of this chip will not work using the current sink technique!! I have had success with CD4046 and NOT HEF4046.

-Will Schorre