

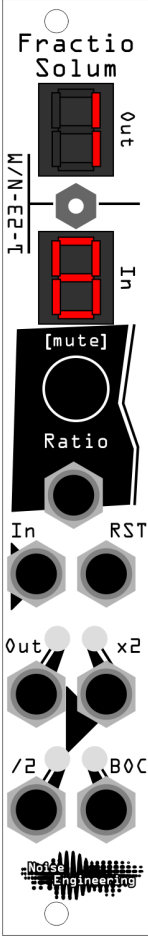
Noise Engineering

Fractio Solum

CV-controlled clock divider and multiplier with intuitive ratio display.

Overview

Type	Voltage controlled clock divider/multiplier
Size	4 HP
Depth	0.8 inches
Power	2x5 Eurorack
+12 mA	50
-12 mA	14
+5 mA	0



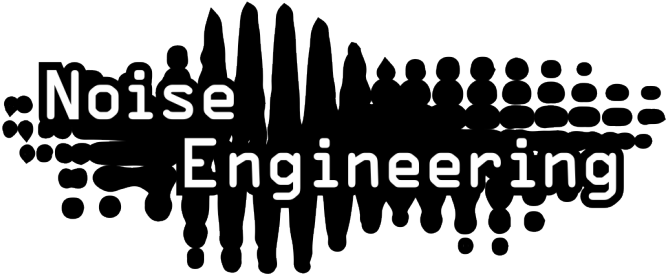
Fracto Solum is a simple and easy-to-use clock divider/multiplier. Patch a clock to the In jack, dial in a fraction with the encoder, and you're off! CV over ratio opens up an extra level of clocking and sequencing power. FS also includes a mute feature, a reset input, x2 and /2 outs that further divide and multiply the selected ratio by 2, and a BOC output that outputs a trigger each time the division starts a cycle.

Etymology

Fractio -- from latin: "fraction"

Solum -- from latin: "foundation"

"Foundation of fractions"



Power

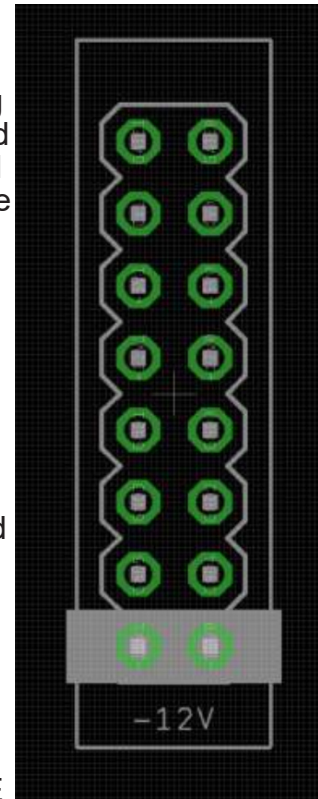
To power your Noise Engineering module, turn off your case. Plug one end of your ribbon cable into your power board so that the red stripe on the ribbon cable is aligned to the side that says -12v and each pin on the power header is plugged into the connector on the ribbon. Make sure no pins are overhanging the connector! If they are, unplug it and realign.

Line up the red stripe on the ribbon cable so that it matches the white stripe and/or -12v indication on the board and plug in the connector.

Screw your module into your case BEFORE powering on the module. You risk bumping the module's PCB against something metallic and damaging it if it's not properly secured when powered on.

You should be good to go if you followed these instructions. Now go make some noise!

A final note. Some modules have other headers -- they may have a different number of pins or may say NOT POWER. In general, unless a manual tells you otherwise, DO NOT CONNECT THOSE TO POWER.



Warranty

Noise Engineering backs all our products with a product warranty: we guarantee our products to be free from manufacturing defects (materials or workmanship) for one year from the date of the original retail purchase (receipt or invoice required). The cost of shipping to Noise Engineering is paid by the user. Modules requiring warranty repair will either be repaired or replaced at Noise Engineering's discretion. If you believe you have a product that has a defect that is out of warranty, please contact us.

This warranty does not cover damage due to improper handling, storage, use, or abuse, modifications, or improper power or other voltage application.

Input and output voltages

FS's trigger inputs will trigger from any signal over +2v. The CV input expects only positive voltage, 0v to +5v. The outputs send triggers at about +5v.

Interface

Out/In (display): These two numbers indicate the selected clock ratio. The display can be thought of as a fraction: for instance, if $\frac{3}{4}$ is displayed, 3 triggers will be output at the Out jack for every 4 triggers that are input at the In jack.

Ratio: Sets the division/multiplication ratio.

Ratio (press): Activates a mute on all outputs. Pressing again unmutes the clock while keeping everything in time and phase.

In: Clock input.

RST: Reset input. Resets the clock cycle to the beginning.

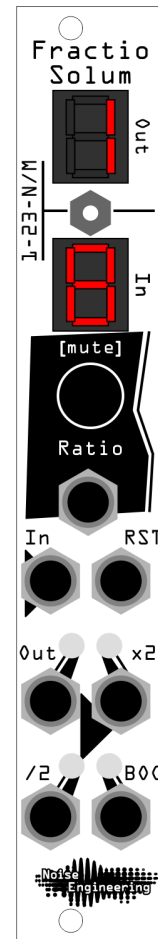
Out: Clock output based on ratio shown on the Out/In displays.

x2: Identical to Out but twice the rate.

/2: Identical to Out but half the rate.

BOC: Outputs a trigger at the beginning of each clock cycle, based on the /2 output. This means that the main Out jack will complete two cycles every time BOC fires.

1-23-N/M: Selects a subset of ratios that can be selected with the encoder or CV. See tables on the next page for a full lists of ratios.



Ratio tables

1: $1/x$ or $x/1$. x can be any number from 1-16.

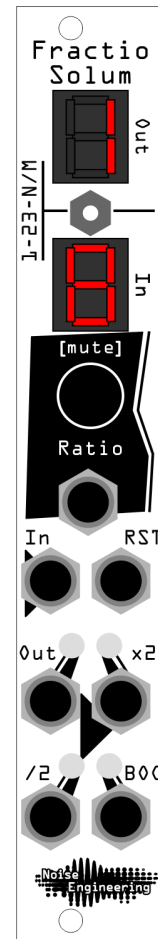
1/16	1/15	1/14	1/13
1/12	1/11	1/10	1/9
1/8	1/7	1/6	1/5
1/4	1/3	1/2	1/1
2/1	3/1	4/1	5/1
6/1	7/1	8/1	9/1
10/1	11/1	12/1	13/1
14/1	15/1	16/1	

23: this removes divisors that have factors that are not 2 or 3 in either the numerator or denominator.

1/16	1/12	1/8	1/6
3/16	1/4	1/3	3/8
1/2	2/3	3/4	1/1
4/3	3/2	2/1	8/3
3/1	4/1	16/3	6/1
8/1	12/1	16/1	

N/M: Any fraction with numerators/denominators equal to or less than 10. Find all of the unusual divisions and multiplications here.

1/10	1/9	1/8	1/7	1/6	1/5	2/9	1/4	2/7
3/10	1/3	3/8	2/5	3/7	4/9	1/2	5/9	4/7
3/5	5/8	2/3	7/10	5/7	3/4	7/9	4/5	5/6
6/7	7/8	8/9	9/10	1/1	10/9	9/8	8/7	7/6
6/5	5/4	9/7	4/3	7/5	10/7	3/2	8/3	5/3
7/4	9/5	2/1	9/4	7/3	5/2	8/3	3/1	10/3
7/2	4/1	9/2	5/1	6/1	7/1	8/1	9/1	10/1



Patch Tutorial

Polyrhythms: Mult a clock to the In jack on FS and to a trigger destination like Manis Iteritas. Patch the Out jack on FS to another trigger destination. Turn the encoder to change the ratio and hear the difference in triggering. Patch a slower clock division to the RST jack to keep it in phase. This is useful for taming more unusual polyrhythms.

Now, patch the Out jack to a sequencer's clock input and the BOC jack to the sequencer's reset input. This will allow you to clock sequences polymetrically while staying in time and phase in relation to the master clock.

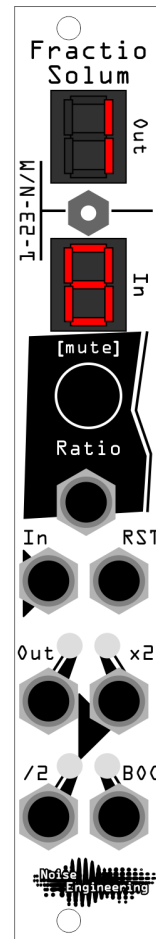
Clock sequence: Using the patch above, patch a CV source, like a stepped random or CV sequence, to the Ratio input. This will modulate the clock ratio, changing the meter of your sequence based on the input CV.

Poly polyrhythms: If you have two FS, try patching the same clock to both with different clock ratios on each. This is a great way to get polyrhythms, and by patching the same CV source to each you can add related-but-different variation to each part.

Rhythmic modulation: Try patching the four outputs of FS to a quad envelope generator like Pons Asinorum. This creates a source of rhythmic modulation, which is useful for modulating things like the BIA.

Tap tempo: If you have any sort of manual trigger module, the FS can act as a tap tempo. Patch the output of your manual trigger to the In jack on FS, and tap until FS picks up the rhythm.

Preset ratios: Try using a voltage sequencer like Mimetic Digitalis or Vox Digitalis to save ratio "presets". Patch a CV channel to the Ratio CV input on FS and set each step to the desired value, then manually (or with a clock) advance through steps to change the ratio. A multichannel sequencer like Mimetic Digitalis can control multiple FS, with different ratios per FS per step.



Design Notes

Fractio Solum was a weird idea from the start. The concept was simple but we knew that the test was going to be a nightmare. The whole point of FS is to help generate the weirdest rhythms out there.



These are **DIFFICULT** times.



Firmware testing is a tricky proposition at the best of times. Finding bugs in code creating time signatures that are wacky and also under CV? Good luck. It was daunting. We showed FS at NAMM 2019 and were close to having it out... but the enormity of the task of test continued to loom. We were excited with the format and layout, though; so much so that it inspired the layout of Vox Digitalis. In fact, both Markus and Kris independently designed the VD to be essentially what it is based on the FS (we were pretty excited when two of us converged on the same concept with almost 100% overlap since that's pretty rare and we usually do a lot more arguing).

In late 2019, we started working on a new generation of processors and we realized that we could port the FS to this processor. The new processor afforded a lot of advantages and so we decided to take the time to do it, even though it delayed release of the product. We expected the switch to move us into 2020, but that the release would not be delayed dramatically. Of course, 2020 happened.

FS is an odd duck. It isn't everyone's cup of tea. If you like weird times, it might be yours. If you like polyrhythms, take two. The moment Kris fell in love with it was when she put three in a case with six BIA. It's a different workflow than any comparable module, but we hope you'll find it intuitive, useful, and most of all, fun.

Special Thanks

Michael Gordon