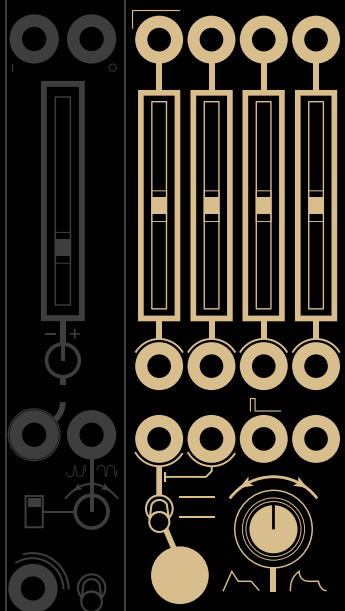
INSTRUō | SPECIALIST SYNTHESIZERS



cèis [2]

ADSR

User Manual

Contents

Description

The Instruō cèis[2] is a fully analogue voltage controlled ADSR envelope generator. The ADSR function generator is the model pioneered by the East-coast mindset and is extensively used in subtractive synthesis patches. The cèis[2] gives the ability to externally control the attack, decay, sustain, and release stages of the envelope while also emitting trigger and gate signals for each segment, offering maximum versatility from a classic tool.

This version [2] revision brings additional flexibility and control through a completely redesigned logic extraction circuit for the segment gates, envelope re-trigger input, and a precision throughput for voltage controlled slew limiter capabilities.

Features

- LED button for manual control and indication of output CV level
- Fader and CV control over all 4 segments
- Gate output per segment
- Fader LED for segment stage indication
- Gate/Trig modes which can force completion of the Attack duration when triggered
- Hold mode for sustain segment lock for CV slew use
- Combined trigger output which fires when there is a change in segment
- Variable envelope response shape from linear to exponential

Installation

1. Confirm that the Eurorack synthesiser system is powered off.
2. Locate 8 HP of space in your Eurorack synthesiser 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 cèis[2] in your Eurorack synthesiser case.
6. Power your Eurorack synthesiser system on.

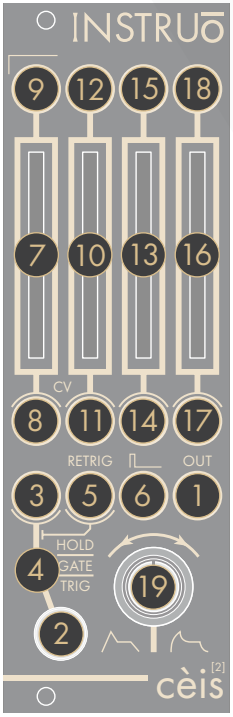
Note:

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

Specifications

- Width: 8HP
- Depth: 27mm
- +12V: 70mA
- -12V: 40mA

cèis[2] | sɪs | **noun** (envelope) a containing structure or layer, a curve joining the successive peaks of a modulated wave



Key

1. CV Output
2. Gate/Trig Button
3. Gate/Trig Input
4. Gate/Trig Toggle
5. Retrigger Input
6. Combined Trigger Output
7. Attack Slider
8. Attack CV Input
9. Attack Gate Output
10. Decay Slider
11. Decay CV Input
12. Decay Gate Output
13. Sustain Slider
14. Sustain CV Input
15. Sustain Gate Output
16. Release Slider
17. Release CV Input
18. Release Gate Ouput
19. Shape Knob

Inputs / Ouputs

CV Output (OUT): The **CV Output** is a bipolar control voltage output.

- Output range for envelope generation: 0V to 10V
- Output range for CV through: -10V to 10V

Gate/Trig Button: The **Gate/Trig Button** will force an envelope signal from the **CV Output** when pressed.

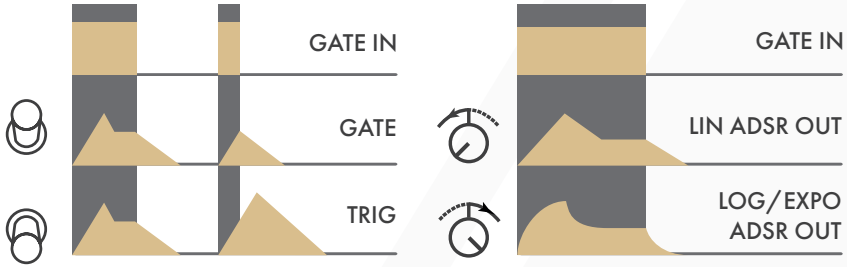
- The button illuminates representing the amplitude contour of the generated envelope signal when a signal is present at the **CV Output.**

Gate/Trig Input: The **Gate/Trig Input** is an external voltage input that will force voltage generation at the **CV Output**.

- If the **Gate/Trig Toggle** is set to **Gate Mode** or **Trigger Mode**, then gate or trigger signals are accepted at the **Gate/Trig Input**.

Gate/Trig Toggle: The **Gate/Trig Toggle** sets the mode of operation.

Gate Mode: When set to **Gate Mode** and gate signals are received at the **Gate/Trig input**, all envelope stages will complete as expected. The attack and decay stages will complete their durations while gate signals are held HIGH. The sustain phase defines the voltage level of the envelope for as long as the gate signal is held HIGH. The release stage activates on the falling edge of the gate signal and decays to 0V at its defined duration.



- A trigger signal at the **Gate/Trig Input** (or a gate signal with a duration shorter than the attack and/or decay stages), will force the envelope to prematurely jump to the release stage.

Trig Mode: When set to **Trig Mode** and gate signals are received at the **Gate/Trig Input**, all envelope stages will complete as expected if the gate duration exceeds the durations of both the attack and decay stage.

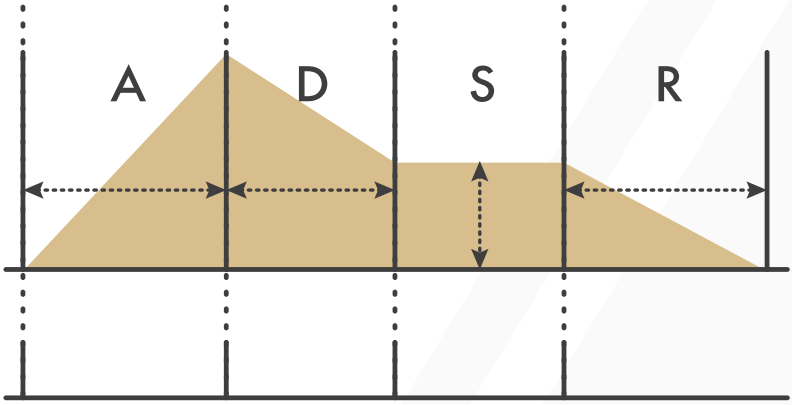
- A trigger signal at the **Gate/Trig Input** will force the envelope to complete the attack stage and then immediately enter the release stage.

Hold Mode: When set to **Hold Mode**, the envelope circuit is stalled and will default to its sustain amplitude. The **Sustain CV Input** receives bipolar control voltage signals that can be slewed by the attack and decay parameters.

Retrigger Input (Retrig): The **Retrigger Input** retriggers the envelope signal's attack stage from its current index.

Combined Trigger: The **Combined Trigger Output** will generate trigger signals at the beginning of each envelope stage.

- Output voltage: 10V.



Trigger Signals

Envelope Controls

Attack Slider: The **Attack Slider** defines the onset duration of the envelope. The value set by this control is measured in the time domain.

- Moving the slider upward will increase the attack duration.
- Moving the slider downward will decrease the attack duration.
- Time range: ~3ms to ~10s.

Attack CV Input: The **Attack CV Input** is a bipolar control voltage input for the attack parameter.

- Control voltage is summed with the slider position.
- Time range: with negative control voltage, lowest time reduces to ~0.8ms.

Attack Gate Output: The **Attack Gate Output** generates a gate signal that is held HIGH for the duration of the attack stage.

- Output voltage: 10V.

Decay Slider: The **Decay Slider** defines the time it takes to reach the sustain stage once the attack stage has been completed. The value set by this control is measured in the time domain.

- Moving the slider upward will increase the decay duration.
- Moving the slider downwards will decrease decay duration.
- Time range: ~3ms to ~12s.

Decay CV Input: The **Decay CV Input** is a bipolar control voltage input for the decay parameter.

- Control voltage is summed with the slider position.
- Time range: with negative control voltage, lowest time reduces to ~0.8ms.

Decay Gate Output: The **Decay Gate Output** generates a gate signal that is held HIGH for the duration of the decay stage.

- Output voltage: 10V.

Sustain Slider: The **Sustain Slider** defines the resting voltage level of the envelope signal once the decay stage has been completed. The value set by this control is not measured in the time domain, but instead is measured as a variable voltage amplitude. Once the attack and decay stages have been completed, the sustain stage will be held for the remaining duration of the gate signal.

- Moving the slider upward will increase the sustain level.
- Moving the slider downward will decrease the sustain level.
- Output range: 0V to 10V.

Sustain CV Input: The **Sustain CV Input** is a bipolar control voltage input for the sustain parameter.

- Control voltage is summed with the slider position.
- Input range: -10V to 10V.
- When the **Sustain CV Input** receives bipolar control voltage, signal throughput can be slewed by the attack and decay parameters.
- This behavior is only available when the **Gate/Trig Toggle** is set to **Hold Mode**.

Sustain Gate Output: The **Sustain Gate Output** generates a gate signal that is held HIGH for the duration of the sustain stage.

- Output voltage: 10V.

Release Slider: The **Release Slider** defines the time it takes to reach 0V once the gate signal drops LOW. The value set by this parameter is measured in the time domain.

- Moving the slider upward will increase the release duration.
- Moving the slider downward will decrease the release duration.
- Time range: ~3ms to ~12s.

Release CV Input: The **Release CV Input** is a bipolar control voltage input for the release parameter.

- Control voltage is summed with the slider position.

Release Gate Output: The **Release Gate Output** generates a gate signal that is held HIGH for the duration of the release stage.

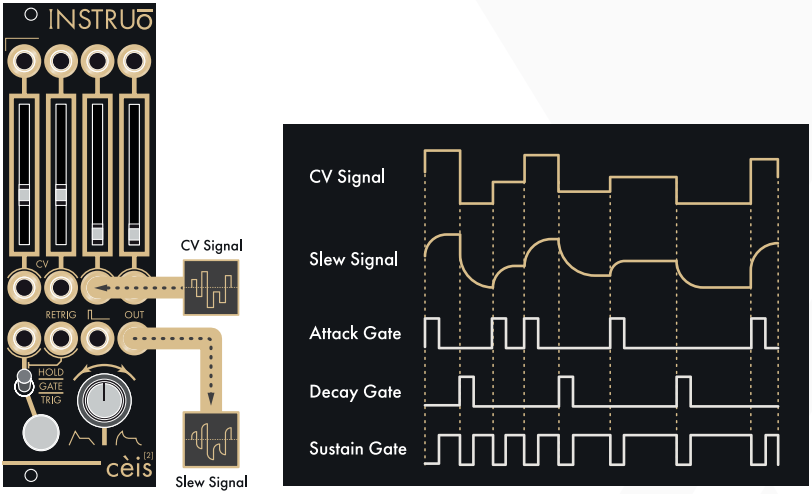
- Output voltage: 10V.

Shape Knob: The **Shape Knob** controls the envelope's contours.

- The knob smoothly morphs between two response curves.
- Turning the knob anticlockwise will set the envelope contour to a linear response curve.
- Turning the knob clockwise will set the envelope contour to a logarithmic/exponential response curve with a logarithmic attack contour and exponential decay and release contours, traditional to classic East Coast ADSR circuits.

Logic Extraction & Slew Limiting

When the **Gate/Trig Toggle** is set to **Hold Mode**, cèis[2] functionality is optimised for use as a voltage-controlled slew limiter.

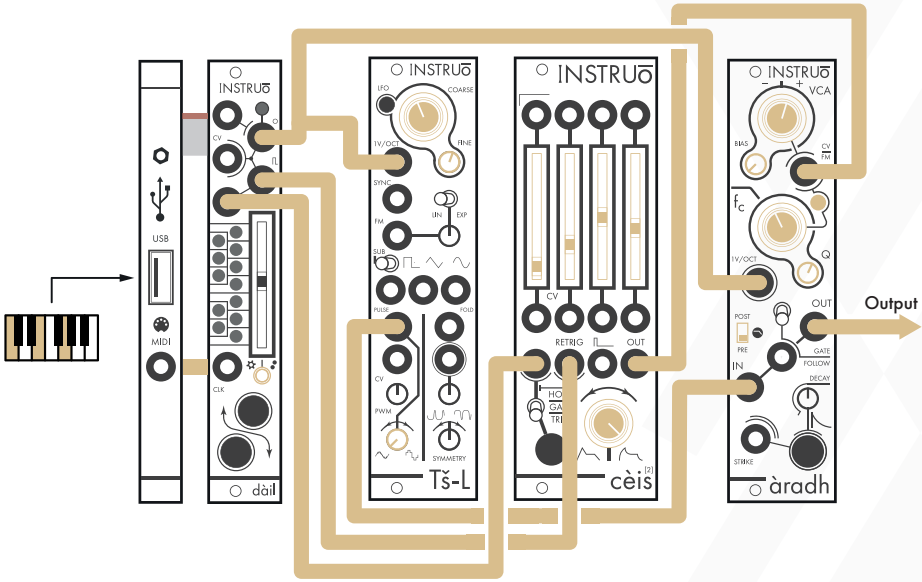


- The **Sustain CV Input** becomes a control voltage input for signals to be slewed.
- The **Sustain Slider** will add a positive DC offset voltage to the slewed voltage.
- The **Attack Slider** defines the slew duration for successive ascending voltages.
- The **Decay Slider** defines the slew duration for successive descending voltages.
- The **Attack Gate Output** generates a gate signal during any ascending slew durations.
- The **Decay Gate Output** generates a gate signal during any descending slew durations.
- The **Sustain Gate Output** generates a gate signal in between slewed voltages.
- The **CV Output** is the slewed control voltage output.

Patch Examples

Retriggered East Coast Synth Voice:

Summary: dàil sends voltage to the oscillator while simultaneously triggering (and retriggering cèis[2]). The **CV Output** of cèis[2] opens the filter and VCA, allowing the oscillator signal to pass through. More traditional East Coast patches would incorporate separate cèis[2] modules for the filter and VCA.



Audio Path:

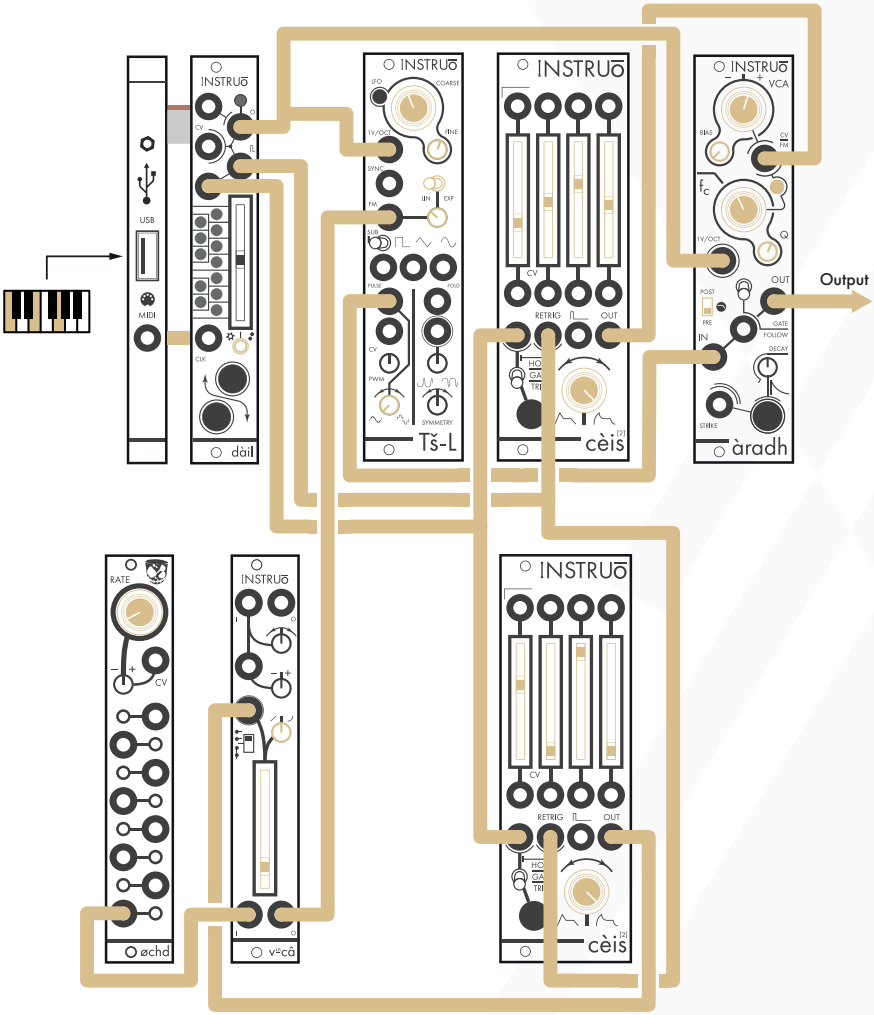
- Connect a harmonically rich waveform of an oscillator to the input of a filter.
- Connect the audio output of the filter to the audio input of a VCA.
- Monitor the output of the VCA.
- Set the frequency of the oscillator to a desired position.
- Set the cutoff frequency of the filter to a desired position.
- Set the resonance of the filter to a desired position.
- Set the level of the VCA to its minimum position.

Control Path:

- Connect a USB MIDI controller to dàil and set it to MIDI-to-CV Mode.
- Connect the CV output of dàil to a buffered multiple.
    - A buffered multiple will keep the signal from dropping voltage when split.
- Connect one copy of dàil's CV output to the 1V/Oct input of the oscillator and connect another copy of dàil's CV output to the 1V/Oct input of the filter.
    - This is known as keyboard tracking and allows the filter to increase the cutoff frequency as higher-pitched notes are played.
- Connect the gate output of dàil to the **Gate/Trig Input** of cèis[2].
- Connect the trigger output of dàil to the **Retrigger Input** of cèis[2].
- Connect the **CV Output** of cèis[2] to a multiple.
- Connect one copy of the cèis[2] signal to the cutoff frequency CV input of the filter and set the corresponding CV attenuator to a desired position.
- Connect a second copy of the cèis[2] CV signal to the CV input of the VCA and set the corresponding CV attenuator to a desired position.
- Set the **Shape Knob** to its maximum setting for a logarithmic/exponential response curve.
- Set the **Attack**, **Decay**, **Sustain**, and **Release Sliders** to desired positions.

Vibrato Swell:

Summary: Every time dàil plays a new note, the CV signal of a secondary cèis[2] slowly opens VCA 2, increasing the amount of modulation the LFO can apply to the FM input of the oscillator.



Audio Path:

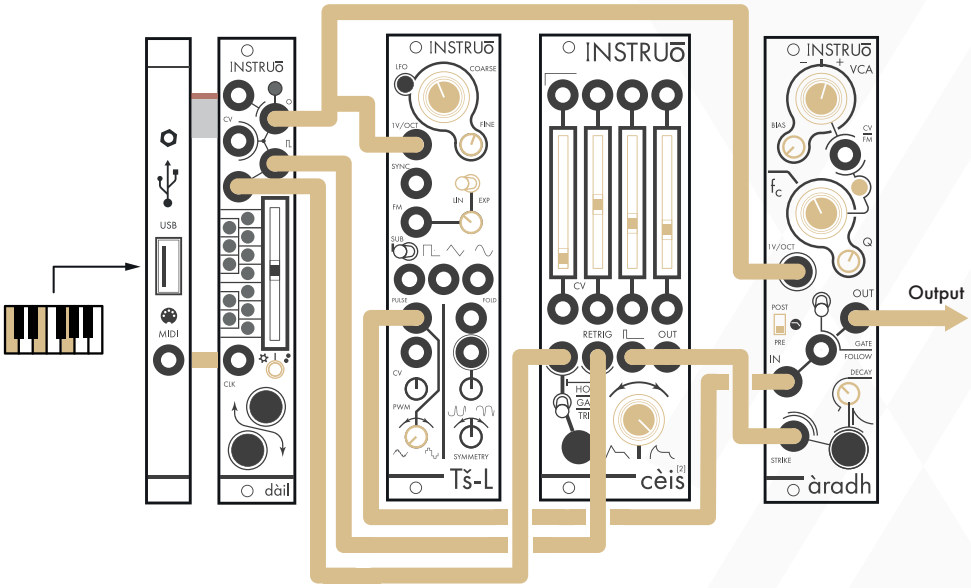
- Create the **East Coast Synth Voice** audio path.

Control Path:

- Create the **East Coast Synth Voice** control path.
- Connect the CV output of an unsynchronised LFO to the input of a VCA 2 and set the rate of the LFO to a desired position (typically 5 - 7 Hz).
- Connect the output of the VCA 2 to the FM input of the oscillator. Increase the CV attenuator of the FM input to a desired position.
- Instead of connecting the gate and retrigger outputs of dàil to the **Gate/Trig Input** and **Retrigger Input** of just one cèis[2], connect it to a multiple.
- Connect one copy of dàil's gate and retrigger signals to the Gate/Trig Input and Retrigger Input of the primary cèis[2]. The CV Output of cèis[2] should still be connected to a multiple, modulating both the cutoff frequency of the filter and the amplitude of the VCA.
- Connect a second copy of dàil's gate and retrigger signals to the **Gate/Trig Input** and **Retrigger Input** of the secondary cèis[2].
- Connect the **CV Output** of the secondary cèis[2] to the CV input of VCA 2 and set the corresponding CV attenuator to a desired position.
- Set a long **Attack**, minimum Decay, maximum **Sustain**, and minimum **Release**.

Burst Generator:

Summary: Every Time cèis[2] is triggered, a burst of trigger signals will strike the low pass filter allowing the oscillator signal to pass through. For added modulation, multiply the **Combined Trigger Output** signal and connect it to both the strike input of the low pass filter and the clock input of a sequencer and connect the CV output of the sequencer to the 1V/Octave input of the oscillator.



Audio Path:

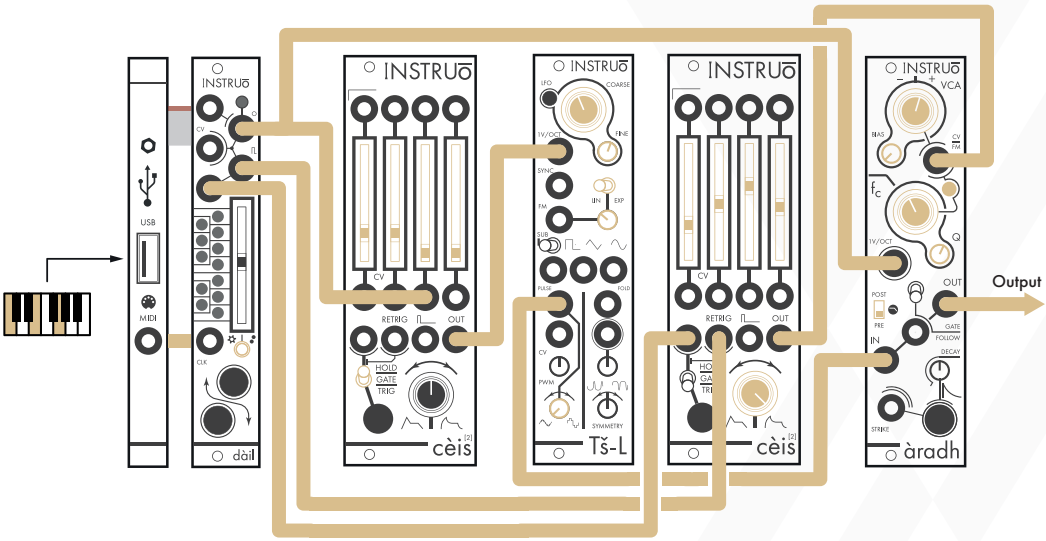
- Create the **East Coast Synth Voice** audio path.
- Use a triggerable low pass filter like àradh.

Control Path:

- Connect the **Combined Trigger Output** to the strike input of the lowpass gate.
- Set the separate envelope stages at different positions to create the desired trigger burst.
- Trigger cèis[2] via the **Gate/Trig Input** or the **Gate/Trig Button.**

CV Slew Limiter:

Summary: Adapting the **East Coast Synth Voice** – dàil's voltage is slewed through cèis[2], creating a portamento (glide) effect between successive notes.



Audio Path:

- Create the **East Coast Synth Voice** audio path.

Control Path:

- Create the **East Coast Synth Voice** control path.
- Instead of connecting the 1V/Octave output of dàil directly to the 1V/Octave input of the oscillator, connect it to the **Sustain CV Input** input of a secondary cèis[2].
- Set the **Gate/Trig Toggle** of the secondary cèis[2] to **Hold Mode**.
- Connect the **CV Output** of the secondary cèis[2] to the 1V/Octave input of the oscillator.

- Set the **Attack** and **Decay Sliders** to desired positions. The **Attack Slider** will set the amount of portamento between ascending notes, while the **Decay Slider** will set the amount of portamento between descending notes.

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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.