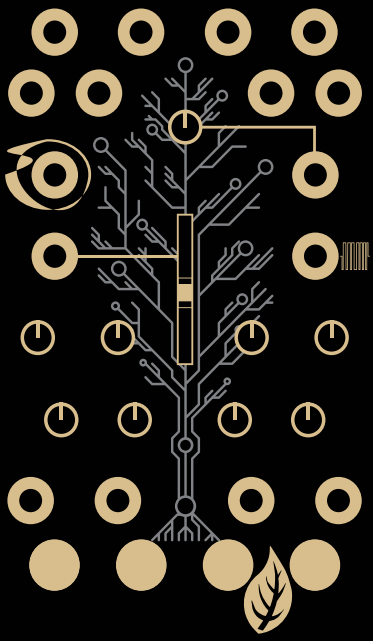
INSTRUŌ | SPECIALIST SYNTHESIZERS



SCÍON

Quad Random Voltage Generator / Biofeedback » CV

User Manual

Contents

3
Description / Features

4
Installation / Specifications

5
Overview

6
Stimulation

8
Sensitivity

9
Density / Raw Signal Output

10
Channels

12
Modes

16
Patch Examples

Description

The SCÍON is a biofeedback sensor built into a quad random voltage generator. This design is based on the MidiSprout by Datagarden (https://www.midisprout.com/)

It translates biofeedback data, sourced from contact with organic surfaces, into musically useful control signals. Tiny fluctuations in surface conductance on organic materials stimulate control voltage and gate signal changes that can be used to modulate and permutate your patch. Dynamic control over biofeedback sensitivity allows you to quickly adapt any input source to a useful range of responsiveness.

Apply the sensor pads (included with the SCÍON) to your house plants, your own skin, or even attach the sensor clips to your pet (only if it is willing). When no sensor cables are used simply touching the capacitive Leaf electrode with your finger will create random voltages derived from life itself.

SCÍON offers the ability to make music with all living things.

Features

- Four random control voltage outputs
- Four random gate outputs
- Raw signal output
- Conductive Leaf plate
- Semitone, random, harmonic overtone, and clocked modes
- Includes TENS sensor cable pads and TENS sensor cable clips

Installation

1. Confirm that the Eurorack synthesizer system is powered off.
2. Locate 14 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 SCÍON in your Eurorack synthesizer case.
6. Power your Eurorack synthesizer system on.

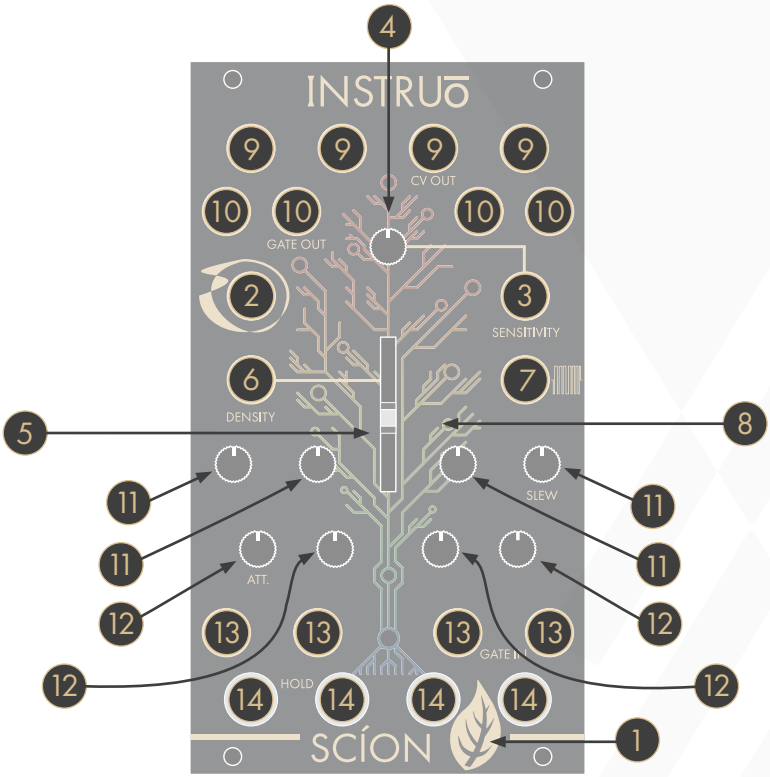
Note:

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

Specifications

- Width: 14 HP
- Depth: 27mm
- +12V: 70mA
- -12V: 10mA

SCÍON | ˈsʌɪən | **noun** (biology) young shoot or stem useful for sprouting or forming new roots, descendant of a noble family



Key

1. Leaf
2. Sensor Input
3. Sensitivity CV Input
4. Sensitivity
5. Density Fader
6. Density CV Input
7. Raw Signal Output
8. Tree
9. Channel 1 to 4 CV Outputs
10. Channel 1 to 4 Gate Outputs
11. Channel 1 to 4 Slew
12. Channel 1 to 4 Attenuators
13. Channel 1 to 4 Gate Inputs
14. Channel 1 to 4 Hold Buttons

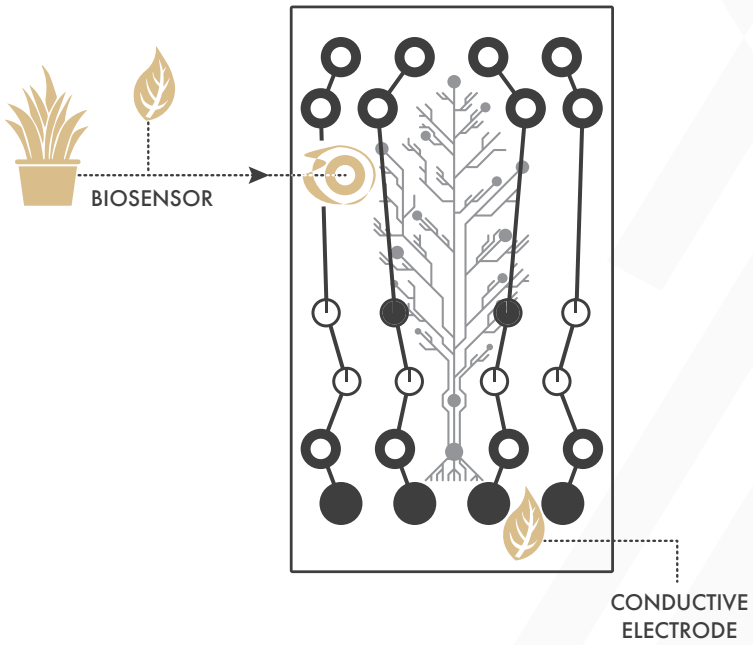
Stimulation

Leaf: The **Leaf** is a conductive electrode plate on the front panel that is connected to the **Internal Biofeedback Sensor**.

Sensor Input: Signals present at the **Sensor Input** will connect to the **Internal Biofeedback Sensor**.

- Biofeedback sources such as plants or human skin generate the information converted to control voltages and gate signals. These can be thought of as **Seeds**.

Seeds can be planted in multiple ways:



1. **Touching the Leaf**

When the **Leaf** is touched by a fingertip, the two conductive electrode plates complete a circuit that affects the **Internal Biofeedback Sensor**.

2. **Connecting the source via TENS Sensor Cables**

- Connect the 3.5mm TS end of the **TENS Sensor Cable** to the **Sensor Input**.
- Connect the two sensor pads (or sensor clips) of the **TENS Sensor Cable** to two separate areas of the organic source.
- Factors such as moisture, sunlight, and contact surface area can determine the responsiveness of a plant.
- Every plant will have a different level of responsiveness.

3. **Touching the end of a standard patch cable**

- Connect a 3.5mm TS patch cable to the **Sensor Input**.
- When both the Tip and Sleeve of the patch cable are touched by a fingertip, a circuit is completed that affects the **Internal Biofeedback Sensor**.

4. **Connecting any audio or control voltage signal**

- Rising edge signals work best.
- White noise will continually excite the **SCÍON**.

Sensitivity

The **Sensitivity** parameter sets the responsiveness of the **Sensor Input**.

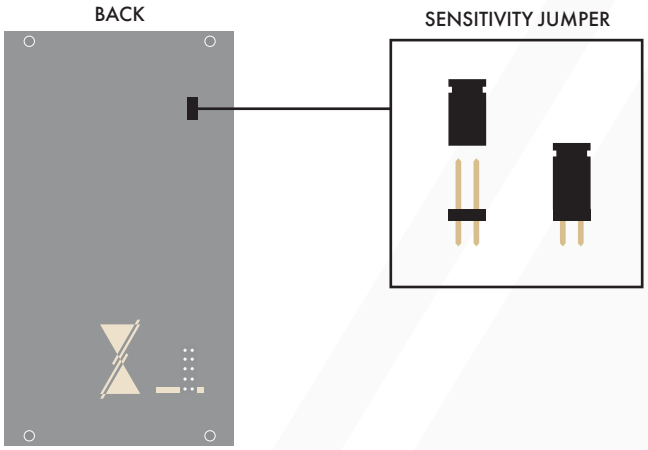
- Turning the knob anticlockwise decreases the responsiveness of the **Sensor Input** and/or the **Leaf**.
- Turning the knob clockwise increases the responsiveness of the **Sensor Input** and/or the **Leaf**.
- It is possible to find a threshold in which direct contact with the biofeedback source is needed for biofeedback activity.

Sensitivity CV Input: The **Sensitivity CV Input** is a unipolar positive control voltage input for the **Sensitivity Input**.

- Control voltage is summed with the knob position.
- Input Range: 0V - 5V.

Sensitivity Jumper: The **Sensitivity Input** and the **Leaf** are connected in parallel when the **Sensitivity Jumper** is installed.

- This allows for simultaneous control of the **Internal Biofeedback Sensor** via the **Sensitivity Input** and the **Leaf**.
- If the jumper is uninstalled, either the **Sensitivity Input** or the **Leaf** can be used, but not both. Using the **Sensitivity Input** will disable the **Leaf** in this configuration.



Density

The **Density** fader globally defines the distribution of available voltages for each channel.

- Moving the fader downward will decrease the available control voltage density.
- Moving the fader upward will increase the available control voltage density.
- It is important to note that individual control voltage ranges can be set via the **Attenuators**.
- The **Attenuators** affect the control voltage range set by the **Density** parameter on a per channel basis.
- There is more information on the **Density** parameter in the **Modes** section of the manual.

Density CV Input: The **Density CV Input** is a unipolar positive control voltage input for **Density**.

- Control voltage is summed with the fader position.
- Input Range: 0V - 5V.

Raw Signal Output

The **Raw Signal Output** accesses a pulse waveform from the analogue circuit used to generate the data at the **Internal Biofeedback Sensor**.

- This signal can be used as audio or control voltage/clock.
- Pressure applied to the **Leaf** will result in higher frequencies.
- Output range: 0V - 5V.



Channels

Tree: The **Tree** gives visual feedback of the **Internal Biofeedback Sensor** and the signals present at each **CV Output**. With the bloom of each colour, a new control voltage and gate duration is generated at the corresponding outputs. .

CV Output: The **CV Outputs** generate control voltages based on the activity of the **Internal Biofeedback Sensor**.

- Each **CV Output** corresponds to a different colour of the **Tree**.
- If the top of the **Tree** illuminates red, additional coin toss logic determines the possibility of a higher rate of control voltage activity. This red illumination can be thought of as a **High Activity Indicator**.
- From left to right, the **CV Outputs** correspond to the Blue, Green, Yellow, and Orange illumination of the **Tree** from bottom to top.
- Output range: 0V - 5V.

Gate Output: The **Gate Outputs** generate gate signals with random durations.

- Each **Gate Output** corresponds to a different colour of the **Tree**.
- From left to right, the **Gate Outputs** correspond to the Blue, Green, Yellow, and Orange illumination of the **Tree** from bottom to top.
- If the top of the **Tree** illuminates red, additional coin toss logic determines the possibility of shorter gate durations. This red illumination can be thought of as a **High Activity Indicator**.
- Duration ranges: 100ms - 3.5s.
- Output voltage: 5V.

Slew: The **Slew** knobs set the amount of time it takes for the control voltage signal to reach its final voltage level.

- This is also known as **Portamento**, **Slide**, or **Glide**.
- The **Slew** knobs individually affect the corresponding control voltage outputs on a per channel basis.

- Turning the knob anticlockwise decreases the amount of slew applied to the control voltage. If the knob is fully anticlockwise, control voltage will be stepped.
- Turning the knob clockwise increases the amount of slew applied to the control voltage.

Attenuator: The **Attenuators** individually scale the corresponding control voltages on a per channel basis.

Gate Input: A signal present at the **Gate Inputs** will activate either ratcheting for the corresponding **Gate Outputs**, in which the random duty cycle of the gate signal is divided into either 4, 8, or 16 subdivisions, or force a change in voltage, acting like a more traditional clocked sample and hold. The behavior of the **Gate Inputs** is determined by the state of **Mode 4: Clocked Mode**.

Hold Button: The **Hold Buttons** freeze the current control voltage and gate state of the corresponding channel.

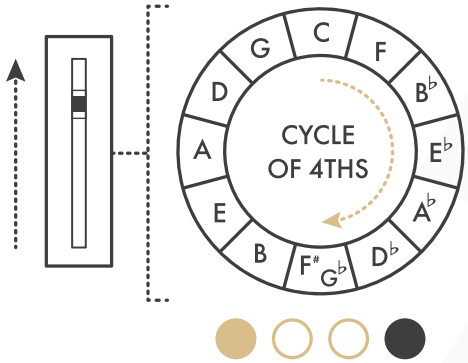
- When control voltage is held, manually turning the **Attenuators** will still scale the range of the **CV Outputs**.

Modes

To enter the **Mode Menu**, press all **Hold Buttons** down simultaneously until the **Hold Button** corresponding to the currently selected **Mode** starts to blink. **Modes** can then be selected by the **Hold Buttons**. Pressing the corresponding **Hold Button** for **Modes 1, 2, and 3** once will select the mode. A **Hold Button** will blink when the corresponding mode is selected. Pressing it again will exit the **Mode Menu**.

Once in the **Mode Menu**, Pressing the fourth **Hold Button** will toggle **Mode 4** on and off. **Mode 4** is a secondary option and can be used in conjunction with the three primary modes. Once it has been toggled, pressing the **Hold Button** for the selected primary mode will exit the **Mode Menu**.

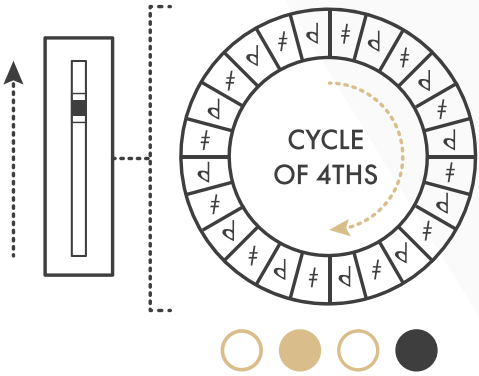
Mode 1 - Quantised Mode:



With the **Attenuators** fully clockwise, the 0V - 5V output range of the **CV Outputs** will be quantised to semitones.

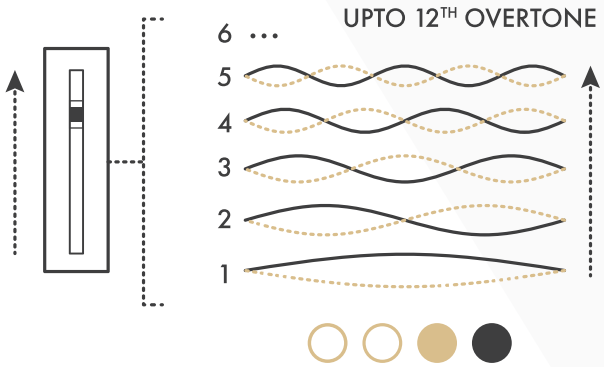
- The **Density** parameter determines the range of available voltages.
- When the **Density** fader is fully downwards, the range of the control voltage is limited to perfect octaves over a 0V - 5V range. Moving the fader upwards will add voltages following the circle of 4ths until all 12 chromatic voltages are available.
- The fader's LED will blink to indicate a change in available voltages.

Mode 2 - Random Mode:



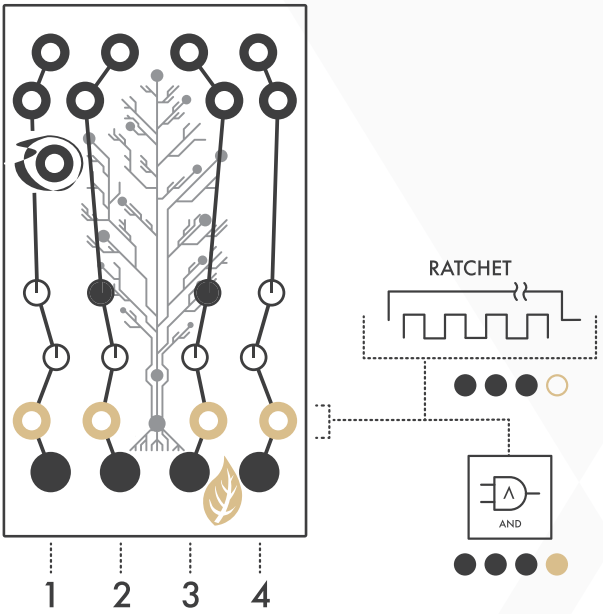
- With the **Attenuators** fully clockwise, the 0V - 5V output range of the **CV Outputs** will be quantised in the same way as **Mode 1**, but with an additional random voltage offset which is applied to the control voltage signal.
- The **Density** parameter determines the range of available voltages. When the **Density** fader is fully downwards, the range of the control voltage is limited to dissonant octaves over a 0V - 5V range. Moving the fader upwards will increase the number of available voltage steps in a similar manner to **Mode 1**, but with addition microtonal offsets applied.
- With the **Density** fader at its highest position, the **CV Outputs** will generate random un-quantised voltage with a 0V - 5V range.
- The fader's LED will blink to indicate a change in available voltages.

Mode 3 - Harmonic Overtone Mode:



- With the **Attenuators** fully clockwise, the 0V - 5V range of the **CV Outputs** will be quantised to the intervals that outline the harmonic overtone series.
- When the **Density** fader is fully downwards, the control voltages are limited to the first harmonic. Moving the fader upwards will add voltages following the harmonic overtone series up to the 12th harmonic.
- The fader's LED will blink to indicate a change in available voltages.
- This mode changes the function of the **Density CV Input** to a voltage follower that defines the fundamental of the harmonic overtone series. With it, **SCÍON** can generate harmonics (voltages) related to an external sequence or control voltage.

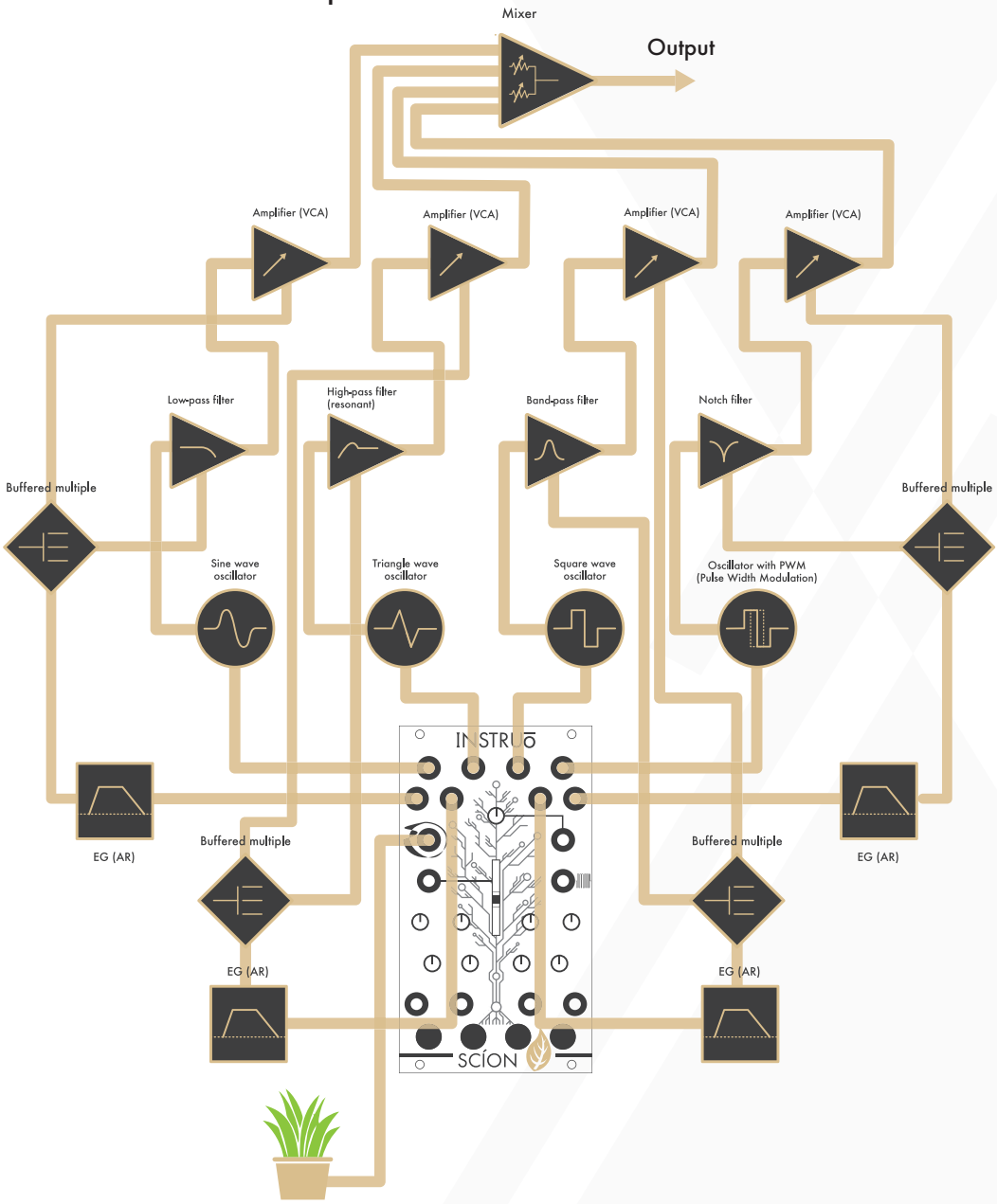
Mode 4 - Clocked Mode:



- This mode changes the function of the **Gate Inputs** to behave similar to a classic sample and hold.
- With every gate or trigger signal present at the corresponding channel's **Gate Input**, a new random voltage is forced at the corresponding channel's **CV Output**. New voltages will only occur if there is enough activity at the **Internal Biofeedback Sensor**.

Patch Examples

East Coast Counterpoint:



Summary: When a biofeedback source is present, the **CV Outputs** send voltages to the oscillators while the **Gate Outputs** trigger the envelope generators. The CV outputs of the envelope generators open the filters and VCAs, allowing the oscillator signals to pass through.

Biofeedback Path:

- Patch an input source (Plant, Audio, etc) into the **Sensitivity Input** of the **SCÍON**.

Audio Path:

- Connect the desired waveform outputs of four separate oscillators to four separate filter audio inputs.
- Connect all audio outputs of the filters to the audio inputs of four separate VCAs.
- Connect all audio outputs of the VCAs to four inputs of a mixer.
- Monitor the output of the mixer.
- Tune all oscillators to unison (some detuning is allowed).
- Set the cutoff frequencies of the filters to desired positions.
- Set the resonances of the filters to desired positions.
- Set the individual levels of the VCAs to desired positions.
- Set the individual levels of the mixer to desired positions.

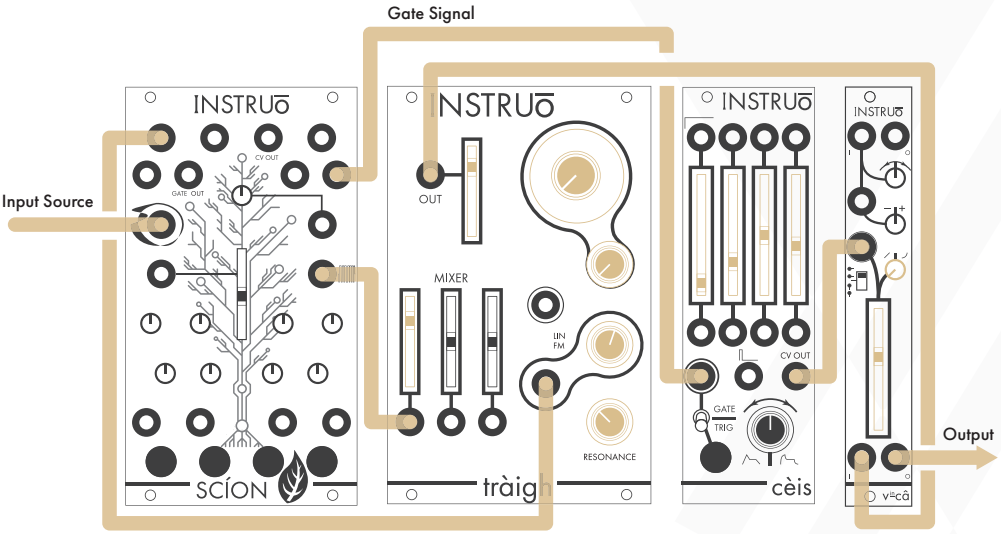
Control Path:

- Connect all **CV Outputs** to the 1V/Oct inputs of all four oscillators (Each **CV Output** can be run through a separate quantiser for tonal counterpoint).
- Connect all **Gate Outputs** to four separate envelope generator trigger inputs.
- Connect all CV outputs of the four envelope generators to four separate multiples.
- Connect one copy of the first envelope generator CV signal to the cutoff frequency CV input of filter 1 and set the corresponding CV attenuator to a desired position.

- Connect a second copy of the first envelope generator CV signal to the CV input of VCA 1 and set the corresponding CV attenuator to a desired position.
- Set the stages of envelope 1 to desired positions.
- Repeat the last four steps for the remaining channels of audio.

Biofeedback Audio:

Summary: When a biofeedback source is present, the **CV Output** will open the filter while the **Gate Output** triggers the envelope generators. The CV outputs of the envelope generators open the VCA, allowing the **Raw** signal to pass through.



Biofeedback Path:

- An input source is required at the **Sensitivity Input** or the Leaf.

Audio Path:

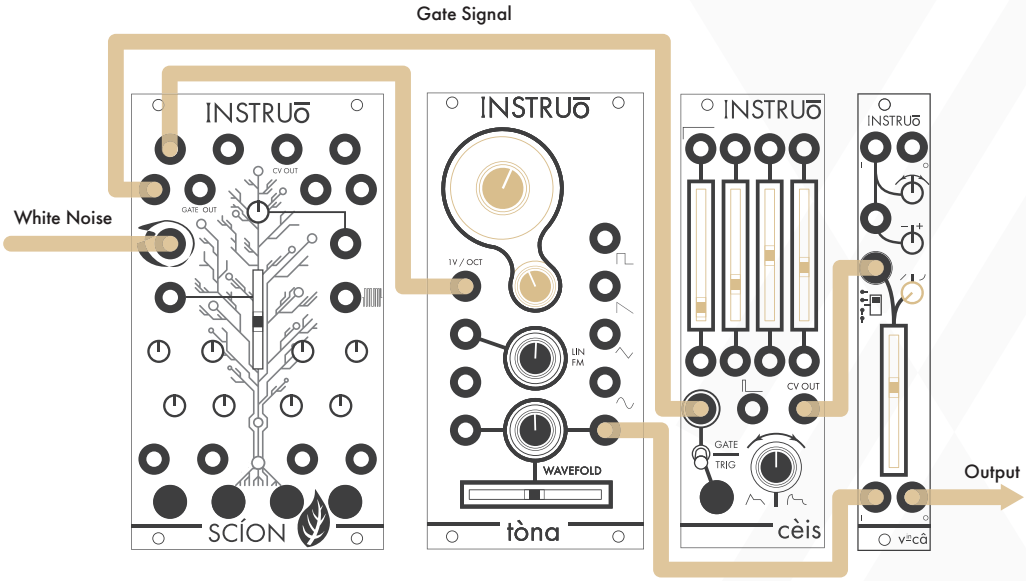
- Connect the **Raw Signal Output** to the audio input of a filter
- Connect the audio output of the filter to the audio input of a VCA.
- Monitor the output of the VCA.
- Set the cutoff frequency of the filters to a desired position.
- Set the resonance of the filter to a desired position.
- Set the level of the VCA to a desired position.

Control Path:

- Connect a desired **CV Output** to the cutoff frequency CV input of the filter and set the corresponding CV attenuator to a desired position.
- Connect a desired **Gate Output** to the trigger input of an envelope generator.
- Connect the CV output of the envelope generator to the CV input of the VCA and set the corresponding CV attenuator to a desired position.
- Set the envelope stages to desired positions.

Traditional Random Voltage Generator:

Summary: White noise will activate the **Internal Biofeedback Sensor**, generating random voltage at the **CV Output**. The **CV Output** sends voltages to the oscillator while the **Gate Output** triggers the envelope generator. The CV output of the envelope generator opens the VCA, allowing the oscillator signals to pass through. This can be done for all four **CV Outputs** and **Gate Outputs** creating four sets of traditional random voltage and random gate generators.



Biofeedback Path:

- Connect a white noise source to the **Sensitivity Input**.

Audio Path:

- Connect the desired waveform output of an oscillator to a VCA
- Monitor the output of the VCA.
- Set the level of the VCA to a desired position.

Control Path:

- Set the **SCÍON** to **Mode 2: Random Mode**.
- Connect a desired **CV Output** to the 1V/Oct input of the oscillator.
- Connect a desired **Gate Output** to the trigger input of an envelope generator.
- Connect the CV output of the envelope generator to the CV input of the VCA and set the corresponding CV attenuator to a desired position.
- Set the envelope stages to desired positions.

Manual Author: Collin Russell
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.