



INSTRUO | SPECIALIST
SYNTHESIZERS

làrachd
Input Utility
User Manual

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Description

The Instruō **làrachd** is a fully analogue multifunction utility module that provides various methods of interfacing external signals and interactions into musically useful control voltage signals.

It features a stereo line level to dual mono modular level converter, condenser microphone, audio enhancer, envelope follower, threshold comparator, and dual footswitch interface (footswitch included), làrachd is a true “Swiss Army knife” that finds a purpose in every patch.

Whether you’re looking to process line level signals with your modular effects, control your processors like filters and VCAs with acoustic signals, or hands-free record on arbhar or Lúbadh, **làrachd** is your all-in-one solution.

Features

- Stereo line level to dual mono modular level conversion
- On-board condenser microphone
- Audio enhancement circuitry
- Envelope following with threshold comparator derived gate
- Dual footswitch interface
- Included dual footswitch

Installation

1. Confirm that the Eurorack synthesizer system is powered off.
2. Locate 8 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 **lārachd** in your Eurorack synthesizer case.
6. Power your Eurorack synthesizer system on.

Note:

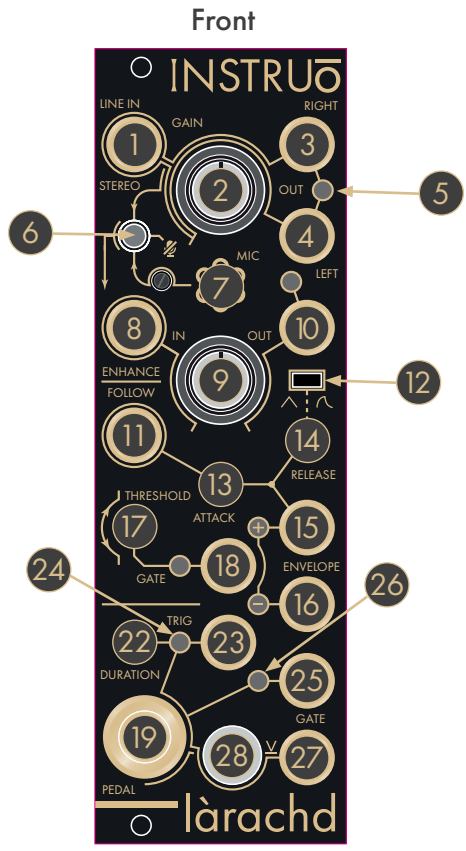
This module has reverse polarity protection.

Inverted installation of the power cable will not damage the module.

Specifications

- Width: 8 HP
- Depth: 30mm
- +12V: 75mA
- -12V: 70mA

làrachd | La:rəxg | noun (vestige) a range of operation, a marked effect, impression, or impact



Footswitch



Key

- | | | |
|----------------------|------------------------------|---------------------------------|
| 1. Stereo Line Input | 11. Envelope Follower Input | 21. B - Button |
| 2. Stereo Level | 12. Response Curve Switch | 22. A - Button Trigger Duration |
| 3. Left Output | 13. Attack | 23. A - Button Trigger Output |
| 4. Right Output | 14. Release | 24. A - Button Trigger LED |
| 5. Output LED | 15. Positive Envelope Output | 25. A - Button Gate Output |
| 6. Source Toggle | 16. Negative Envelope Output | 26. A - Button Gate LED |
| 7. Microphone | 17. Comparator Threshold | 27. B - Button Gate Output |
| 8. Enhance Input | 18. Comparator Gate Output | 28. Latching Gate Button |
| 9. Enhance Level | 19. Dual Footswitch Input | |
| 10. Enhance Output | 20. A - Button | |

Level Conversion & Audio Enhancement

Stereo Line Input: Stereo input for line level to modular level conversion.

- The signal present at the **Stereo Line Input** (TRS 3.5mm) will be split and output from the **Left** (TS 3.5mm) and **Right** (TS 3.5mm) **Outputs**.
- If the **Right Output** is unpatched then its signal will sum with the **Left Output** as a mono source.
- A mono sum of the stereo signal present at the **Stereo Line Input** can be used as the normalised input source for the **Enhance Input** and the **Envelope Follower Input** based on the setting of the **Source Toggle**.

Stereo Level: Manual level control for the signal present at the **Stereo Line Input**.

- Turning the **Stereo Level** knob clockwise increases the input signal.
- Fully anti-clockwise will set the throughput gain to approximately unity level of the stereo line source.
- The available gain range is approximately +40dB.

Left Output: Mono split output of the stereo signal (Tip) present at the **Stereo Line Input**.

Right Output: Mono split output of the stereo signal (Ring) present at the **Stereo Line Input**.

Output LED: LED indication of the signal present at the **Left Output**.

Source Toggle: Toggle that switches the normalised input source of the **Enhance Input** and the **Envelope Follower Input**.

- If the toggle is in the up position, a mono sum of the stereo signal present at the **Stereo Line Input** is the normalised input source of the **Enhance Input** and the **Envelope Follower Input**.
- If the toggle is in the centre position, input source normalising to the **Enhance Input** and **Envelope Follower Input** is muted.
- If the toggle is in the down position, the **Microphone** is the normalised input source of the **Enhance Input** and **Envelope Follower Input**.

Microphone: On-board condenser microphone.

- The **Microphone** can be the normalised input source for the **Enhance Input** and the **Envelope Follower Input**.
- **làrachd** has the same **Microphone** implementation as **arbhar**.

Enhance Input: Mono input for audio enhancement.

- Similar to **arbhar** and **Lúbadh**, **làrachd's Enhance Input** is based on tangential distortion limiting circuitry (as used in $\tanh[3]$). This circuit is used for soft clipping, limiting, and waveshaping. Further non-linear shaping and gentle filtering is applied through this signal processor.
- If no signal is present at the **Enhance Input**, either a mono sum of the signal present at the **Stereo Line Input** or the **Microphone** signal can be chosen as the normalised input source.
- If a normalised input source is active, patching a connection to the **Enhance Input** will break the normal.

Enhance Level: Manual level control for waveshaping over the signal present at the **Enhance Input** or the normalised input source.

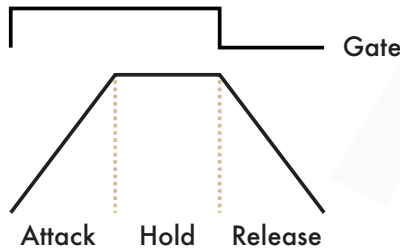
Enhance Output: Mono output of the audio enhancement circuit.

Envelope Following

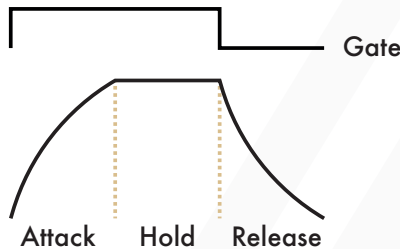
Envelope Follower Input: A signal present at the **Envelope Follower Input** will generate an envelope signal at the **Positive** and **Negative Envelope Outputs**.

- If no signal is present at the **Envelope Follower Input**, either a mono sum of the signal present at the **Stereo Line Input** or the **Microphone** can be chosen as the normalised input source.
- If a normalised input source is active, patching a connection to the **Envelope Follower Input** will break the normal.

Response Curve Switch: Switch that determines the response curve of the variable envelope signal generated at the **Positive** and **Negative Envelope Outputs**.



- If the switch is in the left position, a linear response curve will be selected



- If the switch is in the right position, a logarithmic attack/exponential release response curve will be selected.

Attack: Manual attack time control for the generated envelope signal.

- Changes to this parameter are additive to the generated envelope signal.
- Maximum slew rate is approximately 1V/second.

Release: Manual decay time control for the generated envelope signal.

- Changes to this parameter are additive to the generated envelope signal.
- Maximum slew rate is approximately 1V/second.

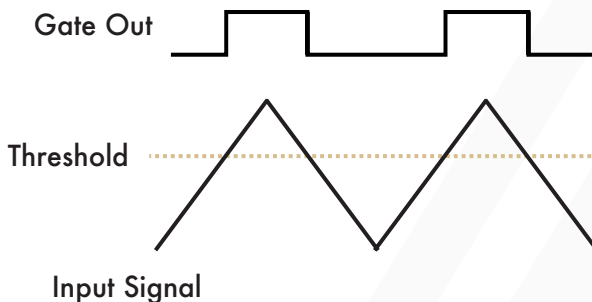
Positive Envelope Output: Unipolar positive envelope output.

Negative Envelope Output: Unipolar negative envelope output

Comparator Threshold: Manual control that sets the threshold of the comparator.

Comparator Gate Output: Gate output of comparator.

- If an input signal exceeds the **Comparator Threshold**, a gate signal is generated at the **Comparator Gate Output**.



Pedal Interfacing

Dual Footswitch Input: ¼" (6.35mm) input for the included **Dual Footswitch** or other compatible footswitch controllers.

A - Button: If the **A - Button** (left) of the **Dual Footswitch** is pressed, a trigger signal is generated at the **A - Button Trigger Output**.

A - Button Trigger Duration: Manual duration control of the trigger signal generated at the **A - Button Trigger Output** when the **A - Button** of the **Dual Footswitch** is pressed.

- Trigger duration range is 5ms to 500ms.

A - Button Trigger LED: LED indication of the signal present at the **A - Button Trigger Output**.

A - Button Gate Output: If the **A - Button** of the **Dual Footswitch** is pressed, a gate signal is generated at the **A - Button Gate Output**.

- A gate signal will be held HIGH for as long as the **A - Button** of the **Dual Footswitch** is pressed.

A - Button Gate LED: LED indication of the signal present at the **A - Button Gate Output**.

B - Button Gate Output: If the **B - Button** (right) of the **Dual Footswitch** is pressed, a gate signal is generated at the **B - Button Gate Output**.

- A gate signal will be held HIGH for as long as the **B - Button** of the **Dual Footswitch** is pressed.

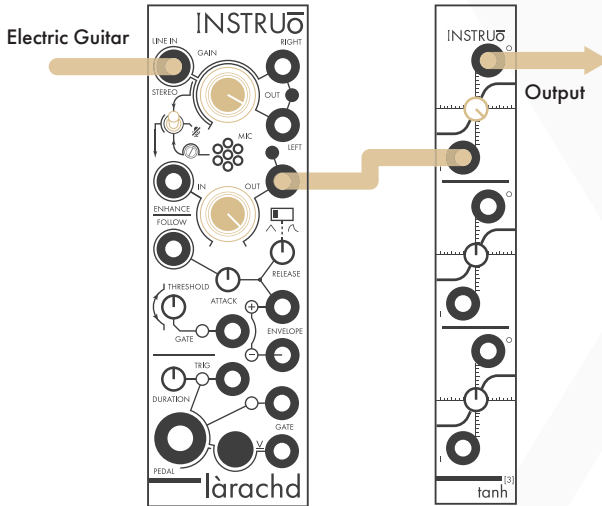
Latching Gate Button: Button that, when pressed, will generate a latching gate signal at the **B - Button Gate Output**.

- If a gate signal is already held HIGH at the **B - Button Gate Output** due to the pressing of the **B - Button** on the **Dual Footswitch**, pressing the **Latching Gate Button** will flip the state of the **B - Button Gate Output**, forcing the gate signal to pull LOW. Similarly, if a gate signal is already held HIGH at the **B - Button Gate Output** due to the state of the **Latching Gate Button**, pressing the **B - Button** of the **Dual Footswitch** will flip the state of the **B - Button Gate Output**, forcing the gate signal to pull LOW.

Patch Examples

Distorted Guitar Amp:

Summary: When the electric guitar signal is connected to `làrachd`, `làrachd` acts as a preamplifier while `tanh[3]` acts as a distortion.

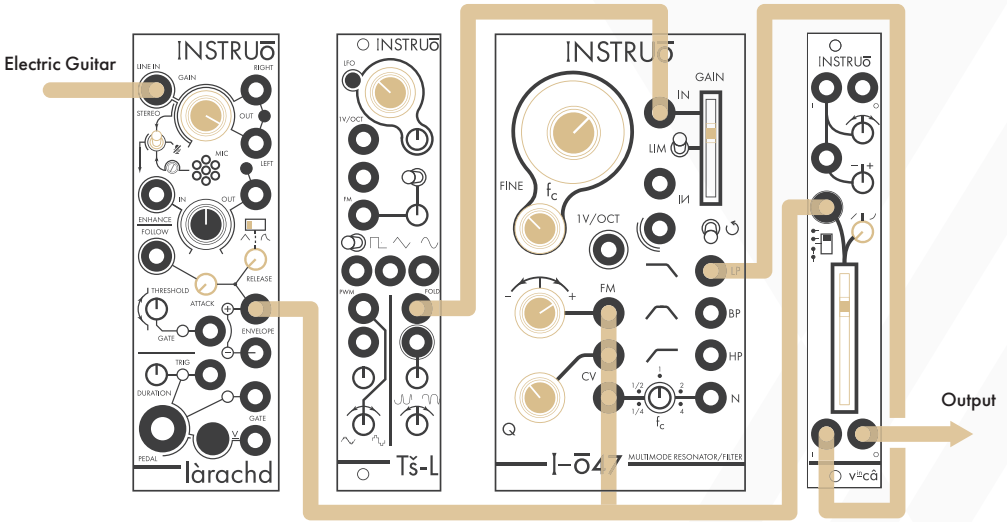


Audio Path:

- Connect an electric guitar to the **Stereo Line Input** of `làrachd`.
- Set the **Stereo Level** knob to 4:00.
- Set the **Source Toggle** to its up position, allowing the **Stereo Line Input** signal to normal to the **Enhance Input**.
- Set the **Enhance Level** knob to its maximum position.
- Connect the **Enhance Output** to a channel of `tanh[3]`.
- Set the level of `tanh[3]` to a desired position.
- Monitor from the output of `tanh[3]`.

Guitar Controlled Synth Voice:

Summary: The electric guitar signal gets amplified and sent to the envelope follower. The generated envelope signal then modulates a low-pass filter and a VCA.



Audio Path:

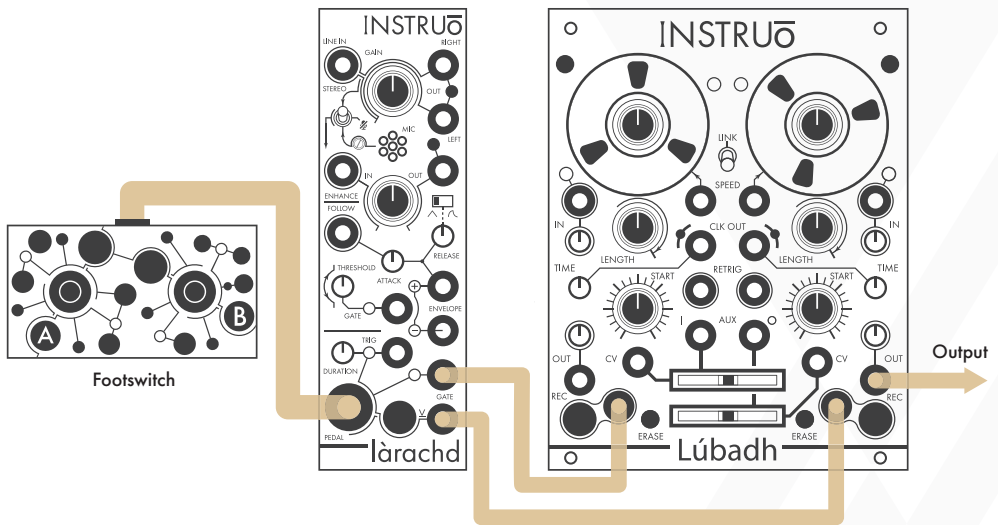
- Connect a desired waveform of an oscillator to the audio input of a low-pass filter.
- Connect the audio output of the filter to the audio input of a VCA.
- Monitor the audio output of the VCA.
- Set the fundamental frequency of the oscillator to a desired position.
- Set the cutoff frequency of the filter to a desired position.
- Set the resonance of the filter to a desired position.
- Set the level of the VCA to its unity position.

Control Path:

- Connect an electric guitar to the **Stereo Line Input** of làrachd.
- Set the **Stereo Level** knob to 4:00.
- Set the **Source Toggle** to its up position, allowing the **Stereo Line Input** signal to normal to the **Envelope Follower Input**.
- Connect the **Envelope Follower Output** to a multiple.
- Connect one copy of the **Envelope Follower Output** signal to the FM input of the filter and set the corresponding CV attenuator to a desired position.
- Connect a second copy of the **Envelope Follower Output** signal to the CV input of the VCA and set the corresponding CV attenuator to a desired position.
- Set the **Response Curve Switch** to its left position, making the envelope signal linear.
- Set the **Attack** and **Decay** knobs to their minimum position.

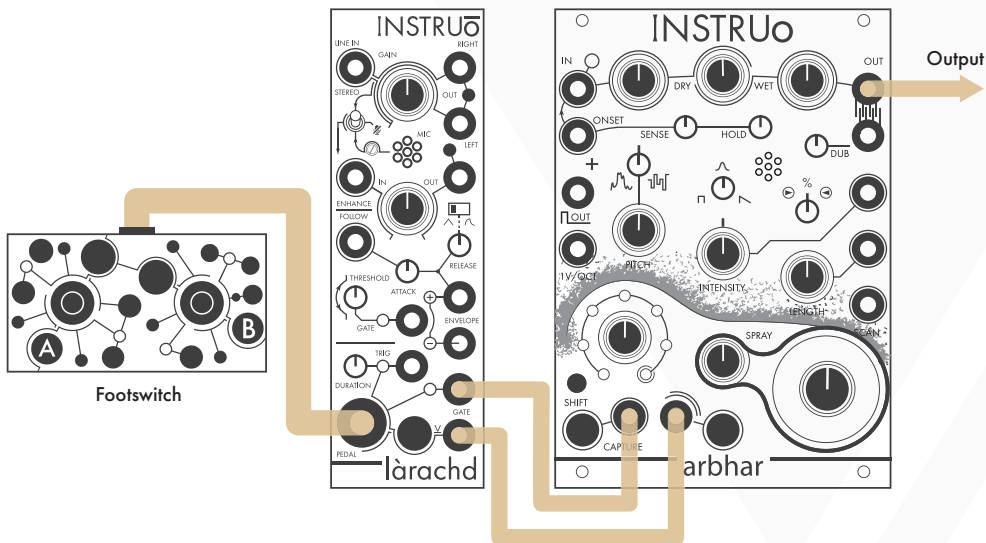
Hands Free Recording:

Summary: The **Dual Footswitch** controls either both Record functions on Lúbadh or the Capture and Strike functions of arbhar.



Lúbadh Control Path:

- Connect the **Dual Footswitch** to the **Dual Footswitch Input** of làrachd.
- Connect the **A - Button Gate Output** to the left Record Gate Input of Lúbadh.
- Connect the **B - Button Gate Output** to the right Record Gate Input of Lúbadh



arbhar Control Path:

- Connect the **Dual Footswitch** to the **Dual Footswitch Input** of làrachd.
- Connect the **A - Button Gate Output** to the **Capture Input** of arbhar.
- Connect the **B - Button Gate Output** to the **Strike Input** of arbhar.

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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.