INSTRUŌ | SPECIALIST SYNTHESIZERS

eãs

Logic Module

User Manual

Contents

Description

Logic gates were originally used for the implementation of Boolean functions in computation and in electronic devices. These functions were performed on one or more binary inputs to create a single binary output.

In music synthesis, this concept can be appropriated for many things including the creation of interesting rhythmic patterns as well as patch-based problem solving.

eãs is the be all and end all of logic modules. Sporting all of the classic logic gate functions, it includes AND, NAND, OR, NOR, XOR, XNOR, and NOT.

Everything from syncopated rhythmic structures, to CMOS-style ring modulation, to creative solutions to your patch's most glaring issues, eãs is there.

Logic, after all, is the beginning of wisdom, not the end of it.

Features

- AND & NAND gate logic
- OR & NOR gate logic
- XOR & XNOR gate logic
- NOT gate logic

Installation

1. Confirm that the Eurorack synthesizer system is powered off.
2. Locate 4 HP of space in your Eurorack synthesizer case.
3. Connect the 10 pin side of the IDC power cable to the 2x5 pin header on the back of the module, confirming that the red stripe on the power cable is connected to -12V.
4. Connect the 16 pin side of the IDC power cable to the 2x8 pin header on your Eurorack power supply, confirming that the red stripe on the power cable is connected to -12V.
5. Mount the Instruō **eãs** in your Eurorack synthesizer case.
6. Power your Eurorack synthesizer system on.

Note:

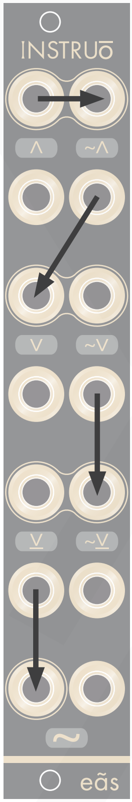
This module has reverse polarity protection.
Inverted installation of the power cable will not damage the module.

Specifications

- Width: 4 HP
- Depth: 27mm
- +12V: 5mA
- -12V: 0mA

eãs | /es/ | **noun** (nature) a cascade of water falling from a height, formed when a river or stream flows over a precipice or steep incline.

Normalisation



Key

1. AND Input 1
2. AND Input 2
3. AND Output
4. NAND Output
5. OR Input 1
6. OR Input 2
7. OR Output
8. NOR Output
9. XOR Input 1
10. XOR Input 2
11. XOR Output
12. XNOR Ouput
13. NOT Input
14. NOT Output

Gate Logic

AND & NAND Gate Logic: In AND gate logic, voltage is held HIGH at the output if all the inputs to the AND gate are held HIGH. If none or not all inputs to the AND gate are HIGH, the output will be held LOW. NAND gate logic is the inverse of AND gate logic.

- If the signal present at **AND Input 1** and **AND Input 2** are both held HIGH, voltage will pass to the **AND Output**.
- The signal present at **AND Input 1** normals to **AND Input 2**, meaning that if there isn't a cable connected to **AND Input 2**, the AND gate will still function.
- An inverted copy of the AND gate is present at the **NAND Output**.

OR & NOR Gate Logic: In OR gate logic, voltage is held HIGH at the output if one or both of the inputs to the OR gate are held HIGH. If neither input is HIGH, the output will be held LOW. NOR gate logic is the inverse of OR gate logic.

- If the signal present at either **OR Input 1** or **OR Input 2** is held HIGH, voltage will pass to the **OR Output**.
- If using the OR gate only, a signal must be present at **OR Input 1** for **OR Input 2** to function.
- An inverted copy of the OR gate is present at the **NOR Output**.
- The **NAND Output** normals to **OR Input 1**.

XOR and XNOR Gate Logic:

In XOR gate logic, voltage is held HIGH at the output if one, and only one, of the inputs is held HIGH. If both inputs are held LOW or both are held HIGH, the output will be held LOW. XNOR gate logic is the inverse of XOR gate logic.

- If the signal is exclusively held HIGH at either **XOR Input 1** or **XOR Input 2**, but not both, voltage will pass to the **XOR Output** and **XNOR Output**.
- An inverted copy of the XOR gate is present at the **XNOR Output**.
- The **NOR Output** normals to **XOR Input 2**.

NOT Gate Logic:

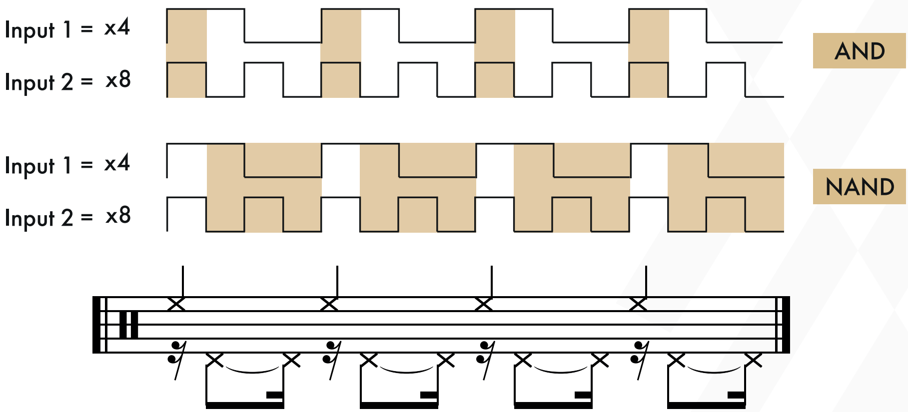
In NOT gate logic, voltage is held HIGH at the output if LOW voltage is present at the input. Similarly, voltage is held LOW at the output if HIGH voltage is present at the input.

- NOT gate logic is a way to invert gate and trigger signals.
- The **XOR Output** normals to the **NOT Input**.

Boolean Logic Tables

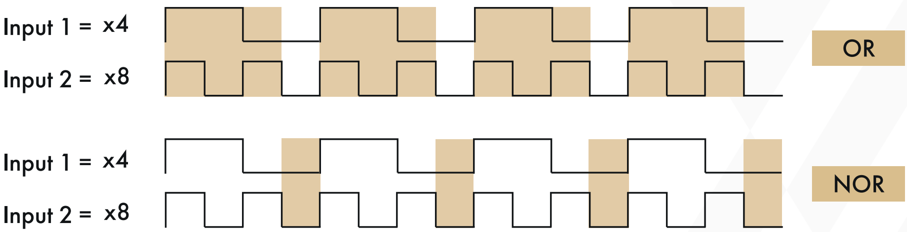
AND & NAND Gate Logic

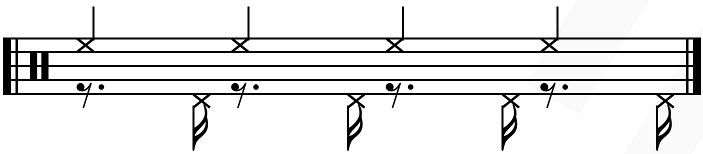
Input 1	Input 2	AND	NAND
0	0	0	1
0	1	0	1
1	0	0	1
1	1	1	0



OR & NOR Gate Logic

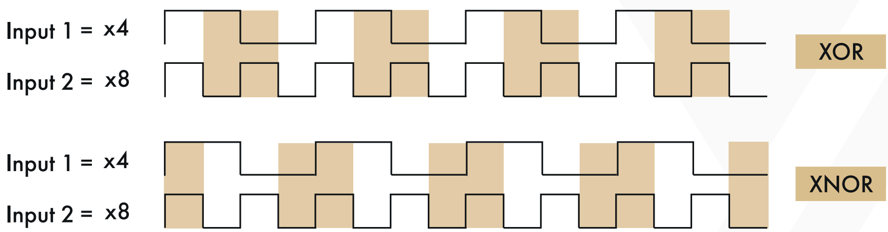
Input 1	Input 2	OR	NOR
0	0	0	1
0	1	1	0
1	0	1	0
1	1	1	0

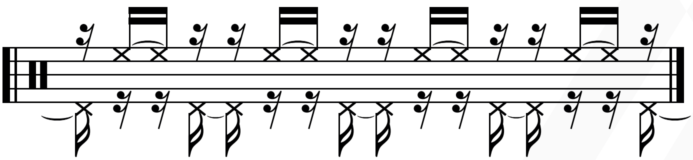




XOR & XNOR Gate Logic

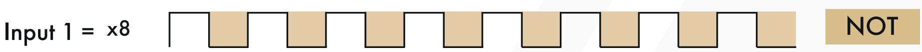
Input 1	Input 2	XOR	XNOR
0	0	0	1
0	1	1	0
1	0	1	0
1	1	0	1

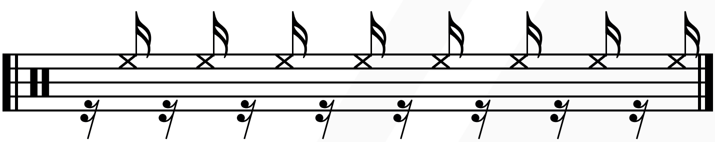




NOT Gate Logic

Input	NOT
0	1
1	0

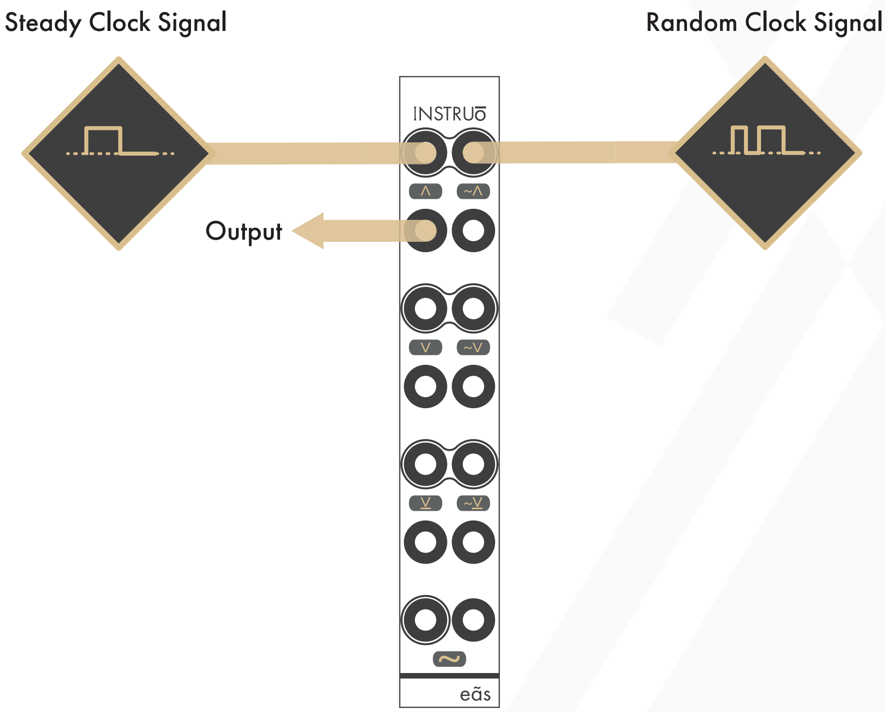




Patch Examples

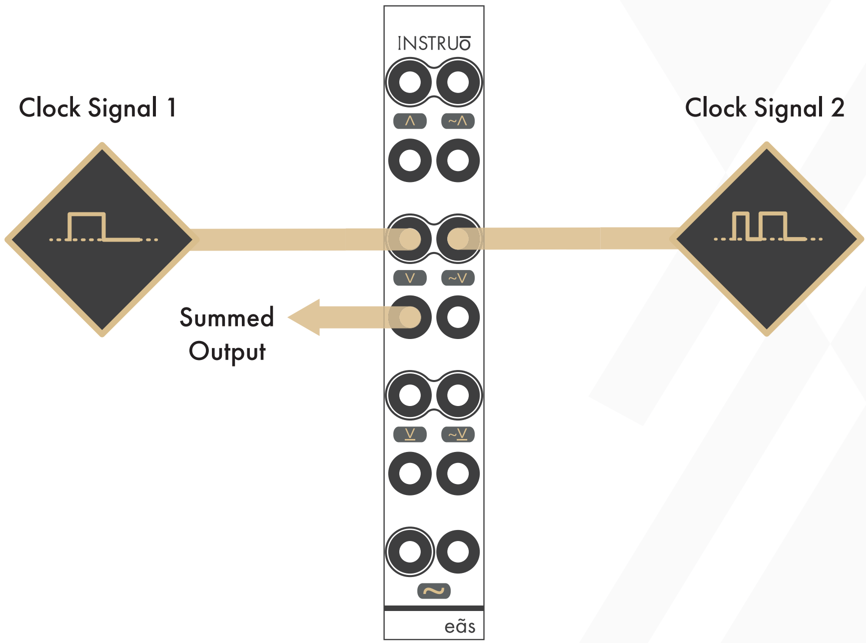
Pulse Syncing:

Summary: A primary use case for AND logic is to synchronize two pulse signals. By connecting a steady clock signal to **AND Input 1** and connecting a faster random pulse signal to **AND Input 2**, the **AND Output** will generate random pulses only when the steady clock signal is held HIGH.



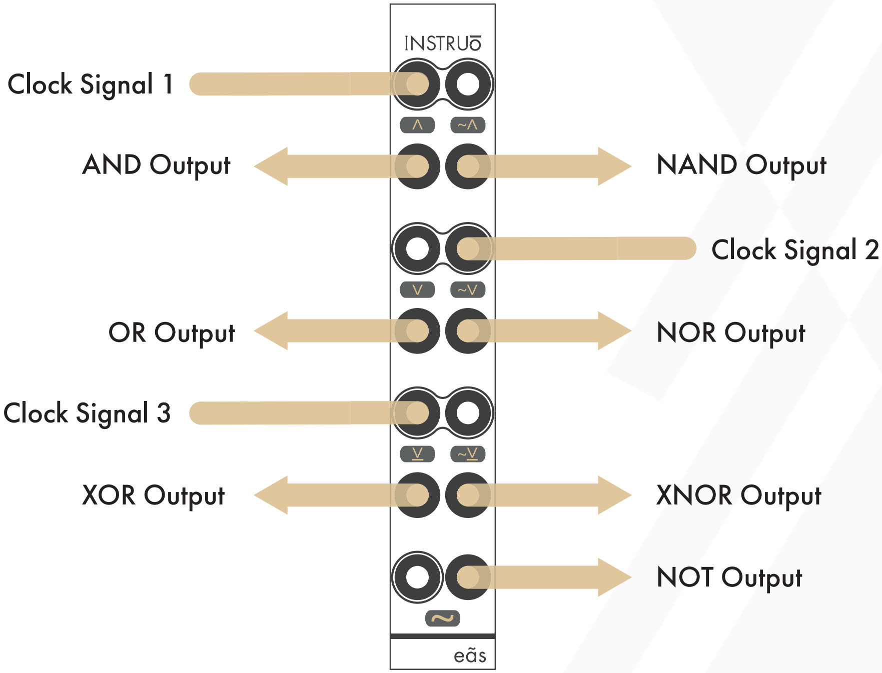
Pulse Mixing:

Summary: A primary use case for OR logic is to mix two pulse signals. By connecting a pulse signal to **OR Input 1** and a different pulse signal to **OR Input 2**, the **OR Output** will generate a sum of the two pulse signals, creating a more intricate pulse pattern.



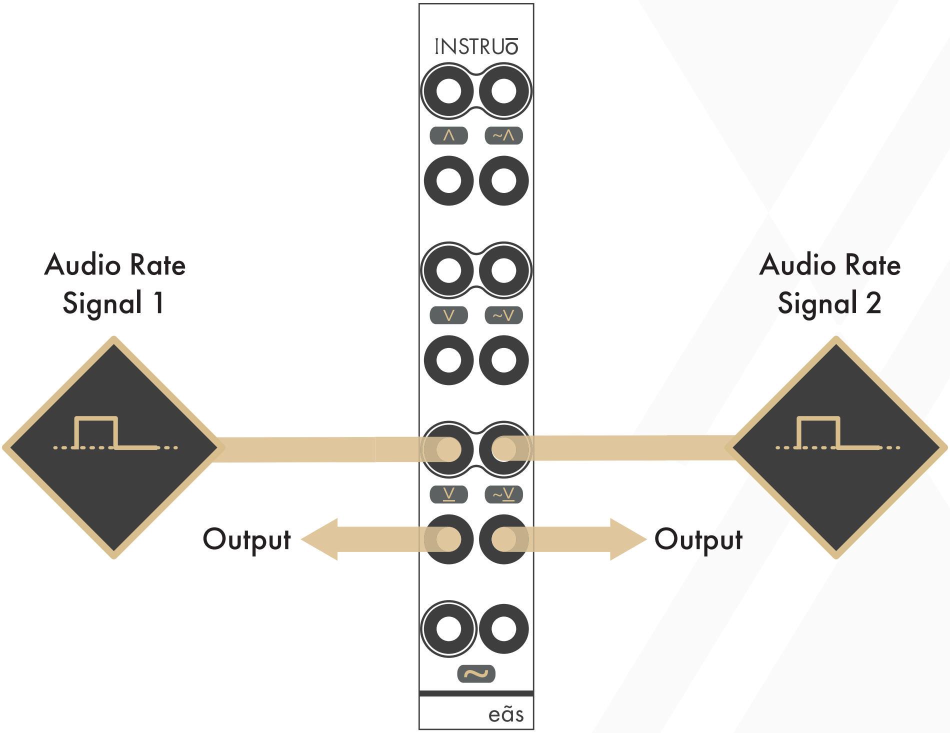
Rhythmic Variations:

Summary: Any two different clock signals or gate/trigger patterns can be connected to one of the logic gates for interesting rhythmic outputs. Experiment with different clock rates and logic gates. Take advantage of the internal normalling and use three clock signals or gate/trigger patterns instead of two.



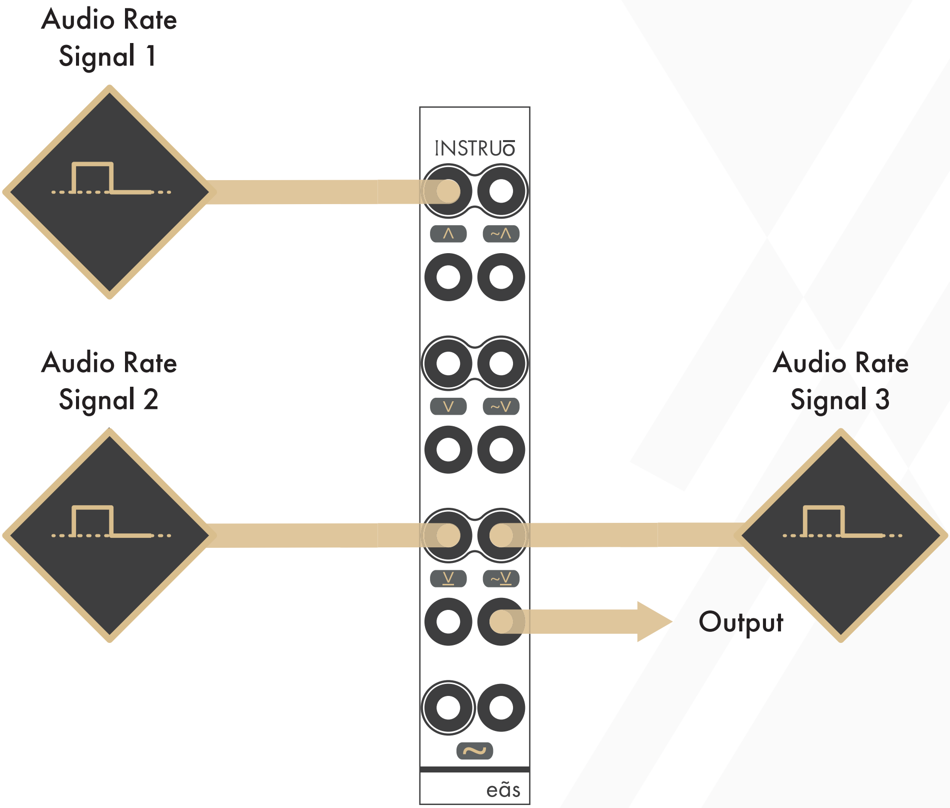
CMOS-Style Ring Modulation:

Summary: Connect two different audio signals to both **XOR Inputs** for CMOS-style ring modulation effects. This style of ring modulation is often used for synthesizing cymbal sounds. It's also found on many classic synthesizers as a way to add overtones to the primary oscillator waveforms.



Cheapnis:

Summary: Combine audio rate signals at any of the logic gates for 1-bit pulse code modulation tones. Unipolar positive audio rate signals will result in authentically cheap digital sounds.



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Manual Design: Dominic D'Sylva

CE This device meets the requirements of the following standards: EN55032, EN55103-2, EN61000-3-2, EN61000-3-3, EN62311.