Ritual Electronics Amnis Perfect Circuit Random And Chaos Modulation Instruction Manual

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Ritual Electronics

Ritual Electronics Amnis Perfect Circuit Random And Chaos Modulation

Product Information

The Ritual Electronics Amnis is a shift register module with versatile functionality. It can be used as a generative sequencer for gates and CV, a tunable digital noise source, a random gate and CV generator, and the center of a chaotic system, among other applications. The module features two input signals: Clock and Data, which are comparator-based. From these signals, the Amnis generates 8 gate outputs that are synchronized with the clock. Additionally, it produces 3 staircase CVs and a slewed CV. With its 8 gates and 4 CV outputs, the Amnis can serve as the core of any modular patch.

Product Usage Instructions

1. **Installation:**
    - Always turn off your Eurorack case before plugging or unplugging the Amnis module.
    - Ensure the correct connection of the bus board cable by aligning the red line on the cable with the RED text on the module.
    - Take caution not to touch any electrical terminals when attaching the Eurorack bus board cable.
    - The Amnis module requires a 10-pin cable for connection and uses a 16-pin connector for expansions.
    - Make sure you have 6HP of free space in your Eurorack case for installing the Amnis module. The module has a depth of 35mm.
2. **Expansion:**
    - The Amnis module is compatible with Music Thing Modular Turing Machine expanders, replacing the Turing Machine as the master.
    - Exercise caution when connecting the header, as many Turing Machine expanders are not protected against reverse voltages.
    - Recommended expanders include Music Thing Volts, Mystic Circuits Leaves, Schreibmaschine Modular Brainiac, and Binary.

3. **Usage:**
    - Provide the Amnis module with two input signals: Clock and Data.
    - The Clock signal determines the timing of the outputs, while the Data signal can be any type of signal.
    - The Amnis generates 8 gate outputs synchronized with the Clock signal.
    - From these gate outputs, it also produces 3 staircase CVs and a slewed CV.
    - The module can be used in various patching configurations to achieve desired generative sequences, digital noise, random gates, and chaotic systems.

Amnis

Thank you for purchasing Ritual Electronics Amnis.
Your module has been assembled with care in our studio in Marseille, France.

- **You can find your module on Modulargrid: https://www.modulargrid.net/e/ritual-electronics-amnis**
- **For any remarks and information, contact us at**: **contact@ritualelectronics.com**
- **For video demos and patch ideas check**: **https://www.instagram.com/ritualelectronics/**

Limited warranty

Ritual Electronics warrants this product to be free of defects in materials or construction for a period of one year from the date of purchase. Malfunction resulting from wrong power supply voltages, backward or reversed euro rack bus board cable connection, abuse of the product or any other causes determined by Ritual Electronics to be the fault of the user are not covered by this warranty, and normal service rates will apply. During the warranty period, any defective products will be repaired or replaced, at the option of Ritual Electronics, on a return-to-Ritual Electronics basis with the customer paying the transit cost to Ritual Electronics. The return of your module is on us. Ritual Electronics implies and accepts no responsibility for harm to persons or apparatus caused through the operation of this product.

Installation

Always turn your Eurorack case off before plugging or unplugging a module. Please pay attention to the way you connect the bus board cable. Align the red line on the cable with the “RED” text on the module. Do not touch any electrical terminals when attaching any Eurorack bus board cable.Amnis uses a 10-pin cable. The bigger 16-pin connector is used for expansions. See the next page. Ritual Electronics Amnis requires:

- 85mA on +12V (maximum recorded draw)
- 10mA on -12V
- 0mA on +5V

You will need 6HP of free space in your Eurorack case to install Amnis. The module is 35mm deep.

Expansion

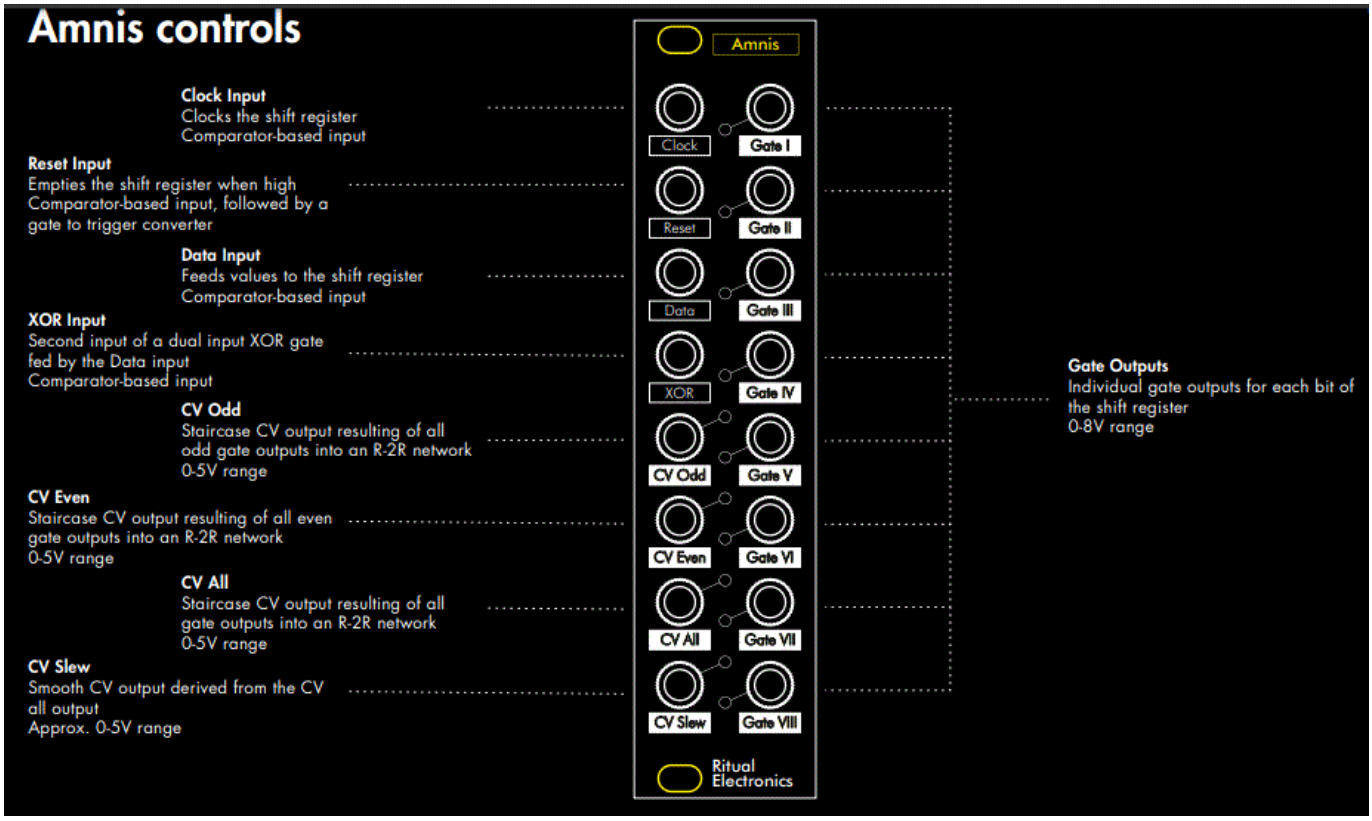
- Amnis is compatible with the Music Thing Modular Turing Machine expanders. It acts as the Master (replaces the Turing Machine).
- Please be very careful with the header connection. Many Turing Machine expanders are not protected against reverse voltages.
- Some of the expanders are very useful, such as the simple Music Thing Volts, the great Mystic Circuits Leaves

or the very blinking lights Schreibmaschine Modular Brainiac and Binary.

Overview

- Amnis is a shift register with a few tricks up its sleeves. It can be used as a generative sequencer for gates and CV, as a tunable digital noise source, as a random gate and CV generator, as the center of a chaotic system, and more.
- It needs two input signals to start doing its thing. A Clock and some Data. Data can be pretty much any signal. Both inputs are comparator-based.
- From these two signals, Amnis will generate 8 gate outputs, always on the clock. From these gate outputs, it will generate 3 staircase CVs and a slewed CV. With 8 gates and 4 CV outputs, it can be the heart of any patch.
- Amnis has an XOR input for linear feedback. A shift register with linear feedback is the core of the Rungler, the chaotic core in Rob Hordijk's Benjolin and Blippoo Box. With Amnis you can recreate these types of behaviors with any oscillators you have on hand. As it is fully patchable, you can use the XOR for way more.
- Amnis is compatible with the Turing Machine expanders thanks to its expansion port at the back.

Amnis controls



Shift Registers

- Digital shift registers were not created to be musical devices. You can find a lot of them in computers and digital devices where they can have a variety of purposes. Despite being very simple it is versatile when used as part of a sound-making system.
- On each clock tick, the shift register reads the Data input. If the Data input is High (signal above 2.5V) the shift register will output a gate on Gate I output. If the Data input is Low (signal below 2.5V) the shift register won't output a gate.
- On the next clock tick, this process starts again. The Data is analyzed and the result is output on Gate I. At the same time, the previous result gets shifted to the next Gate output.
- When the information reaches Gate VIII, it drops out of the shift register and gets forgotten forever.
- The Wikipedia article is not bad and worth reading if you want to have a deeper understanding: **https://en.wikipedia.org/wiki/Shift_register**
- Do not mix up the Shift Register and Analog Shift Register! The latter is very different and while being very interesting in a musical context, it is not what Amnis is. Amnis is a digital shift register, it reads gates and outputs gates.

Linear Feedback Shift Registers

- When coupled with a logic gate, shift registers can turn into LFSRs or Linear Feeback Shift Registers. With the use of feedback the shift register can be used to generate pseudo-random sequences, digital noise, and more.
- By connecting a Gate Output to the XOR Input of Amnis, we create a feedback loop that influences the result of the Data analysis. The Data signal will be XORed against the XOR Input. Note that external signals can be used in the XOR Input.
- A quick look at the Wikipedia article may confuse you some more: **https://en.wikipedia.org/wiki/Linear-**

feedback_shift_register

- In a musical context, this means you can spice up the sequences you get from the “classic” shift register.
- You won’t get long non-repairing random sequences with Amnis’ setup but using Gate VIII in the XOR input you get a reasonable amount of randomness.
- By patching some more you can go very random though. See the patch examples later.

Clock

- The Clock system in Amnis deserves a bit of explanation as it is a crucial element of the shift register in a musical context.
- The Clock and Data inputs need to be precisely aligned to work as expected. If the Data signal is received after the rising edge of the clock, it won’t result in a High value at Gate I.
- When Amnis is used with a digital sequencer as both the Data source and the Clock source a problem can arise. The digital nature of the sequencer means the signal it outputs may have small timing differences between them. The shift register does not like this.
- Amnis has a Clock delay built in. The trimmer on the bottom PCB is used to shift the Clock forward in time. This way you can align the Clock and the Data signals.
- If you don’t plan on using Amnis this way, leave the trimmer at 0 (fully CCW) as the delay compensation reduces the maximum speed of the clock.

Reset

- The Reset Input can be used to create shorter sequences or to empty the shift register bits
- As with all other inputs the Reset Input can be driven with any signals thanks to its built-in comparator.
- It also features a gate to trigger the converter. This way only the rising edge of the signal is used to reset instead of pausing the shift register for the length of the received gate

Data

- Data is a vague name for an input but we could not find better. First, it shows the digital nature of the shift register. Second, it does not specify the type of expected signal… as it can be any!
- It can be any signal but it will eventually end up being a gate. The Data Input goes straight into a comparator. Its threshold is set to 2.5V.
- If the Data signal you use is correlated to the Clock Input, you’ll have more or less repetitive behaviors. If the Data signal is free-running and completely desynchronized, you’ll end up with an evolving behavior.
- For more control over the Data, use an external comparator before the Data Input!

XOR

- As described earlier, the XOR Input is used to turn the shift register in a Linear Feedback Shift Register. Musically, it allows multiple things.
- The most straightforward is to add randomness or variations to the shift register.
- It can also be used to loop the register. For an 8-step loop, plug Gate VIII to the XOR Input, and disconnect the Data cable when you like a sequence. Amnis will repeat itself. See patch examples for a detailed explanation.

- If you have other logic modules in your system you can try combining them with the Gate Outputs to allow longer pseudo-random sequences.
- If you feed Amnis a single Gate in the Data input and XOR together Gates IV, V, VI & VIII you will have a 255 steps random sequence a.k.a. the longest pseudo-random sequence you can obtain with an 8-bit linear feedback shift register.

A [Data]	**B [XOR]**	**Out [Gate I]**
0	0	**0**
1	0	**1**
0	1	**1**
1	1	**0**

- XOR logic truth table
- (0 = Gate Low, 1 = Gate High)

Outputs

- Amnis has three types of outputs. 8 Gate outputs, 3 staircase CV outputs, and 1 smooth CV output.

Gate Outputs

- They correspond to each bit of the register (bit 0 = Gate I, bit 1 = Gate II, …, bit 7 = Gate VIII)
- They are 8V gates with a duty cycle of 50% of the Clock

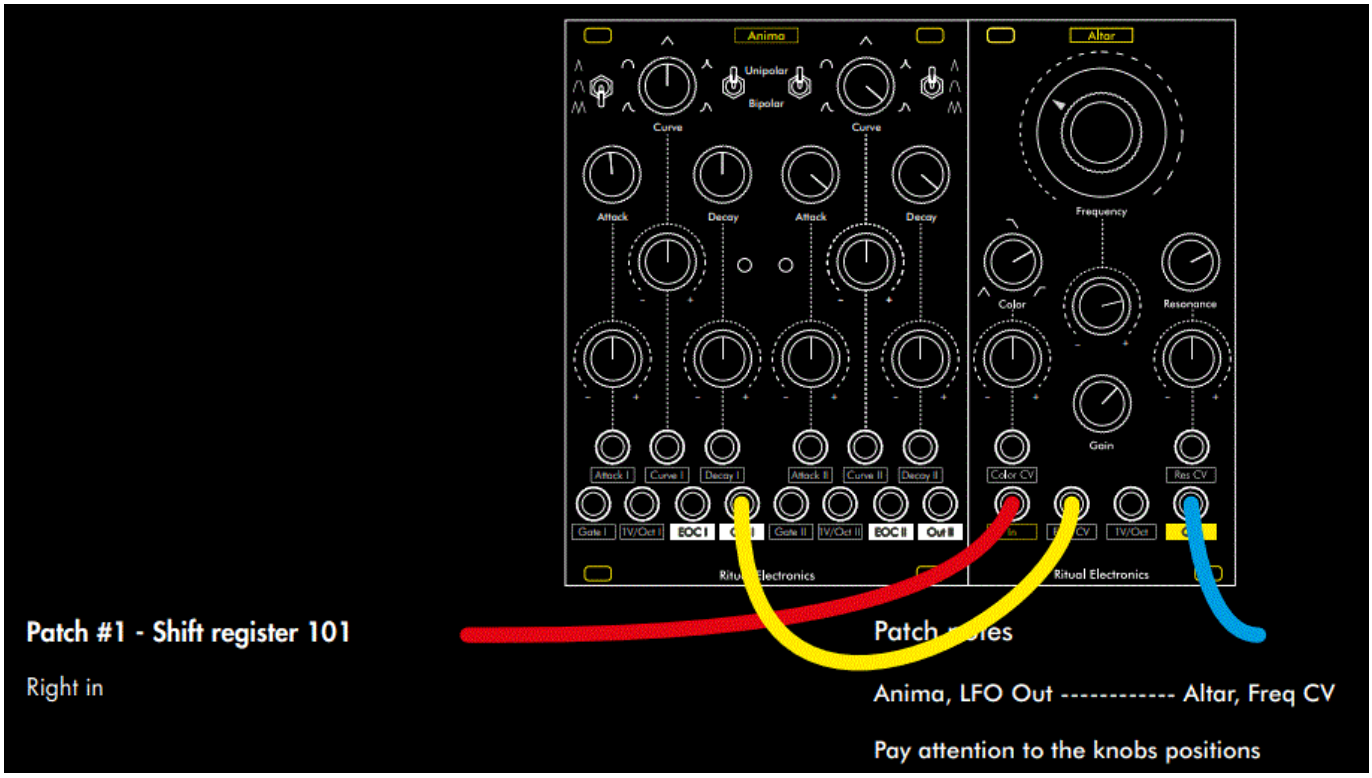
Staircase CV Outputs

- The different CV outputs are mixed together using the R-2R principle. The first output uses the 4 odd bits in a R-2R
- The second output uses the 4 even bits in a second R-2R
- The third output uses all the outputs in an 8-bit R-2R network.

Slewed CV Outputs

- To add even more versatility to Amnis we turned the All Output into a smooth CV by sending it to a slew limiter. It softens the edges of the staircase for a Slewed CV Output. Note that the slewing is speed-dependent. Different clock speeds will lead to different degrees of smoothness.

Patch ideas



Patch #2 – LFSR 101
We dared.
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #3 – Gate sequencer expander
We dared.
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #4 – True Random Generator White Noise
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #5 – Digital Noise Digital
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #6 – Bitcrusher Use Réseaux or another R-2R / Mixer to rearrange the bits!
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #7 – Rungler
Use Réseaux or another R-2R to rearrange the bits!
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #8 – Patch It Yourself Turing Machine
Use Réseaux or another R-2R to rearrange the bits!
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV
- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Patch #9 – Ecosystem
Heart of a living and breathing patch
Patch notes

- Sampler, Out ———— Envelope Follower, In
- Envelope Follower, Out ———- Altar, Freq CV

- Sampler, Out ————- Preamp, In
- Preamp, Out ————- Altar, In

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Documents / Resources

Amnis	Ritual Electronics Amnis Perfect Circuit Random And Chaos Modulation [pdf] Instruction Manual Amnis Perfect Circuit Random And Chaos Modulation, Amnis, Perfect Circuit Random And Chaos Modulation, Circuit Random And Chaos Modulation, Random And Chaos Modulation, Chaos Modulation

References

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- Shift register - Wikipedia
- Ritual Electronics (@ritualelectronics) • Instagram photos and videos
- Ritual Electronics Amnis - Eurorack Module on ModularGrid
- User Manual