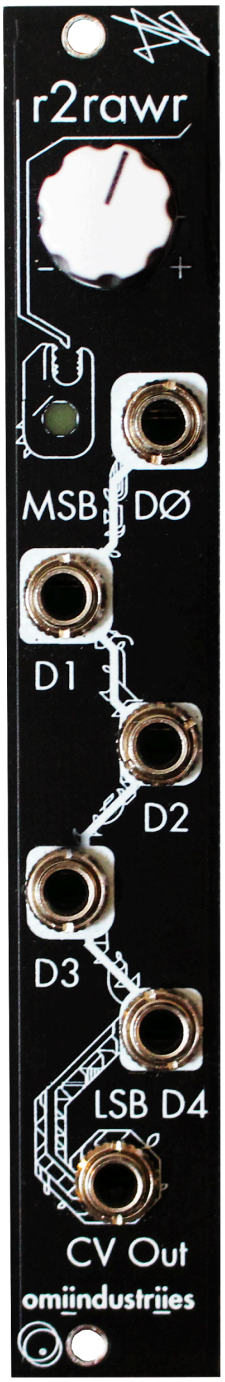
R2Rawr



The r2rawr in its most simple form is a 5-bit digital to analog converter. Its basic usage operation is to take gate signals (on or off binary signals) and turn those into stepped analog voltage. It's great to pair with clock dividers, random gate sources, logic modules, gate sequencers, and square wave oscillators/LFOs.

It uses a simple resistor ladder for its digital to analog conversion, a lo-fi and easy solution. This method uses resistors of two different values, R and 2R. A resistor (R) has a value (10k or 10,000 ohms) and another resistor (2R) with a value twice that resistance (20k or 20,000 ohms). This is called an R2R DAC.

The order from top to bottom of the inputs indicates the weighting of each bit. QØ on top has a label next to it reading MSB or Most Significant Bit, while Q4 has LSB next to it, or Least Significant Bit. Each bit input changes the voltage output by half as much as the bit above it.

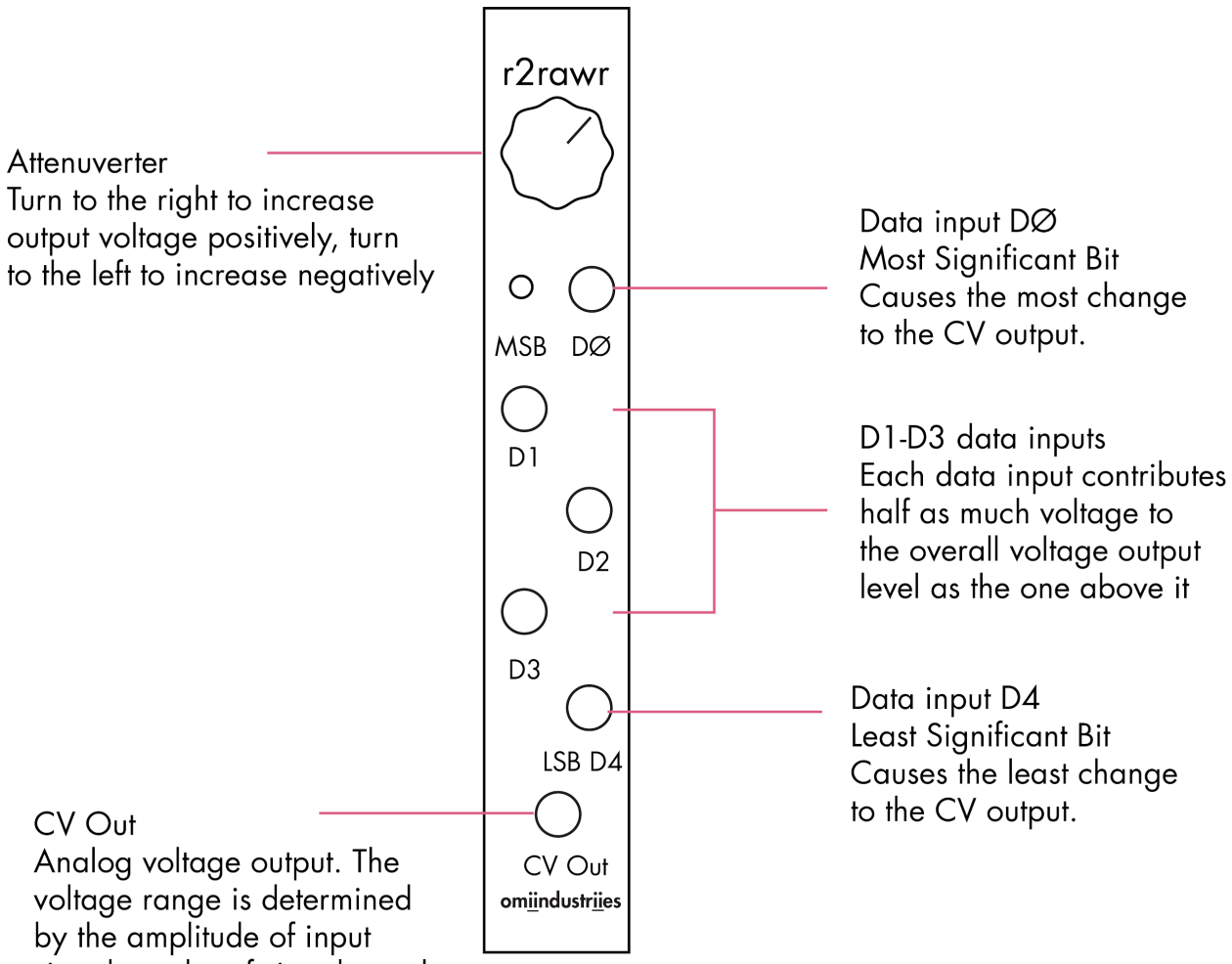
The output of the digital to analog converter is sent to an attenuverter to set the polarity and voltage level. An attenuverter is a bipolar amplitude control, which means if you turn it to the right, the voltage increases positively, if you turn it to the left the voltage will increase negatively. Although the digital to analog converter name instills an idea of just using digital/binary/gate signals, this is a Eurorack module, you can patch anything into the inputs, in fact I recommend you do to get a better feel of how your modules work.

However, much of the information laid out in this manual presupposes you are using gate signals as inputs.

It was primarily designed to be paired with the omiindustriies Dual Digital Shift Register. I chose a five-bit DAC as a way to motivate patching for more than one side of the DDSR with four gate outputs. I also just like the number five.

The total number of possible states for the r2rawr at a given attenuverter level is 2^5 (two to the fifth power) which equals 32. This presupposes you are using binary signals only as the inputs. Changing the attenuverter level or polarity will cause a new set of 32 values to be present at the output stage.

While I've talked about all five bits being used at once, you by no means have to. Combining different groups of inputs will result in sequences with less possible states. The top three bit-inputs are where you're going to get the most dramatic change.


r2rawr
MSB
DØ
D1
D2
D3
LSB D4
CV Out
omiindustriies
Attenuverter
Turn to the right to increase output voltage positively, turn to the left to increase negatively
Data input DØ
Most Significant Bit
Causes the most change to the CV output.
D1-D3 data inputs
Each data input contributes half as much voltage to the overall voltage output level as the one above it
Data input D4
Least Significant Bit
Causes the least change to the CV output.
CV Out
Analog voltage output. The voltage range is determined by the amplitude of input signals, order of signals, and attenuverter settings.

Tips

- ➔ Use a clock divider/multiplier set at the master clock speed or two times the clock speed to make time-synced vibrato. Unsynced oscillators can also be used for different flavors of vibrato.

- ➔ If you don't like a particular sequence, try reordering the data inputs.

- ➔ It can also act as a mixer for audio signals. The attenuverter becomes the master level control and the order the input sources are patched becomes their set level in the mix.

- ➔ The r2rawr uses a high speed operational amplifier at its attenuverter and output stages. This op amp in particular was chosen because of its use in the line of LZX video synthesizer modules. This means the r2rawr can not only process input signals that exist below and at the audio range, it can operate up to the rate of video signals.

- ➔ The r2rawr can also be used to drop Eurorack audio level signals down to the +/-1V range used by LZX modules by using the last two inputs and the attenuverter.

- ➔ There is a voltage drop and no amplification so the output voltage will be lower than the amplitude of the incoming signals.

- ➔ Different manufacturers use different voltage levels for their gate/trigger signals. Common levels are 5V and 8V, but it changes from maker to maker.

- ➔ The line below the power header on the PCB indicates the position of the red stripe or -12V line. No damage will come from plugging it in wrong as it has polarity protection.

- ➔ The r2rawr uses 15mA @ +12V, and 14mA @ -12V and is 25mm deep