User Manual

Taiga Keyboard Electronic Musical Instrument Manual V1.1.0

Thank You!

Thank you for purchasing the Pittsburgh Modular Taiga Keyboard. Your interest and investment in our ideas and research help support our ongoing innovative synthesizer design!

Taiga Keyboard is a new window into the world of Taiga . It is a showcase of how new approaches to synthesis can push analog synthesis forward. I believe in analog and I believe that analog synthesis is bursting with amazing worlds left to discover. Taiga Keyboard is meant to be a map to some of these worlds.

Analog is important,

Richard Nicol
Founder | Product Designer
Pittsburgh Modular Synthesizers

Pittsburgh Modular
Taiga Keyboard Design Team

Instrument Design: **Richard Nicol**
Analog Research and Engineering: **Michael Johnsen**
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Layout and Design: **Jongjian Cai**
Firmware Support: **Zhiwen Huang**
Project Logistics: **Alice Lai**
Business Coordination: **Danielle Nicol**

Special Thanks
Cre8audio
Buscrates

1.1 Important Power Information

Please Read:

Please read the Pittsburgh Modular Taiga Keyboard Synthesizer Guidebook completely before use and retain for future reference.

- Only use the DC power adapter provided by Pittsburgh Modular with Taiga Keyboard. Using an incorrect power adapter can cause permanent damage to Taiga Keyboard, installed Eurorack modules, and the power adapter.
- Taiga Keyboard is an electronic device. Exposure to water will cause Taiga Keyboard circuitry to short circuit and may cause permanent damage.
- Do not attempt to modify Taiga Keyboard. Tampering with the circuitry may cause permanent damage.
- Do not place heavy objects on Taiga Keyboard. The user interface is mounted on a PCB that can be damaged if stressed by excessive weight.
- Do not attempt to repair Taiga Keyboard. Please contact Pittsburgh Modular regarding malfunctions of any kind.
- Pittsburgh Modular is not responsible for any damage or loss caused by improper use of Taiga Keyboard.

## IMPORTANT Eurorack Ribbon Cable Power Information:

The Pittsburgh Modular Taiga Keyboard Synthesizer includes a Eurorack format synthesizer power supply. Eurorack format modules can be installed, rearranged, removed, and replaced with any compatible Eurorack modules from Pittsburgh Modular, Cre8audio, or other manufacturers.

Do NOT remove Eurorack modules from the Pittsburgh Modular Taiga Keyboard Synthesizer while it is plugged in!

Do NOT plug or unplug the power ribbon cable from installed Eurorack modules while the Pittsburgh Modular Taiga Synthesizer is plugged in!

The Pittsburgh Modular Taiga Synthesizer uses a standard, keyed 16 pin Eurorack power header to connect Eurorack modules to a bipolar +/-12v power supply. Please pay very close attention to the orientation of the ribbon cable when adding and removing modules. The stripe on the ribbon cable marks -12 volt power. This stripe needs to line up with the -12 volt pins on the power supply and the -12 volt pins on the module. The Pittsburgh Modular Taiga Keyboard Synthesizer includes reverse polarity protection so it should not be damaged when a module is plugged in incorrectly; however, as a general rule, failure to match up the pins correctly can result in damage to one or all the modules in a case.

2 User Interface
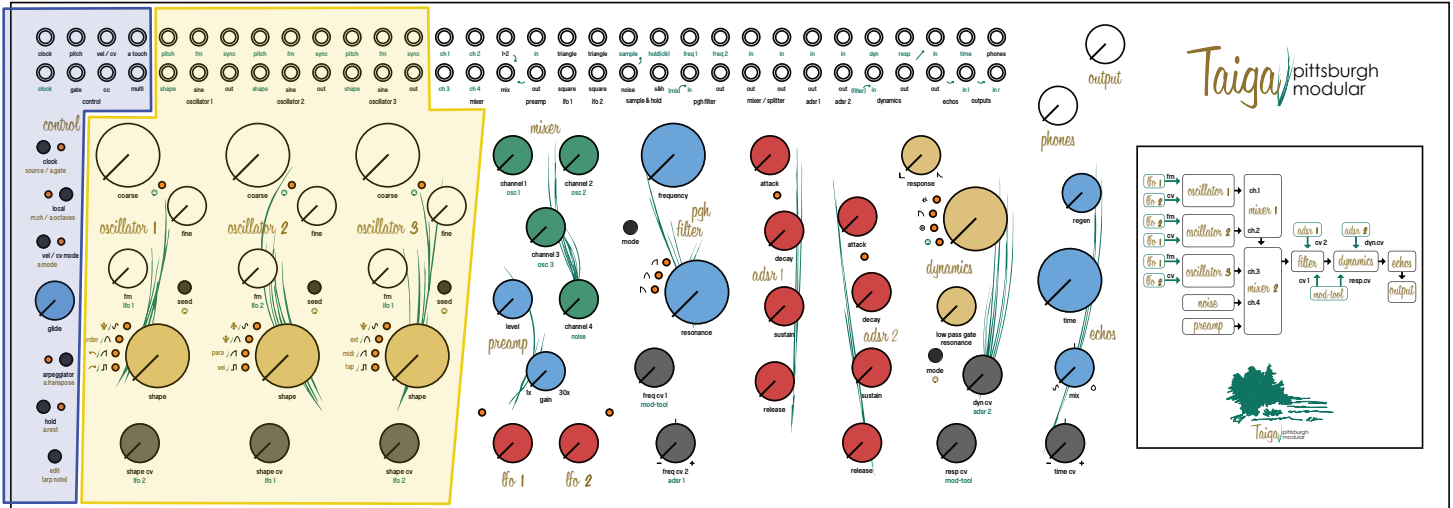
Control Section (Blue)

Clock Button

Main Function - Internal Clock Tap tempo / Assign External Clock Division

Edit Function - Assign Clock Source / Assign Arpeggiator Gate Length

Local Button

Main Function - Enable/Disable Local Keyboard Control

Edit Function -Assign Midi Channel / Assign Arpeggiator Octave Range

Velocity/CV Mode Button

Main Function - Assign Velocity/CV Output Jack Mode

Edit Function -Assign Arpeggiator Playback Mode

Glide Knob - Assign Portamento Amount

Arpeggiator Button

Main Function - Enable/Disable Arpeggiator Mode

Edit Function - Enable/Disable Arpeggiator Transpose Mode

Hold Button

Main Function - Enable/Disable Gate Hold Mode

Edit Function - Add Rest to Arpeggio Pattern

Edit Button

Main Function - Press and Hold to Enable Edit Functions of Other Buttons / Press and Hold to Add Additional Notes to Arpeggio.

Clock In Jack - External Gate Signal Input Jack

Clock Out Jack - Clock Signal Output Jack

Pitch Out Jack - Note On Pitch Output Jack

Gate Out Jack - Note On Gate Output Jack

Velocity/CV Out Jack - 0-5v Velocity/CV Output Jack

CC Out Jack - 0-5v MIDI CC Output Jack

Aftertouch Out Jack - 0-5v Aftertouch Output Jack

Multi-Function Out Jack - 0-5v Mod Tool Output Jack

Oscillator Sections (Yellow)

Coarse Knob - Coarse Frequency Tuning Knob

MIDI LED - Show Oscillator MIDI Response Enabled / Disabled Status

Fine Knob - Fine Frequency Tuning Knob

FM Knob - Frequency Modulation Amount

Seed Button

Main Function - Select the Oscillator Seed Waveform

Edit Function - Enable/Disable Oscillator MIDI Response

Shape Knob - Modify the Shape of the Selected Seed Wave

Shape CV Knob - Assign the Amount of Shape Modulation

Pitch In Jack - 1 Volt Per Octave Pitch Tracking Input

Shape In Jack - Shape CV Input Jack

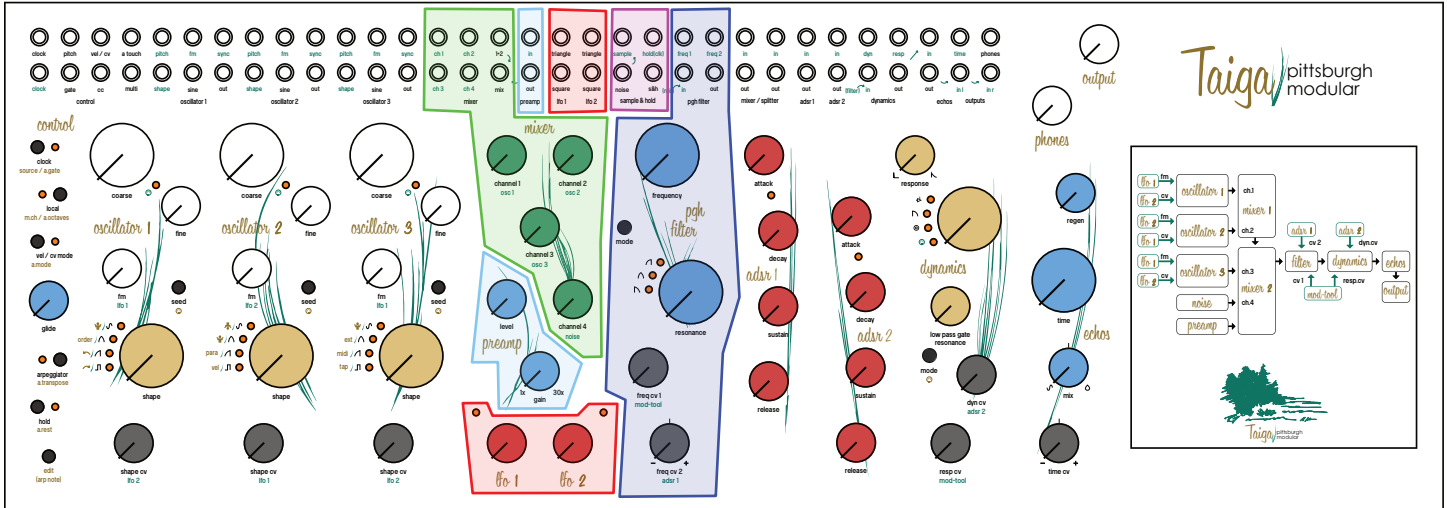**FM In Jack** - FM CV Input Jack

Sine Out Jack - Sine Wave Output Jack

Sync In Jack - Hard Sync Input Jack

Wave Out Jack - Selected Seed Wave Output Jack

2 User Interface

Mixer/Preamp/LFO/Sample and Hold/Filter

Mixer Section (Green)

Channel 1 Knob - Assign Amplitude of Channel 1 /Oscillator 1 Wave Out Jack

Channel 2 Knob - Assign Amplitude of Channel 2 /Oscillator 2 Wave Out Jack

Channel 3 Knob - Assign Amplitude of Channel 3 /Oscillator 3 Wave Out Jack

Channel 4 Knob - Assign Amplitude of Channel 4 / Noise

Channel 1 In Jack - Channel 1 Input Jack

Channel 2 In Jack - Channel 2 Input Jack

Channel 1+2 Out Jack - Channel 1 and 2 Mix Breakout Output Jack

Channel 3 In Jack - Channel 3 Input Jack

Channel 4 In Jack - Channel 4 Input Jack

Mix Out Jack - Channel 1, 2, 3, 4, and Preamplifier Mixer Output Jack

Preamp Section (Blue)

Level Knob - Assign Output Amplitude of Preamplifier

Gain Knob - Assign Gain of Preamplifier

Preamp In Jack - Channel 2 Input Jack

Preamp Out Jack - Preamp Breakout Output Jack

LFO 1 and 2 Sections (Red)

Frequency Knob - Assign Frequency of LFO

Triangle Out Jack - Triangle Wave Output Jack

Square Out Jack - Square Wave Output Jack

Sample and Hold / Noise Sections (Purple)

Sample In Jack - Waveform to be Sampled Input Jack

Noise Out Jack - Noise Output Jack

Hold In Jack - Gate Input Jack

Sample and Hold Out Jack - Sampled Voltage Output jack

Filter Section (Blue)

Frequency Knob - Filter Cutoff Frequency Knob

Mode Button

    Main Function - Assign Filter Response

    Edit Function - None

Resonance Knob - Filter Resonance Level Knob

Frequency CV 1 Knob - Frequency CV 1 Modulation Amount

Frequency CV 2 Attenuverter Knob - Frequency CV 2 Modulation Amount (positive or negative)

Frequency CV 1 In Jack - Frequency CV 1 Input Jack

Audio In Jack - Audio Signal Input Jack

Frequency CV 2 In Jack - Frequency CV 2 Input Jack

Audio Out Jack - Audio Signal Output Jack

2 User Interface

Mixer Splitter/ADSRs/Dynamics/Echos/Outputs
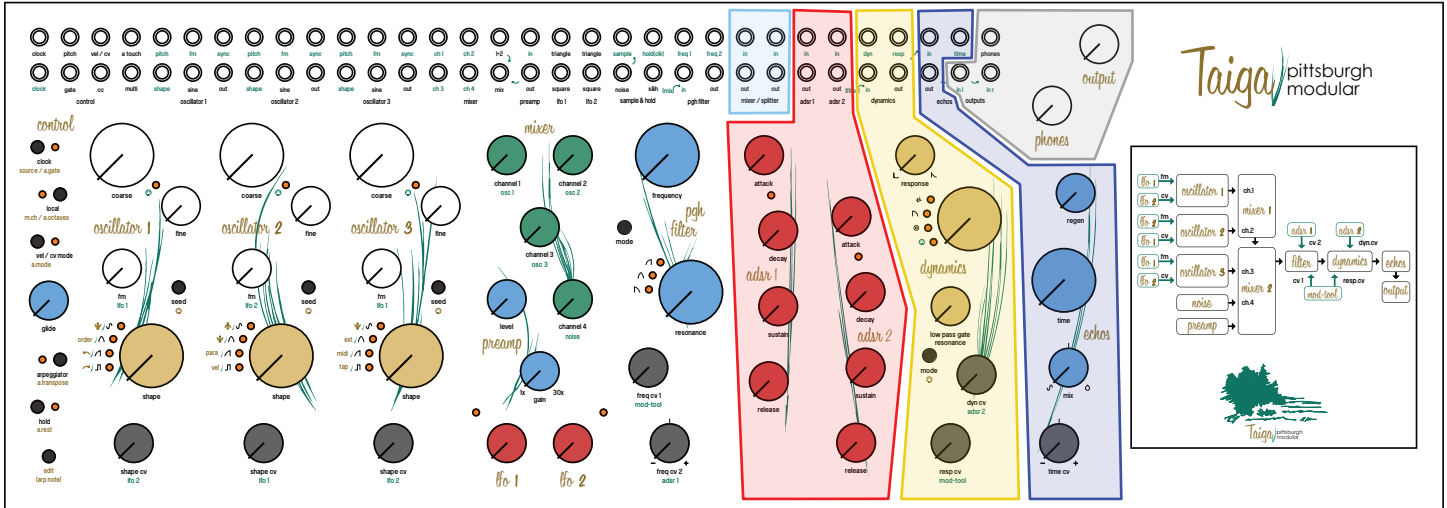
Mixer / Splitter Section

In Jack - Audio or CV Input Jack

Out Jack - Audio or CV Output Jack

In Jack - Audio or CV Input Jack

Out Jack - Audio or CV Output Jack

ADSR Sections

Attack Knob - Assign Attack Timing of Envelope

Decay Knob - Assign Decay Timing of Envelope

Sustain Knob - Assign Sustain Amplitude of Envelope

Release Knob - Assign Release Timing of Envelope

ADSR In Jack - Envelope Gate Input Jack

ADSR Out Jack - Envelope CV Output Jack

Dynamics Section

Response Knob - Assign Decay Timing of Low Pass Gate

Dynamics Knob - Assign Audio Pass-through Level

LPG Resonance Knob - Assign Low Pass Gate Resonance Amount

Mode Button

    Main Function - Assign Dynamics Response

    Edit Function - Enable/Disable Dynamics MIDI Response

Dynamics CV Knob - Dynamics CV Modulation Amount

Response CV Knob - Response CV Modulation Amount

Dynamics CV In Jack - Dynamics CV Input Jack

Audio In Jack - Audio Signal Input Jack

Response CV In Jack - LPG Decay Timing CV Input Jack

Audio Out Jack - Audio Signal Output Jack

Echos Section

Regeneration Knob - Assign Delay Feedback Amount

Time Knob - Assign Delay Time

Mix Knob - Wet / Dry Audio Signal Mix Amount

Time Attenuverter Knob - Frequency CV 2 Modulation Amount (positive or negative)

Audio In Jack - Audio Signal Input Jack

Audio Out Jack - Audio Signal Output Jack

Time CV In Jack - Time CV Input Jack

Outputs Section

Phones Knob - Assign Headphone Amplitude

Output Knob - Assign Output Amplitude

Audio In Left Jack - Audio Signal Left Input Jack

Audio In Right Jack - Audio Signal Right Input Jack

Headphones Out Jack - Stereo Headphones Jack

2 User Interface

power **dc 15v** **left** **right** **midi out** **midi in** **usb**

Power

Power Switch

Barrel Jack - 15v 1.5A DC 5.5mm Barrel Connector

Output Jacks

Left Jack - ¼ mono Audio Output Jack

Right Jack - ¼ mono Audio Output Jack

MIDI Jacks

Midi Out Jack - 5 pin DIN MIDI Output Jack

Midi In Jack - 5 pin DIN MIDI Input Jack

USB Jack

USB Jack - MIDI Input, MIDI Output, and Firmware Updates

3 Taiga Keyboard Overview

3.1 Overview:

The Pittsburgh Modular Taiga Keyboard Synthesizer combines the functionality of many modular synthesizer modules behind a single panel. Connect different functions using patch cables to create complex sounds and textures.

The Taiga Keyboard signal path is divided into two types of signals: audio signals and control voltages. The audio signal is the sound that is produced. The audio signal path starts at an oscillator or other sound source. The audio signal is then patched through other functions used to shape the sound such as a filter or dynamics module.

Control voltages (CV) manipulate the audio signal in several different ways. Gates are represented by a high (5 volts) or low (<= 0 volts) control voltage. A gate can be generated using a pulse or square wave from an oscillator or modulation source, or by using the MIDI gate or clock output. A gate can be shaped using an ADSR to control the attack, decay, sustain, and release of the gate. The modified gate signal can then be sent to any CV input on Taiga.

A second use for control voltages is as a modulation source. For example, a control voltage from the **[MIDI Pitch Output]** jack patched into the **[Filter Freq CV 1 Input]** jack on the filter module controls the cutoff frequency of the filter based on the midi note received. The LFO provides a separate low frequency oscillator that makes a perfect control voltage modulation source. Audio rate modulation signals also make a great CV source for oscillator FM (frequency modulation).

Taiga Keyboard uses Eurorack standard 1/8" mono jacks for all the patch points.

The Taiga Keyboard interface does not distinguish between audio and control voltage signals. In theory, any output can be patched into any input. In practice, inputs respond best when patched to the expected signal type. However, experimentation can yield surprising results. The type of signal input and output of each jack is covered in the corresponding section.

3 Taiga Keyboard Overview

3.2 Panel Labeling Conventions:

The Pittsburgh Modular Taiga Keyboard uses several simple labeling conventions to make the user interface and signal flow easy to understand.

- Input jacks are labeled in **Green**.
- Output jacks are labeled in White.
- Main button function are labeled in White.
- Edit Mode button function are labeled in **Yellow**.
- The **Yellow** Edit Mode button functions are accessed by pressing and holding down the **[Edit Button]**.
- Internal (normaled) connections are labeled below knobs in **Green**.

3.3 Manual Labeling Conventions:

Within the manual, user interface buttons, knobs, and jacks are in bold and marked with brackets **[ ]**. For example, **[Clock LED]** refers the the LED labeled clock in the Control section.

Taiga Keyboard uses the oscillator waveform LEDS to display selected modes. Most settings have **Yellow** labels associated with the selected value. This makes it sound much more complicated than it is. In practice, the LEDs offer a quick way to see the status of most digital settings.

🟡 Osc 1 Sine   🟡 Osc 2 Sine   🟡 Osc 3 Sine
🟡 Osc 1 Tri   🟡 Osc 2 Tri   🟡 Osc 3 Tri
🟡 Osc 1 Saw   🟡 Osc 2 Saw   🟡 Osc 3 Saw
🟡 Osc 1 Pulse   🟡 Osc 2 Pulse   🟡 Osc 3 Pulse

# 3 Taiga Keyboard Overview

3.4 Internal Patching

Taiga Keyboard utilizes internal patching to create a three oscillator synth voice that does not require patch cables to play. The default internal patching is meant to create the expected or most commonly used signal path for each function. The default patch moves the audio and control signals from left to right. The **[Control]** module manages Midi to CV conversion, arpeggiator, and digital modulation tools setting the pitch of the oscillator and triggering the envelopes and / or dynamics controller. The output of **[Oscillator 1]**, **[Oscillator 2]**, **[Oscillator 3]** is sent to channels 1, 2, 3 of the **[Mixer]**. The mixer outputs to the **[Pgh Filter]**. The output of the filter is sent into the **[Dynamics]** controller to manage both amplitude and harmonics. The signal then passes through the **[Echos]** analog delay before being sent to the main and headphone **[Output]**.

Each default patch will be highlighted and explained in the corresponding individual module section of the manual.

To modify the internal patch or to create something completely new, all of the internal routing can be bypassed using patch cables. This allows total patching freedom without the constrains of a fixed voice architecture. **Plugging a patch cable into an internally patched input jack will override any internal patching.** Most internal connections are made using switched jacks. A switched jack allows the internal signal path to be disabled when a patch cable is inserted. A simple example would be the **[FM Input Jack]** of oscillators. Internally, the lfo outputs are wired to the switched jack **[FM Input Jack]** of each oscillator. When a patch cable is plugged into the **[FM Input Jack]** of one of the oscillators, that patch cable breaks the connection to the lfo output to that oscillator and replaces it with the signal from the inserted patch cable.

3.5 Internal Patching Diagram:

The diagram below shows the pre-patched audio and CV signals. Each signal is patched with a unique color for clarity.
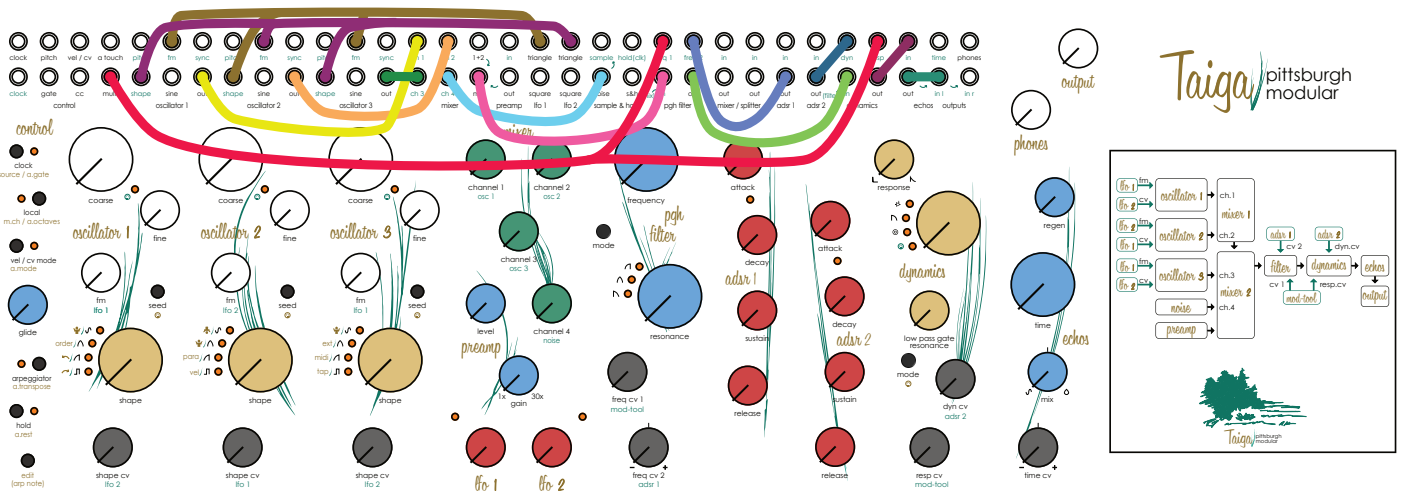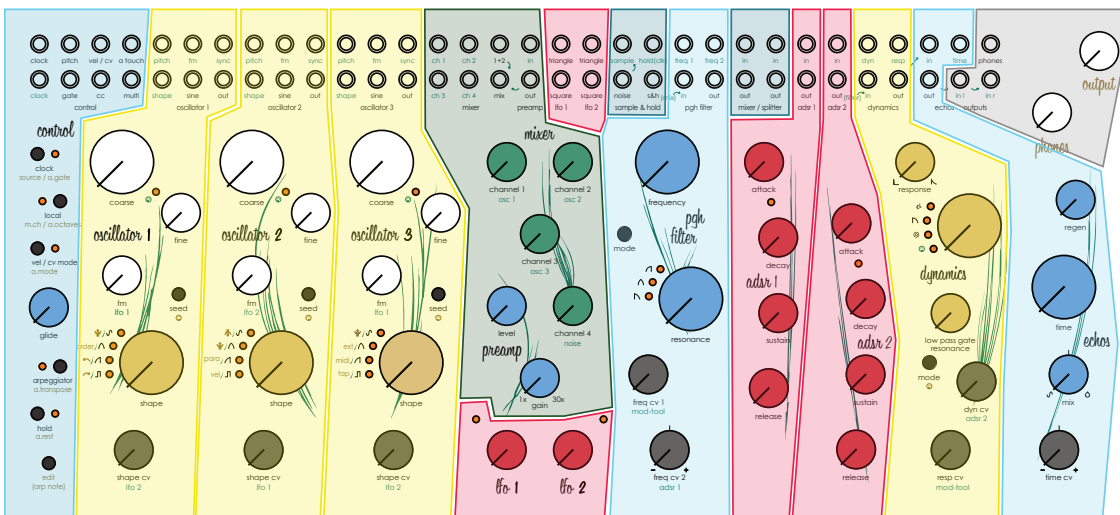
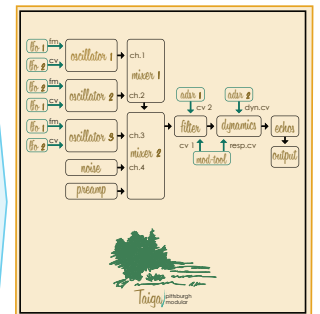# 4 Taiga Keyboard Modules

4.1 Panel Layout

Taiga Keyboard is organized into 11 independent synthesizer modules plus a 24hp eurorack expansion bay. Each module contains a feature set specific to its function. This following pages includes a detailed explanation of each module.

5 Control Module

5.1 Control Module Overview

The Digital Control Functions built into the Taiga Keyboard include a MIDI to CV converter, tap tempo clock source, local control, a 32 step sequencer/arpeggiator, glide, hold, multiple velocity modes, and pitch and modulation wheels. This section will cover each of these features in detail starting with the MIDI to CV converter but first let's discuss the user interface.

5.2 User Interface Conventions:

Each of the buttons in the Control section perform multiple functions. The main function, written under each button in White, is performed by pressing the button. The secondary function, written under each button in **Yellow** is performed by pressing and holding the **[Edit Button]** then pressing the desired button.
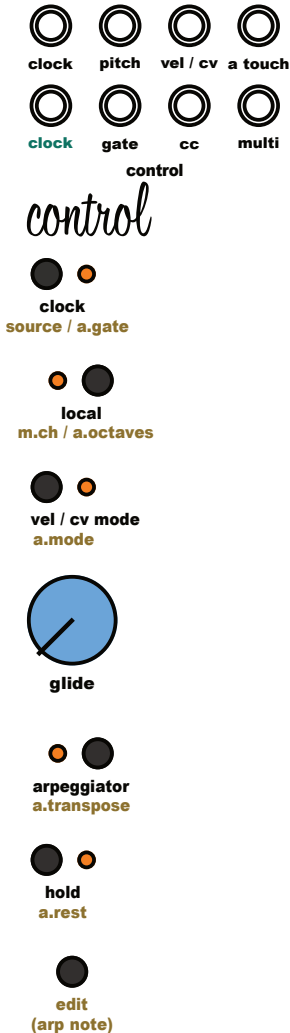
5.3 MIDI to CV Converter Overview:

The MIDI to CV converter allows Taiga Keyboard to respond to digital MIDI messages from a controller or DAW by converting digital MIDI data into analog control voltages. Taiga utilizes the 1volt per octave standard and responds to MIDI note on/off, MIDI note number 0-120, MIDI clock, MIDI clock start/stop, MIDI pitch bend, MIDI modulation or control change messages, and MIDI Velocity. By default, the MIDI channel of Taiga is set to omni, allowing the synthesizer to respond to all MIDI channels.

The Taiga **[MIDI Input Jack]** and **[MIDI Output Jack]** on the rear of the instrument each use a standard 5-Pin MIDI DIN for MIDI input.

5.4 MIDI to CV Converter Pitch:

Note pitch is routed internally from the MIDI section to control the pitch of the each oscillator. MIDI pitch control can be enabled or disabled for each oscillator independently. This allows for maximum flexibility when patching. To enable or disable MIDI pitch control for an Oscillator, press and hold the **[Edit Button]** then press the selected **[Oscillator Seed Button]**. This will toggle MIDI pitch control on and off and modify the functionality and range of the **[Oscillator Pitch Knob]**. Pitch Knob response is covered in the oscillator section.

5.5 MIDI to CV Converter Pitch Glide:

The **[Glide Knob]** adds portamento to the MIDI pitch creating smooth transitions between midi notes. Turning the **[Glide knob]** to the right increases the length of time it takes to slide from one not to the other.

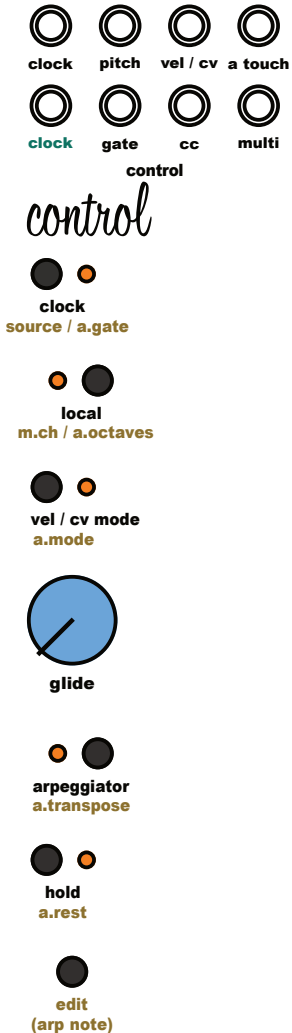# 5 Control Module

5.6 MIDI Octave Offset:

The **[Octave Up Button]** and **[Octave Down Button]** located above the pitch wheel are used to transpose the output of the MIDI pitch over a 7 octave range. Press **[Octave Up Button]** to shift notes up 1 octave and **[Octave Down Button]** to shift notes down 1 octave. Transposing the pitch only affects the pitch of oscillators with MIDI pitch control enabled.

5.7 MIDI to CV Converter Gate:

Note on and note off information is converted to a 5v or 0v gate signal. Note on = 5v. Note off = 0v. The MIDI gate signal is internally routed to the gate input of ADSR 1, ADSR 2, and Dynamics. This allows these modules to be triggered by the MIDI Gate signal without the need for patch cables.

The **[Hold Button]** forces the gate to remain high (on) after a MIDI note off message is received. The gate remains high until the hold function is disabled.

The MIDI Gate signal can be disabled for ADSR 1 and/or ADSR 2 by patching into the **[ADSR Input Jack]**. This breaks the connection between the MIDI Gate and the ADSR input. The MIDI Gate signal can be enabled or disabled for the Dynamics module. To enable or disable the MIDI gate signal, press and hold the **[Edit Button]** then press the **[Dynamics Mode Button]**. This will toggle MIDI gate signal to the Dynamics module on and off.

5.8 Clock Source Overview:

The Control module utilizes 4 clock sources: internal tap tempo, external MIDI, external gate, and internal pseudo-random. The clock is used to advance the Arpeggiator, Mod-Tools output, and Sample and Hold. To select the clock source, press and hold the **[Edit Button]** then press the **[Clock Button]** to cycle through the 4 choices. Press once to check current mode. Press again to advance through the available options. **The clock source can only be changed when Arpeggiator mode is NOT active.**

Clock Source Options Shown On Oscillator 3 LEDs

|		
rnd	🟠	Random Internal Clock
ext	🟠	External Gate
midi	🟠	External MIDI Clock
int	🟠	Internal Tap Tempo

5.9 Internal Tap Tempo Clock Source:

The internal clock source utilizes the **[Clock Button]** to modify the rate of the internal clock. Tap the **[Clock Button]** to change the tempo of the clock. The internal clock rate is saved in memory and recalled when Taiga is powered on. The **[Control Clock Out Jack]** functions as a clock output source in internal tap tempo clock mode and outputs a outputs a +5v 10ms gate signal.

clock   pitch   vel / cv   a touch

clock   gate   cc   multi

control

control

clock
source / a.gate

local
m.ch / a.octaves

vel / cv mode
a.mode

glide

arpeggiator
a.transpose

hold
a.rest

edit
(arp note)

5 Control Module

5.10 External MIDI Clock Source:

The external MIDI clock responds to MIDI start/stop messages and MIDI tempo from an external MIDI clock source. In external MIDI clock mode, the **[Clock Button]** acts as a clock divider cycling through 4 available clock divisions. ÷ 1, ÷ 2, ÷ 4, ÷ 8. Set the MIDI clock division by pressing the **[Clock Button]**. Press once to check current mode. Press again to advance through the available options. The MIDI clock division is saved in memory and recalled when Taiga is powered on. The **[Control Clock Out Jack]** functions as a clock output source in MIDI clock mode and outputs a outputs a +5v 10ms gate signal.
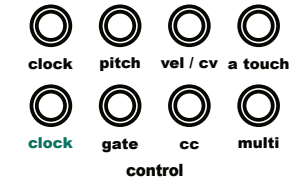
External MIDI Clock Divider Options Shown on All 3 Oscillator LEDs

- Divided by 8
- Divided by 4
- Divided by 2
- Divided by 1

5.11 External Gate Clock:

The external gate clock uses an external gate signal to trigger the clock. In external gate clock mode, the **[Clock Button]** acts as a clock divider cycling through 4 available clock divisions. ÷ 1, ÷ 2, ÷ 4, ÷ 8. Set the external gate clock division by pressing the **[Clock Button]**. Press once to check current mode. Press again to advance through the available options. The external gate clock division is saved in memory and recalled when Taiga is powered on. The **[Control Clock Input Jack]** functions as a clock input in External Gate Clock mode and triggers the clock with the rising edge of most waveforms that rise above 2.5v. The **[Control Clock Out Jack]** functions as a clock output source in External Gate Clock mode and outputs a outputs a +5v 10ms gate signal.

External MIDI Clock Divider Options Shown on All 3 Oscillator LEDs

- Divided by 8
- Divided by 4
- Divided by 2
- Divided by 1

5.12 Internal Pseudo-Random Clock Source:

Internal random clock is based on the tap-tempo but randomly adds or subtracts up to 90% of the clock rate per step. The random clock is very sloppy and will not sync properly with anything. The **[Control Clock Out Jack]** functions as a clock output source in Random Clock mode and outputs a outputs a +5v 10ms gate signal.

clock   pitch   vel / cv   a touch

clock   gate   cc   multi

control

control

clock
source / a.gate

local
m.ch / a.octaves

vel / cv mode
a.mode

glide

arpeggiator
a.transpose

hold
a.rest

edit
(arp note)

5 Control Module

5.13 Local Keyboard Control:

Local keyboard control determines if the keyboard sends note, pitch wheel, and mod-wheel information to the Taiga voice module. Disabling local keyboard control send keyboard note, pitch wheel, and mod-wheel information to the MIDI output only. Enabling local keyboard control send keyboard note, pitch wheel, and mod-wheel information to the Taiga voice module and the MIDI output.

5.14 Assign MIDI Channel:

Enable the assign MIDI channel function by pressing and holding the **[Edit Button]** then pressing the **[Local Button]**. **Assign MIDI channel mode can only be enabled when arpeggiator mode is inactive.** Press once to check current MIDI channel. Press again to advance through the channels. The selected MIDI channel is saved in memory and recalled when Taiga is powered on.
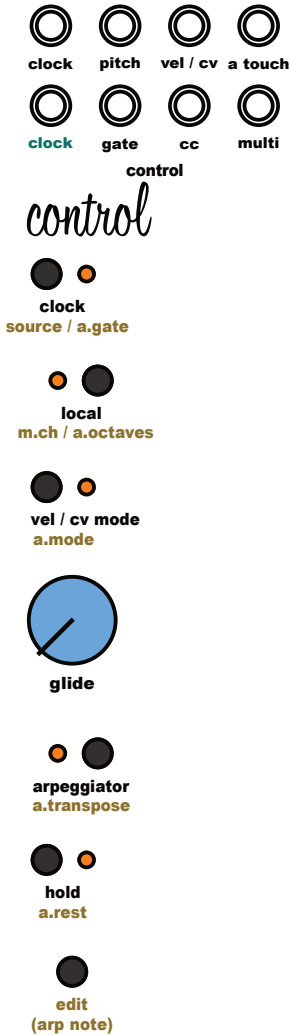
4(16)	8(16)	12(16)
3(15)	7(15)	11(15)
2(14)	6(14)	10(14)
1(13)	5(13)	9(13)

Omni = All On

.

5.15 Assign MIDI Out/Thru

Enable MIDI thru by pressing and holding the **[Edit Button]** then pressing the **[Velocity / CV Mode Button]**. Press once to check current MIDI Thru status. Press again to change. MIDI Thru status is saved in memory and recalled when Taiga is powered on..

MIDI Thru Disabled (All Display LEDs Off)

MIDI Thru Enabled (All Display LEDs On)

5 Control Module

5.16 Velocity Output:

The **[Velocity / CV Output Jack]** outputs a 0v to 5v DC voltage. This output can be used in one of several ways. Note Velocity Mode, Paraphonic Mode, and Random Shift Register Mode.

Note Velocity Mode outputs a 0v to 5v DC voltage based on the velocity value of the active MIDI or arpeggiator note.

5.17 Velocity Output Paraphonic Mode:

Taiga utilizes the **[Velocity Output Jack] to create a 2 voice paraphonic synthesizer. This means Taiga can play 2 notes simultaneously while maintaining a monophonic filter and Dynamics signal path.** This is not a perfect solution or a replacement for true polyphony. Many hardware compromises limit the functionality but if you want to play 2 notes at the same time, Paraphonic Mode can do that.

Patch the **[Velocity / CV Output Jack]** into the **[Pitch]** input of one of the oscillators. This patch cable will send the selected oscillator the offset voltage necessary to play the second note.

Paraphonic calibration procedure is outlined in section 15 of the manual.

5.18 Velocity Output Pseudo-Random Shift Register:

Inspired by the pseudo-random source on the original Voltage Lab, Taiga includes a complex random generator hidden behind the **[Velocity / CC Output Jack]** and **[Gate Output Jack]** that generates both CV and gate signals. The Velocity Pseudo-Random Shift Register functions similar to an analog, 6 stage shift register. When the clock signal triggers an update and the next register value is loaded, there is a chance it will evolve. The random generator cycles through the 6 steps of the sequence and each time the sequencer jumps to the next step, there is a chance the value stored in that step will be replaced with a new value. The result is a random source that feels both random and evolutionary, with an ever evolving 6 step pattern cycle.

Set the Velocity Mode mode by pressing the **[Velocity/CV Mode Button]** to cycle through the 4 options. Press once to check current option. Press again to advance through the available options. **The velocity mode can only be changed when arpeggiator mode is NOT active.**

Velocity Output Options

- ● Pseudo-Random Shift Register Mode (more chance)
- ● Pseudo-Random Shift Register Mode (small chance)
- ● **2 Voice Paraphonic Mode** **(Patch cable needed. See 5.22)**
- ● MIDI Note Velocity 0v to 5v Output
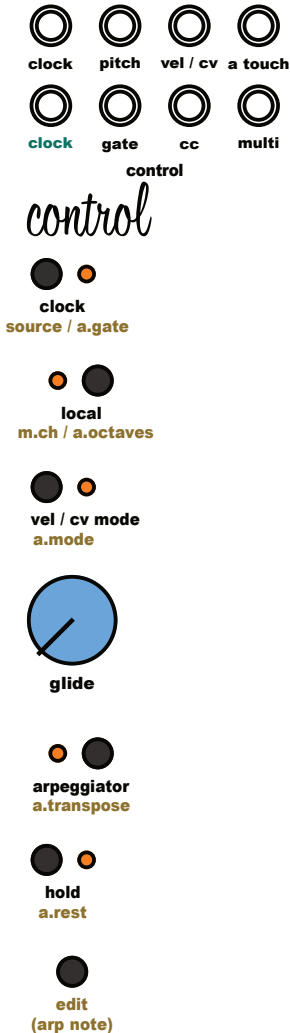
5 Control Module

5.19 Arpeggiator and Note Sequencer:

Arpeggiator mode outputs a monophonic pitch and gate signal. Arpeggios up to 32 notes with velocity are available. The arpeggiator offers two key input modes. The first is the standard arpeggiator input method of pressing and holding multiple MIDI controller keys at once. The second method allows notes to be sequenced one at a time, allowing for the insertion of rests and the use of the same note multiple times. The arpeggiator cycles through the selected notes and velocities at the rate of the active clock source. The set of selected notes resets when the arpeggiator receives a MIDI note off message (key released) or the **[Hold Button]** is released. Sounds confusing but it's simple to use.
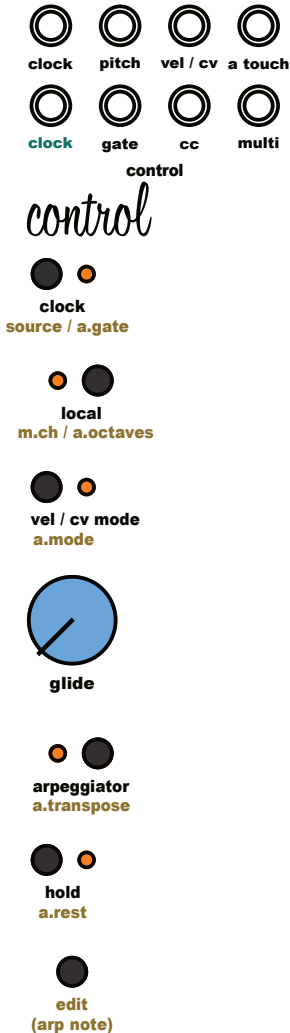
Entering An Arpeggiated Sequence Using Standard Arpeggiator Input Method

Enable arpeggiator mode by pressing the **[Arpeggiator Button]**. Press and hold a few keys on a MIDI keyboard. The arpeggiator will cycle through the depressed keys in the order they were pressed. Playing the notes in this order is sometimes called "as played". To stop the arpeggiated sequence, release one or all of the depressed keys.

Entering An Arpeggiated Sequence Using the Note Sequencing Method

Enable arpeggiator mode by pressing the **[Arpeggiator Button]**. Press the **[Hold Button]** to enable hold mode. Press and hold the **[Edit Button]**. Press keys on a MIDI keyboard one at a time to create a sequence of up to 32 steps. While holding the **[Edit Button]**, press the **[Hold Button]** to add a rest. This note sequencing method automatically enables hold mode. To stop the arpeggiated sequence, press the **[Hold Button]**.

5.20 Additional Arpeggiator Functions:

The arpeggiator offers 6 additional functions to enhance the active arpeggiated sequence: Hold, Transpose, Direction, Arpeggiator Range, Arpeggiator Gate Length, and Random Sequence Generator.

5.21 Arpeggiator Hold:

Enable the hold function by pressing the **[Hold Button]**. The Hold function allows the arpeggiator to cycle through the last set of selected notes after the selected notes have been released, or the **[Edit Button]** is released when using the sequencing input method. Disable the Hold function by pressing the **[Hold Button]**.

5.22 Arpeggiator Transpose:

Enable the Transpose function by pressing and holding the **[Edit Button]** then press the **[Arpeggiator Button]**. Transpose mode can only be enabled when arpeggiator mode and hold mode are active. The Transpose function allows an incoming MIDI note to transpose the active arpeggiated sequence. The sequence is transposed based on the first note of the arpeggiated sequence. Disable the Transpose function by pressing and holding the **[Edit Button]** then press the **[Arpeggiator Button]**.

5 Control Module

5.23 Arpeggiator Playback Direction Mode:

Assign the playback direction of the arpeggiated sequence by pressing and holding the **[Edit Button]** then pressing the **[Velocity / CV Mode Button]**. Press once to check current mode. Press again to advance through the available options. The Random function will randomly jump between the notes of the arpeggiated sequence. Disable Random by pressing and holding the **[Edit Button]** then pressing the **[ARP Button]**.

Arpeggiator Playback Direction Mode Options

rnd 🟠 Random Step Selection

order 🟠 Notes played in the order they were performed

rev 🟠 Notes played highest note to lowest note

fwd 🟠 Notes played lowest note to highest note
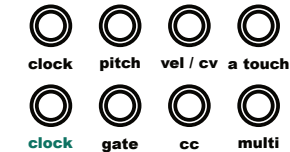
5.24 Arpeggiator Range:

The Arpeggiator Range function sets the number of octaves the active arpeggiated sequence will cycle through. The Arpeggiator Range can be set to 1, 2, or 3 octaves, or random. Set the range by pressing and holding the **[Edit Button]** then pressing the **[Local Button]** to cycle through 1 octave, 2 octaves, or 3 octaves, and random. Press once to check current mode. Press again to advance through the available options. **The arpeggiator range can only be changed when arpeggiator mode is active.**

Arpeggiator Octave Range Options

🟠 Random Octave

🟠 3 Octaves

🟠 2 Octaves

🟠 1 Octave

5.25 Arpeggiator Gate Length:

The Arpeggiator Gate Length function sets the amount of time the arpeggiator gate signal is high (on). Set the Arpeggiator Gate Length by pressing and holding the **[Edit Button]** then pressing the **[Clock Button]** to cycle through the 4 lengths. Press once to check current length. Press again to advance through the available options. **The arpeggiator gate length can only be changed when arpeggiator mode is active.**

Arpeggiator Gate Length Options

🟠 80% of Clock Step Length

🟠 40% of Clock Step Length

🟠 30ms

🟠 10ms

clock   pitch   vel / cv   a touch

clock   gate   cc   multi

control

control

clock
source / a.gate

local
m.ch / a.octaves

vel / cv mode
a.mode

glide

arpeggiator
a.transpose

hold
a.rest

edit
(arp note)

5 Control Module

5.26 Pseudo-Random Sequence Generator Function:

Generate a randomized sequence by pressing the **[Arpeggiator Button]** to enable Arpeggiator mode. Next, press and hold the **[Edit Button]** then press the **[Hold Button]**. This will generate a sequence with a random length (1-32 steps), pseudo-random pitch values, and random velocities. The key of the sequence is based on the last incoming MIDI note. If no MIDI note has been played, the sequence will based on the key of C. The notes of the sequence should mostly stick to the selected key. Major or minor will be randomly chosen. Randomized sequences can include rests.
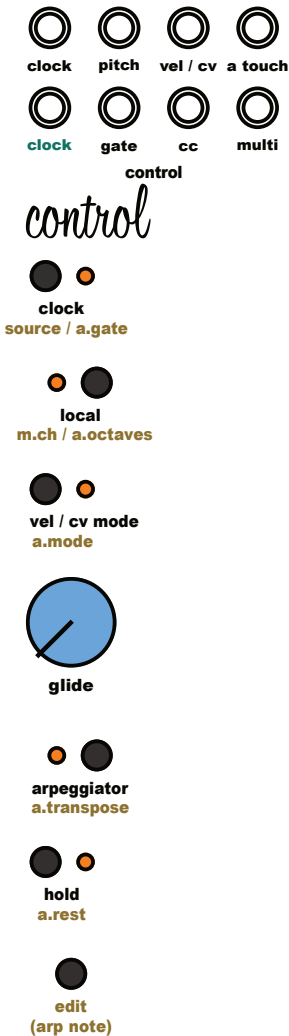
5.27 Octave Up and Octave Down Buttons:

[Octave Up Button] and **[Octave Down Button]** set the active range of the keyboard.

Press and hold the **[Edit Button]** then press the **[Octave Up Button]** to change the frequency range of LFO 1 between low range and high range.
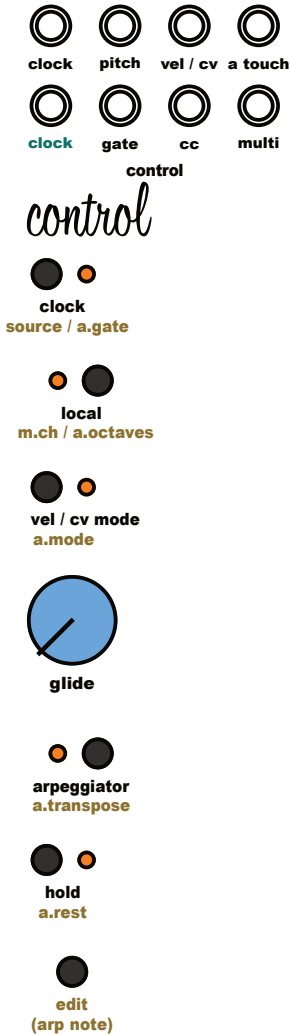
Press and hold the **[Edit Button]** then press the **[Octave Down Button]** to change the frequency range of LFO 2 between low range and high range.
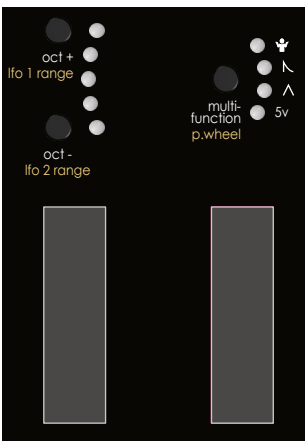
5 Control Module

5.28 Multi-Function Tool:

The Multi-Function Tool is a digital voltage generator controlled the **[Modulation Wheel]** with four modes that controls the **[Multi Output Jack]**. 0-5v Manual control, LFO, envelope, or clock sync'd random voltage. Press the **[Multi-Function Button]** above the **[Modulation Wheel]** to cycle between modes.

rnd	●	Random Voltage
env	●	Decay Envelope
lfo	●	Clock Sync'd Triangle LFO
5v	●	0v to 5v Output

1.Manual Response

Manual voltage response. Press and hold the **[Multi-Function Button]** above the **[Modulation Wheel]** then press the **[OCT Up Button]** or **[OCT Down Button]** to cycle between modes. **Adjust the [Modulation Wheel] to set the output voltage.**

Sine	●	Center Low, Edges High (5v - 0v - 5v)
Tri	●	Center High, Edges Low (0v - 5v - 0v)
Saw	●	Reversed Curve (5v - 0v)
Square	●	0v to 5v Output (0v - 5v)

2. LFO -
A clock sync'd LFO. Press and hold the **[Multi-Function Button]** above the **[Modulation Wheel]** then press the **[OCT Up Button]** or **[OCT Down Button]** to cycle between LFO shapes. Press and hold the **[Multi-Function Button]** then adjust the **[Modulation Wheel]** to set the clock division of the LFO. **Adjust the [Modulation Wheel] to set the amplitude.**
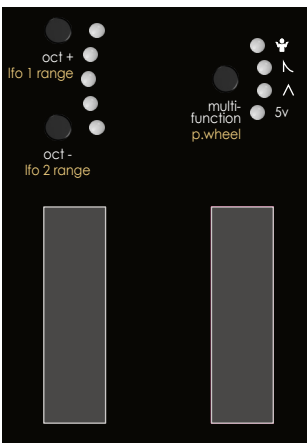
Sine	●	Sine Wave LFO
Tri	●	Triangle Wave LFO
Saw	●	Saw Wave LFO
Square	●	Square Wave LFO with PWM control rather than amplitude control with the **[Modulation Wheel].**

3. Envelope -
A Note on triggered envelope. Press and hold the **[Multi-Function Button]** above the **[Modulation Wheel]** then press the **[OCT Up Button]** or **[OCT Down Button]** to cycle between Envelope shapes. Press and hold the **[Multi-Function Button]** then adjust the **[Modulation Wheel]** to set the decay time of the envelope. **Adjust the [Modulation Wheel] to set the amplitude.**

Sine	●	Percussive Envelope
Tri	●	Swell-y Triangle Envelope
Saw	●	Reversed Percussive Envelope
Square	●	Sustain-y Envelope

4. Random Voltage -
Random voltage generator. Press and hold the **[Multi-Function Button]** above the **[Modulation Wheel]** then press the **[OCT Up Button]** or **[OCT Down Button]** to cycle between random modes. Press and hold the **[Multi-Function Button]** then adjust the **[Modulation Wheel]** to set the random timing. **Adjust the [Modulation Wheel] to set the amplitude.**

Sine	●	Soft Random Expression Generator
Tri	●	Triangular Random Expression Generator
Saw	●	Sawed Random Expression Generator
Square	●	Sample and Hold Generator

clock pitch vel / cv a touch

clock gate cc multi

control

control

clock
source / a.gate

local
m.ch / a.octaves

vel / cv mode
a.mode

glide

arpeggiator
a.transpose

hold
a.rest

edit
(arp note)

oct +
lfo 1 range

oct -
lfo 2 range

multi-
function
p.wheel

5v

5 Control Module

5.29 CC Output Jack CC Number Assign:

To set the active MIDI CC number, press and hold the **[Edit Button]** then press the **[Multi-Function Button]**. While the buttons are pressed, the MIDI section assigns the active MIDI CC number based on the last incoming MIDI CC message it receives. Simply move a mod wheel or engage an input source on a MIDI controller to assign that MIDI CC number to the **[CC Output Jack]**. The MIDI CC number is saved in memory and recalled when Taiga is powered on.
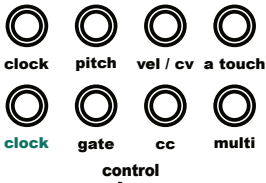
5.30 Pitch Bend Range Select:

There are 4 options for the pitch bend range. 2 semitones (+/- 2 notes), 4 semitones (+/- 3rd), 7 semitones (+/- 5th), 12 semitones (+/- 1 octave). Press and hold the **[Edit Button]** then press the **[Multi-Function Button]** then move the pitch bend wheel to select the pitch bend range. **The pitch bend range can only be changed when arpeggiator mode is NOT active.** The MIDI pitch bend range is saved in memory and recalled when Taiga is powered on.
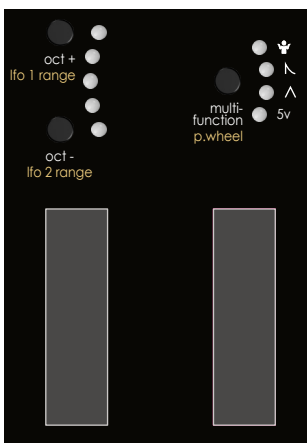
5 Control Module

5.31 Saving to Memory:

Taiga automatically saves digital settings to memory 3 seconds after changes are made as long as the arpeggiator is disabled. If the arpeggiator is enabled, Taiga will wait to save any changes until the arpeggiator is disabled.
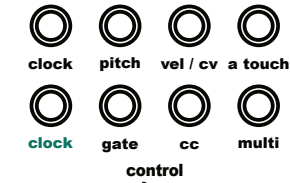
5.32 Input Jacks:

[Control Clock In Jack] Clock input jack. Used as clock source when in external clock mode.

5.33 Output Jacks:

[Control Clock Out Jack] Clock output jack.

[Pitch Jack] Outputs 1 volt per octave CV signal for pitch based on MIDI or arpeggiator note on information.

[Velocity / CV Jack] Outputs a 0v to +5v signal based on the selected Velocity mode settings.

[Aftertouch Jack] Outputs a 0v to +5v signal based on keyboard or incoming MIDI aftertouch value.

[Gate Jack] Outputs a 0v or +5v gate signal for based on MIDI or arpeggiator note on information.

[CC Jack] Outputs a 0v to 5v signal based on the incoming MIDI CC values.

**[Multi Jack]** Outputs a 0v to 5v signal based on the selected Multi-Function Tool settings.
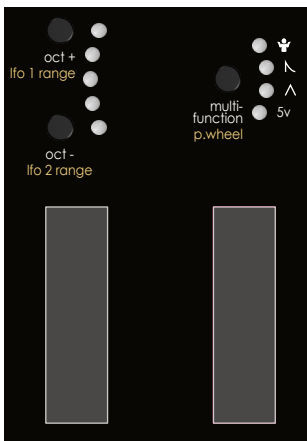
6 Oscillator Modules

6.1 Oscillators Overview:

The sounds generated by the three Taiga oscillators are the culmination of years of research and design. The cascading wave shaping circuitry we have created is the foundation of our organic analog synthesis concept.

The unique sound of Taiga starts with a refined version of our temperature stabilized, analog VCA saw wave oscillator core. The internal signal path of the Taiga oscillators passes the core saw waveform through up to 4 additive wave shapers before reaching the output. Waveform names should be thought of as more of a guide to harmonic density than the definitive shape of the output wave. During the design phase, we began calling the initial clean geometric waveforms (sine, triangle, saw, pulse) seed waves because the shapes of the waveforms available at the output are very different than the internal source wave. As an example, if all the wave shaping is turned down, the output of the triangle wave looks more like a sine wave from the output of the sine wave on an oscilloscope. Because of the intensive wave shaping, the seed wave is simply one of several factors that determine the shape and sound of the output.
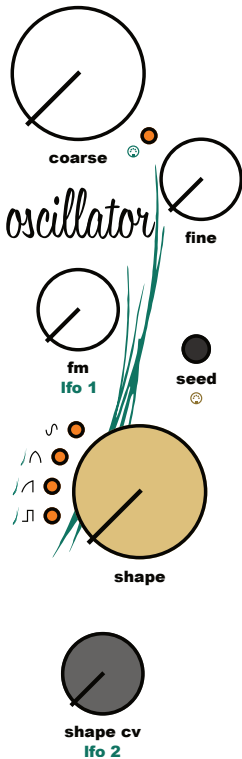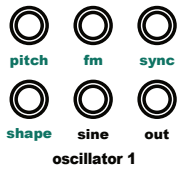
The internal signal path of the Taiga oscillators is more complex than typical oscillators. The waveform passes through up to 4 wave shapers on its way to the output. All of the wave shapers before the wave folder circuit are designed to manipulate the waveform in ways that allow it to interact with the wave folder in different ways. Let's take a close look at each stage of the signal path in the order they occur.

6.2 Oscillator MIDI Control Overview:

All three oscillators have access to the Taiga internal midi bus. Press and hold the **[Edit Button]** then press the **[Seed Button]** to enable or disable this connection.

6.3 Oscillator MIDI Control Enabled:

When MIDI response is enabled, the oscillators respond to MIDI pitch information. Incoming midi notes set the pitch of all MIDI enabled oscillators. The Control module **[Octave Up Button]** and **[Octave Down Button]** can be used to shift the octave of all MIDI enabled oscillators.
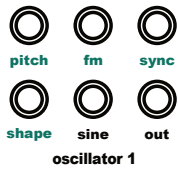
6 Oscillator Modules

6.4 Oscillator MIDI Control Disabled:

When MIDI response is disabled, the oscillators do not respond to MIDI pitch information or the **[Octave Up Button]** and **[Octave Down Button].**

6.5 Oscillator Core:

The core of the Taiga oscillators manages linear frequency modulation, midi note pitch response, octave switching, and volt per octave pitch tracking to generate a frequency stable saw wave. The core can be modulated using the **[Osc Pitch Input Jack]**, **[Osc FM Input Jack]**, and **[Osc Sync Input Jack].**

The **[Osc Pitch Input Jack]** uses 1 volt per octave pitch tracking to set the base frequency of the oscillator.

The **[Osc FM Input Jack]** and **[Osc FM Knob]** use linear FM to modulate the core frequency of the oscillator. The **[Osc FM Input Jack]** is normaled to a LFO Triangle wave output. Plugging a patch cable into the **[Osc FM Input Jack]** will remove the LFO from the signal path.
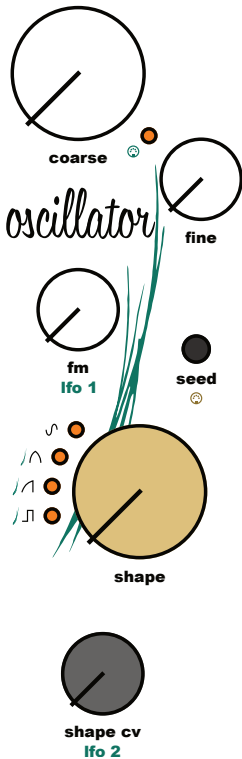
The **[Osc Sync Input Jack]** hard syncs to the incoming waveform to reset the oscillator. The sync input includes an amplifier to allow the oscillator to sync to just about any incoming waveform. This was implemented to allow the **[Osc Sine Output Jack]** to trigger the sync.

6.6 Oscillator Seed Waveforms:

The saw wave generated by the oscillator core is used as raw material to create the other basic geometric waveforms. Triangle and pulse waves are shaped directly from the saw wave and the sine wave is created by further shaping the triangle wave. Two versions of each waveform are available. The standard version and a warped version. In addition, a combined sine and pulse waveform is also available.

Cycle through all the available seed waves, including warped versions by pressing the **[Osc Seed Button]**.

To jump the selected waveform of another oscillator, press and hold the **[Osc Seed Button]** of the oscillator to change then press the **[Osc Seed Button]** of the oscillator with the desired waveform.

6 Oscillator Modules

Seed Waveform Options
1. Sine Wave **[Sine LED]**
2. Warped Sine Wave **[Sine and Triangle LED]**
3. Triangle Wave **[Triangle LED]**
4. Warped Triangle Wave **[Triangle and Saw LED]**
5. Saw Wave **[Saw LED]**
6. Warped Saw Wave **[Saw and Pulse LED]**
7. Pulse Wave **[Pulse LED]**
8. Sine and Pulse Wave **[Sine and Pulse LED]**
9. Randomly Selected Waveform **[All LEDs ON]**
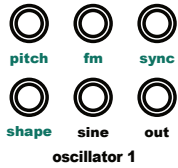
6.7 Oscillator Waveform Warp:

The warp circuit is the last step before the seed wave passes through the wave folder. Warp mode changes the shape of the waveform without modifying the harmonic content or sound. This allows high harmonic content waveforms like the saw to interact strongly with the wave folder. For lower harmonic content waveforms like sine and triangle, warp mode can be thought of like an analog wavetable creating an alternate version of each seed wave.
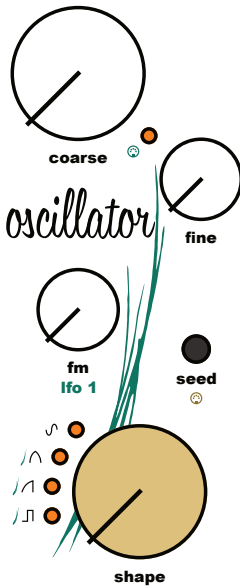
6.8 Oscillator Waveform Timbre:

The last wave shaper in the signal path is the wave folder. The wave folder adds additional harmonics to both simple and complex waveforms by amplifying and folding the waveform back in on itself.

The **[Osc Shape Knob]** controls the strength of the wave folder. Turning the knob to the right increases the depth and number of folds up to a maximum of 6 folds. The density and depth of the folds has a strong affect on the shape and sound of the seed wave. When using the **[Osc Shape CV Input Jack]** and **[Osc Shape CV Knob]** the **[Osc Shape Knob]** acts as the starting point for the external modulation control. The **[Osc Shape CV Input Jack]** is normaled to an LFO Triangle wave output. Plugging a patch cable into the **[Osc Shape CV Input Jack]** will remove the LFO from the signal path.

6.9 Oscillator Waveform Outputs:

The output of the wave folder is available using the **[Osc Audio Output Jack]**. A clean sine wave is available using the **[Osc Sine Output Jack]**.

6 Oscillator Modules

6.10 Oscillator Input Jacks:

[Osc Pitch Input Jack] 1 volt per octave pitch input jack.

[Osc FM Input Jack] Frequency modulation input jack. The **[Osc FM Input Jack]** is normaled to the LFO Triangle wave output. Plugging a patch cable into the **[Osc FM Input Jack]** will remove the LFO from the signal path.

**[Osc Sync Input Jack]** Hard sync input jack.

[Osc Shape CV Input Jack] Shape control CV input jack. The **[Osc Shape CV Input Jack]** is normaled to the LFO Triangle wave output. Plugging a patch cable into the **[Osc Shape CV Input Jack]** will remove the LFO from the signal path.
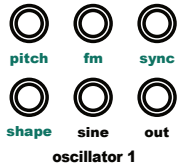
6.11 Oscillator Output Jacks:

[Osc Sine Output Jack] Clean sine wave output jack.

[Osc Audio Output Jack] Main oscillator output based on the selected seed wave and shape settings. This waveform is normaled to a Mixer input jack.
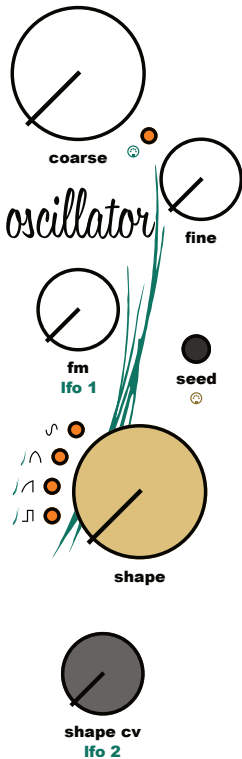
7 Dual Mixer / Preamp Modules

7.1 Dual Channel Mixer Overview:

The dual mixer section is deeper and more useful than it may appear. It is a 2 channel mixer and a 3 channel mixer joined together and capable of mixing both audio or control voltages,

In normal operation, channels 1, 2, 3, 4, and the preamp combine to work as a single 5 channel mixer. However, patching into the **[Mixer 1+2 Output Jack]** splits the mixer into two independent mixers. Channel 1 and Channel 2 are sent to the **[Mixer 1+2 Output Jack]** while channel 3, 4, and the preamp are sent to the **[Mixer Output Jack]**. Patching into the **[Preamp Output Jack]** removes the preamp from the **[Mixer Output Jack]**.

The ability to split the mixer adds an important level of flexibility to potential patches. Channel 1 and 2 can be used to mix a pair of CV signals while channel 3, 4, and 5 mix the audio from the 3 oscillators. This is just one of many possibilities.
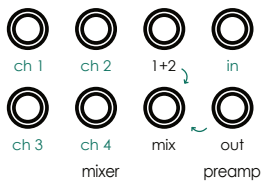
7.1 Dual Channel Mixer Internal Routing:

The dual mixer is internally normaled to the oscillators and the noise source. Channel 1 is normaled to Oscillator 1. Channel 2 is normaled to Oscillator 2. Channel 3 is normaled to Oscillator 3. Channel 4 is normaled to Noise. Plugging a patch cable into the **[Mixer Channel Input Jack]** will remove the normaled audio source from the signal path. The preamp is not normaled to any signal.
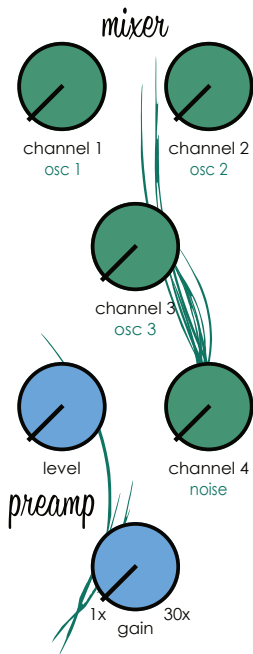
7.2 Dual Channel Mixer Gain Staging:

The internal gain structure of the mixer was designed to mix 3 oscillators and the noise source cleanly with the **[Mixer Channel Knobs]** set to around 12 or o'clock. Precise knob positions depend heavily on the selected waveforms. When mixing fewer channels the **[Mixer Channel Knobs]** can be turned up. The **[Mixer Channel Knobs]** can also be turned up on purpose to distort the output of the mixer.

7.3 Preamp:

The preamp uses a high gain, soft clipping overdrive limiter circuit to increase the level of audio signals. The preamp can be used to cleanly increase the level of external audio to internal signal levels, or it can be used as an overdrive / limiter for internal signals. This circuit sounds very nice patched between the mixer and the filter. It can also be used to patch the output of Taiga back into the mixer section creating a unique feedback drive effect. The **[Preamp Output Jack]** is normaled to the mixer output. Plugging a patch cable into the **[Preamp Output Jack]** will remove the preamp from the mixer signal path.
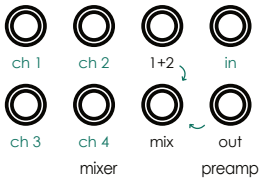
7 Dual Mixer / Preamp Modules

7.4 Dual Mixer / Preamp Input Jacks:

[Mixer Channel 1 Input Jack] Channel 1 input jack. The [Mixer Channel 1 Input Jack] is normaled to the oscillator 1 output. Plugging a patch cable into the [Mixer Channel 1 Input Jack] will remove oscillator 1 from the signal path.

[Mixer Channel 2 Input Jack] Channel 2 input jack. The [Mixer Channel 2 Input Jack] is normaled to the oscillator 2 output. Plugging a patch cable into the [Mixer Channel 2 Input Jack] will remove oscillator 2 from the signal path.

[Mixer Channel 3 Input Jack] Channel 3 input jack. The [Mixer Channel 3 Input Jack] is normaled to the oscillator 3 output. Plugging a patch cable into the [Mixer Channel 3 Input Jack] will remove oscillator 3 from the signal path.

[Mixer Channel 4 Input Jack] Channel 4 input jack. The [Mixer Channel 4 Input Jack] is normaled to the noise output. Plugging a patch cable into the [Mixer Channel 4 Input Jack] will remove the noise from the signal path.

[Preamp Input Jack] Preamp audio input jack.

7.5 Dual Mixer / Preamp Output Jacks:

[Mixer 1+2 Output Jack] Mix of channels 1 and 2 output jack. The [Mixer 1+2 Output Jack] is normaled to the mixer output. Plugging a patch cable into the [Mixer 1+2 Output Jack] will remove channel 1 and 2 from the mixer output.

[Mixer Output Jack] Main mixer output jack. The [Preamp Output Jack] is normaled to the mixer output.

[Preamp Output Jack] Preamp output jack. The [Preamp Output Jack] is normaled to the mixer output. Plugging a patch cable into the [Preamp Output Jack] will remove the preamp from the mixer output.
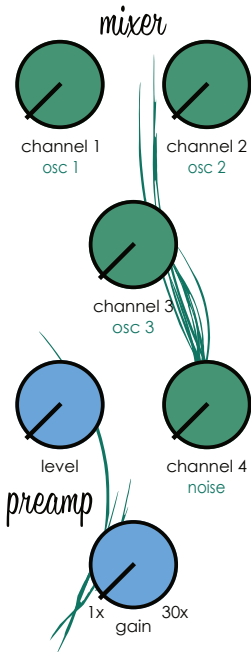
# 8 Utility Modules (LFOs / Noise / Sample & Hold / Mixer/Splitter)

8.1 LFO Overview:

The LFO module is a pair of analog, dual range, low frequency oscillators with +/- 5 volt triangle and square wave outputs. Perfect for long sweeps or audio rate frequency modulation. Select between high and low range by holding down the **[Edit Button]** and pressing the **[Octave Up Mode Button]** for LFO1 and **[Octave Down Mode Button]** for LFO2.
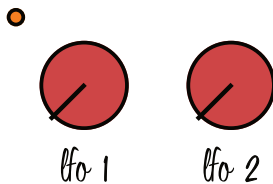
LFO Ranges:
High: 2 Hz to 500 Hz
Low: 41 seconds to 5 Hz
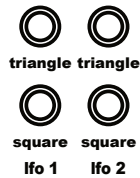
8.2 Noise Overview:

The transistor core analog noise source is pitched somewhere between pure white and pink noise. Perfect for percussion or adding a bit of edge to a sound. The output is around +/- 5v. The **[Noise Output Jack]** is normalized to the **[Sample and Hold Sample Input Jack]**.

8.3 Sample & Hold Overview:

The Sample & Hold circuit samples the voltage patched to the **[Sample and Hold Sample Input Jack]** and outputs that voltage until a new sample voltage is taken. A sample is taken when the **[Sample and Hold Hold Input Jack]** receives a positive gate or trigger. The sample source can be audio or cv. The output is sent to the **[Sample and Hold Output Jack]**.

The **[Sample and Hold Sample Input Jack]** is normaled to the noise output. Plugging a patch cable into the **[Sample and Hold Sample Input Jack]** will remove the noise from the signal path.
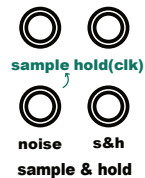
The **[Sample and Hold Hold Input Jack]** is normaled to the clock output. Plugging a patch cable into the **[Sample and Hold Hold Input Jack]** will remove the clock output from the signal path. The Sample and Hold can be clocked using gate and clock signals. It can also be clocked using an [Oscillator Audio Output Jack]. **The internal wave shaping of the Taiga oscillators requires the Warped Saw Wave [Saw and Pulse LED] to trigger the Sample and Hold. Other Taiga oscillator waveforms will not trigger the Sample and Hold.**
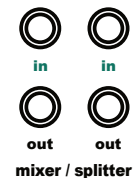
8.4 Mixer/Splitter Overview:

The Mixer/Splitter section offers both mixing and signal splitting with a two channel unity gain mixer and a set of individually buffered outputs. This section can be used as a two channel mixer, buffered signal splitter, or both.

triangle triangle

square square
lfo 1 lfo 2

lfo 1 lfo 2

sample hold(clk)

noise s&h
sample & hold

in in

out out
mixer / splitter

9 PGH Filter Module

9.1 PGH Filter Overview:
The filter has defined the sound of Pittsburgh Modular from the moment it was introduced. A distinct sound that has been tweaked to perfection. It offers a warm, organic sweep through the full frequency range. The lowpass filter is gummy and relaxed while the highpass is clean and defined. The goal was to produce a filter that did not have a dead spot; where every turn of the frequency knob produces something interesting.

freq 1   freq 2

(mix) in   out

pgh filter

9.2 PGH Filter Response:
The PGH Filter module is a voltage controlled, analog, 2 pole, 12db state variable filter. State variable topology offers several filter output responses, highpass , bandpass , lowpass , and notch . Select a filter response using the **[Filter Mode Button]**. Each response produces a very smooth and natural sounding sweep.
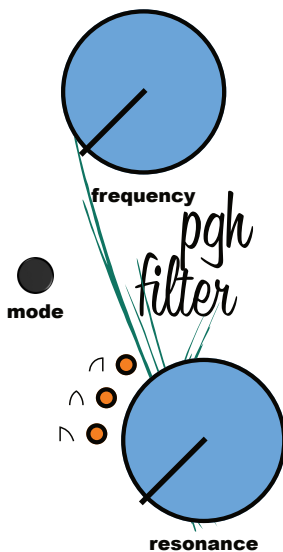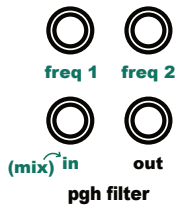
Filter Response Options
1. Lowpass Filter **[Lowpass LED]**
2. Lowpass + Bandpass Filter **[Lowpass and Bandpass LED]**
3. Bandpass Filter **[Bandpass LED]**
4. Bandpass + Highpass Filter **[Bandpass and Highpass LED]**
5. Highpass Filter **[Highpass LED]**
6. Lowpass + Highpass Filter (Notch Filter) **[Lowpass and Highpass LED]**
7. Random Filter Response **[All LEDs ON]**

frequency

pgh
filter

mode

9.3 PGH Filter Resonance:
One of the more interesting aspects of a state variable filter is the ability to offer near infinite resonance without self-oscillating by amplifying a narrow band of frequencies around the filter Cutoff frequency. This helps to shape the smooth, musical sound of the PGH Filter. The amount of resonance available is headroom dependent. Smaller incoming audio signals allow more headroom for resonance and larger incoming audio signals allow less headroom for resonance.

resonance

freq cv 1
mod-tool

9.4 PGH Filter Frequency Modulation:
The frequency of the filter can be modulated using a pair of CV inputs **[Filter Frequency CV 1 Input Jack]** and **[Filter Frequency CV 2 Input Jack]**.

[Filter Frequency CV 1 Input Jack] Input passes through an **attenuator** and is normaled to the **[Multi Output Jack].** This input is best for bipolar modulation sources like the LFO.

[Filter Frequency CV 2 Input Jack] Input passes through an **attenuverter** and is normaled to the **[ADSR 1 Output Jack]** This input is best for unipolar modulation sources like the ADSR because it allow the modulation to be applied positively or negatively.

−   +
freq cv 2
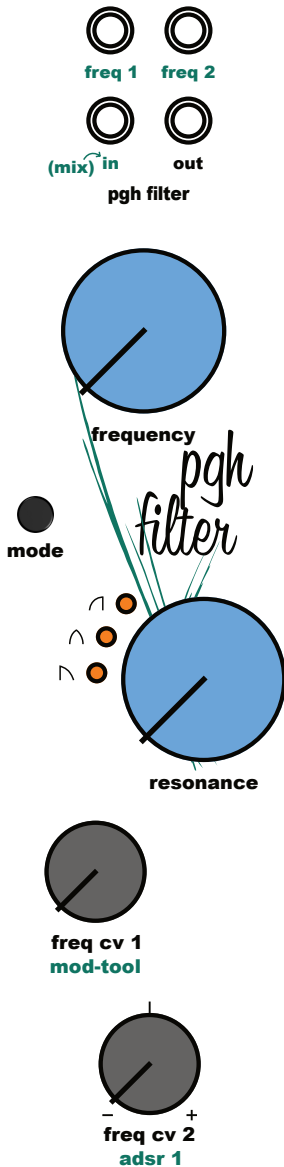adsr 1

9 PGH Filter Module

9.5 PGH Filter Input Jacks:

[Filter Frequency CV 1 Jack] Frequency modulation input jack. The [Filter Frequency CV 1 Input Jack] is normaled to the LFO Triangle wave output. Plugging a patch cable into the [Filter Frequency CV 1 Input Jack] will remove the LFO from the signal path.

[Filter Frequency CV 2 Jack] Frequency modulation input jack. The [Filter Frequency CV 2 Input Jack] is normaled to the ADSR 1 output. Plugging a patch cable into the [Filter Frequency CV 2 Input Jack] will remove the ADSR 1 from the signal path.

[Filter In Jack] Filter audio input jack. The [Filter In Jack] is normaled to the mixer output. Plugging a patch cable into the [Filter In Jack] will remove the mixer output from the signal path.

9.6 PGH Filter Output Jacks:

[Filter Output Jack] Filter audio output jack.

freq 1   freq 2

(mix) in   out

pgh filter

frequency

pgh
filter

mode

resonance

freq cv 1
mod-tool

freq cv 2
adsr 1

10 ADSR Modules

10.1 ADSR Overview:
The ADSR modules are a pair of four stage ADSR envelope generators that smooth the shape of the incoming gates and triggers to produce a more expressive instrument. The envelope outputs can be used to control the amplitude of an oscillator, the cutoff frequency of a filter or any other function on a module that accepts control voltages.

The envelopes in Taiga are based on the Lifeforms SV-1 ADSR and are designed to be snappy and percussive. Small adjustments to the **[ADSR Attack Knob]** will reduce this effect and smooth out the sharp attack.

For each envelope, an incoming gates or trigger signal passes through each of the four stages to output an envelope. When the ADSR modules receives a gate or trigger signal, the attack determines the amount of time needed for the envelope generator to reach the peak output voltage and move on to the decay stage. Decay sets the amount of time needed to transition to the level set by the sustain knob. The sustain level is maintained as long as the incoming gate remains on or high. Once the incoming gate goes low or off, the release knob sets the time needed to close the envelope and return the Envelope output to 0 volts.

ADSR outputs 0-10 volts.

10.2 PGH Filter Input Jacks:
[ADSR Input Jack] Envelope gate input jack.

10.3 PGH Filter Output Jacks:
[ADSR Output Jack] Envelope CV output jack.

in

out

adsr 1

attack

decay

adsr

sustain

release

11 Dynamics Module

11.1 Dynamics Overview:

The Dynamics module plays a large part in shaping the output of Taiga by utilizing a unique processing circuit that adds dimension to the sound. The Dynamics circuit is unique in the way that it simulates the characteristics of the natural world. When used in lowpass gate mode, louder sounds contain more harmonic content and quieter sounds contain less harmonic content. This is not the case when using VCA mode. VCA mode simply changes the loudness of the sound without modifying the harmonic content. There is no reason that synthesizers need to simulate the real world but because of how it affects the harmonic content of sound, a lowpass gate sounds more organic or natural compared to a standard VCA.
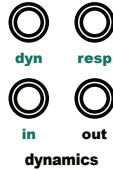
The old school lowpass gate was limited to a static response time that varied from unit to unit. This made each lowpass gate a little different. The Dynamics module in Taiga expands beyond the original concept by adding a unique, **[Dynamics Response Knob]** allowing for customizable gate response times. The dynamics response time can be voltage controlled using the **[Dynamics Response CV Input Jack]** and **[Dynamics Response CV Knob]**.

The pluck response is available in low pass gate mode. The pluck response uses a sharp gate or envelope signal to pluck or strike the Dynamics while taking advantage of the unique response shape to create a percussive sound with a natural decay.
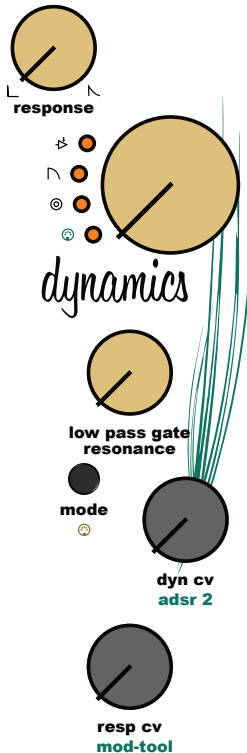
11.2 Dynamics MIDI Control:

MIDI gate control of the Dynamics module is optional and can be enabled or disabled. MIDI control triggers the Dynamics module with MIDI note on/off messages. To enable or disable the Dynamics MIDI response, press and hold the **[Edit Button]** then press the **[Dynamics Mode Button]**. The corresponding yellow MIDI LED will illuminate to show that midi response is active.

11.3 Dynamics Processing Modes:

The Dynamics Controller offers 3 distinct audio processing modes. VCA, low pass gate, and plucked low pass gate. Each mode creates a unique sound and feature set for signal processing. Cycle through all the available Processing Modes by pressing the **[Dynamics Mode Button]**.

Dynamics Controller Processing Modes

1. VCA Mode ⚡ **[VCA LED]**
2. Low Pass Gate Mode ∏ **[Low Pass Gate LED]**
3. Plucked Low Pass Gate Mode ◎ **[Pluck and Low Pass Gate LED]**

11 Dynamics Module

11.4 Dynamics VCA Mode ⊳

In VCA Mode the Dynamics module acts as a transparent voltage controlled amplifier. The **[Dynamics Response Knob]** has little effect on the incoming signal and the **[Dynamics Low Pass Gate Resonance Knob]** has no effect on the incoming signal. Plucked Response is also not available.

The **[Dynamics Knob]** acts as a pass through for the incoming signal. Turn the **[Dynamics Knob]** to the right to manually open up the VCA and allow the incoming signal to pass. When using the **[Dynamics CV Input Jack]** and **[Dynamics CV Knob]**, the **[Dynamics Knob]** acts as the starting point for the level of the incoming signal. The **[Dynamics CV Knob]** offers unity gain in VCA mode at 12 o'clock.
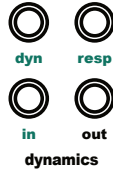
11.5 Dynamics Low Pass Gate Mode

The response of the low pass gate mode sits somewhere between a VCA and a filter. The traditional description of a low pass gate is that it combines a VCA and filter together to allow the circuit to manage both amplitude and harmonic content. Removing harmonics as the low pass gate closes and adding back the harmonics as it opens. The response of the low pass gate is implemented in a way that allows it to remove all audible frequencies and eliminate the need for a VCA.

The Dynamics module has been tuned so that traditional low pass gate an other effects can be achieved using our modern design. Incorporating the ability to pluck the low pass gate with variable response time, smooth resonance, and full frequency range sweep create an organic and unique dynamics manager.

The **[Dynamics Knob]** controls the low pass gate sweep and acts as a pass through for the incoming signal. Turn the **[Dynamics Knob]** to the right to manually open up the low pass gate, adding back harmonics and allowing the incoming signal to pass. When using the **[Dynamics CV Input Jack]** and **[Dynamics CV Knob]**, the **[Dynamics Knob]** acts as the starting point for the incoming signal. The **[Dynamics CV Knob]** offers unity gain in Low Pass Gate mode turned full right. LPG mode is around 6db quieter than VCA mode. This is a quirk of the analog circuit.

11.6 Dynamics Low Pass Gate Resonance:

The Dynamics low pass gate mode offers a soft resonance response tuned to add weight to sounds without becoming overwhelming. Like in the PGH Filter, the amount of resonance available is headroom dependent. Smaller incoming audio signals allow more headroom for resonance and larger incoming audio signals allow less headroom for resonance.
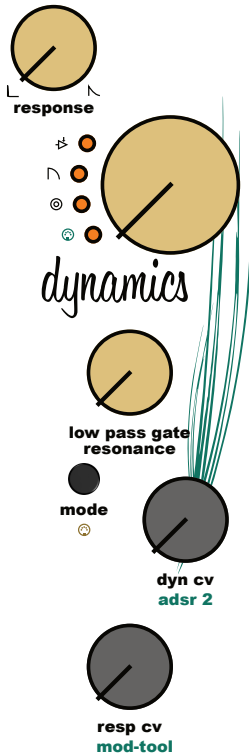
11 Dynamics Module

11.6 Dynamics Pluck Response ◎

Utilize a sharp gate or envelope signal to pluck or strike the Dynamics module in a percussive way. Pluck uses the **[Dynamics CV Input Jack]** to create the percussive effect. Turn the **[Dynamics CV Knob]** full left to hear just the plucked response. Turn the **[Dynamics CV Knob]** to the right to blend the pluck response with the incoming CV or gate signal.

The **[Dynamics Response Knob]** controls the decay time of the incoming **[Dynamics CV Input Jack]** signal. In low pass gate mode, this control uses modern, analog circuitry to expand on the functionality of the outdated components used in vintage low pass gate circuits. This allows the Dynamics module to create natural sounding envelopes to shape sounds. Redesigning the low pass gate with modern, analog circuitry offers precise and reproducible control over the response of the Dynamics module.

Turning the **[Dynamics Response Knob]** to the right increases the decay time. When using the **[Dynamics Response CV Input Jack]** and **[Dynamics Response CV Knob]**, the **[Dynamics Response Knob]** acts as the starting point for the incoming signal.
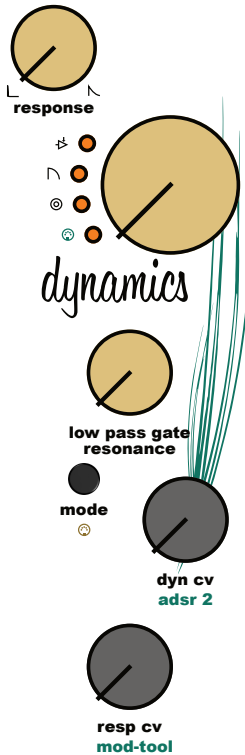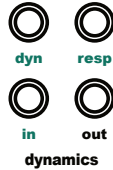
11.7 Dynamics Input Jacks:

[Dynamics CV Input Jack] Amplitude modulation input jack. The **[Dynamics CV Input Jack]** is normaled to the ADSR 2 output. Plugging a patch cable into the **[Dynamics CV Input Jack]** will remove the ADSR 2 from the signal path.

[Dynamics Response CV Input Jack] Response modulation input jack. The **[Dynamics Response CV Input Jack]** is normaled to the **[Multi Output Jack]**. Plugging a patch cable into the **[Dynamics Response CV Input Jack]** will remove the LFO triangle wave from the signal path.

[Dynamics Input Jack] Dynamics audio input jack. The **[Dynamics Input Jack]** is normaled to the filter output. Plugging a patch cable into the **[Dynamics Input Jack]** will remove the filter output from the signal path.

11.8 Dynamics Output Jacks:

[Dynamics Output Jack] Dynamic audio output jack.

dyn   resp

in   out
dynamics

response

dynamics

low pass gate
resonance

mode

dyn cv
adsr 2

resp cv
mod-tool

12 Echos Module

12.1 Echos Overview:

The Echos module utilizes a pair of 4,096 stage BBD chips to produce a voltage controllable analog delay signal. Clean delay time can vary from 16ms to 250ms. The maximum delay time can be increased using the **[Echos Time CV Input Jack]**. The delay time maxes out at 500ms but the increased time comes at the cost of fidelity and high frequency clock noise bleed.

The name BBD stands for bucket brigade device in reference to a line of people passing buckets of water to quickly extinguish a fire. Each stage of a BBD chip contains a single capacitor. Pairing two chips together creates a chain of 8,192 capacitors. Like the water buckets, an audio signal is passed from capacitor to capacitor within the BBD chips once every clock step. A slower clock produces a longer delay and a faster clock produces a shorter delay.
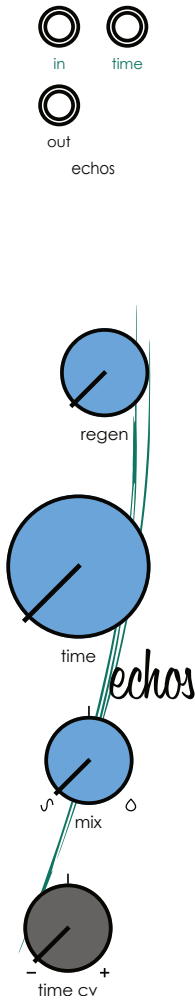
12.2 Echos Delay Time:

Delay time is set by adjusting the **[Echos Time Knob]**. Turning the knob to the right increases the delay time. Delay time can be voltage controlled by patching into the **[Echos Time CV Input Jack]** and adjusting the **[Echos Time CV Knob]**. The **[Echos Time CV Knob]** is an attenuverter. That means the incoming signal is off(-ish) when the knob is set to the 12 o'clock position. Turning the attenuverter to the right passes the original signal through. Turning the attenuverter to the left passes an inverted version of the original signal through. Turning the **[Echos Time CV Knob]** to the right will increase the amount of CV passed through to the delay time. Turning the **[Echos Time CV Knob]** to the left will increase the amount of inverted CV passed through to the delay time. Locating the exact off position of an attenuverter can be difficult. The easiest way to remove the CV signal from the signal path is to simply remove the patch cable patched into the **[Echos Time CV Input Jack]**.

12.3 Echos Regeneration:

The **[Echos Regeneration Knob]** sets the amount of repeats created by the delay. Turning the **[Echos Regeneration Knob]** full left will produce 1 repeat. Turning the knob to the right increases the number of repeats until the delay begins to self-oscillate.

12 Echos Module

12.4 Echos Mix:

The **[Echos Mix Knob]** acts as a balance control between the dry incoming signal and the wet delayed signal. Turning the **[Echos Mix Knob]** to the left weighs the output toward the dry signal. Turning the **[Echos Mix Knob]** to the right weighs the output toward the wet signal. In theory, setting the **[Echos Mix Knob]** at 12 o'clock creates an even mix of the wet and dry signals. In reality, the tolerance of the potentiometer, waves shape, and dry signal level all influence the location of an even 50/50 mix. The **[Echos Mix Knob]** is designed to attenuate the signal at 50/50 mix. The drop in level creates headroom for feedback and self-oscillation to mix properly with the dry signal without distorting.
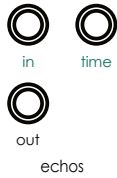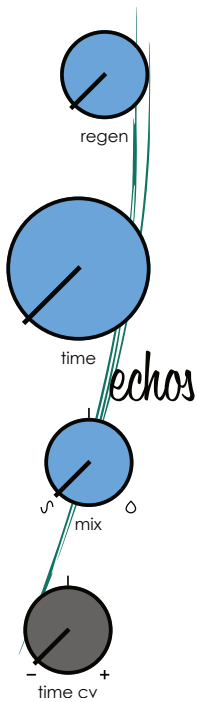
12.5 Echos Input Jacks:

[Echos Time CV Input Jack] Delay time modulation input jack.

[Echos Input Jack] Echos audio input jack. The **[Echos Input Jack]** is normaled to the dynamics output. Plugging a patch cable into the **[Echos Input Jack]** will remove the dynamics output from the signal path.

12.6 Echos Output Jacks:

[Echos Output Jack] Echos audio output jack.

13 Output Module

13.1 Output Overview:
Line level and headphone outputs. The line level output is monophonic. The headphone output is dual monophonic with the same monophonic signal is routed into both the left and right channels.
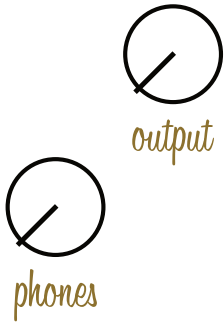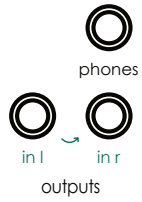
13.2 Output Input Jacks:
[Output Input Jack] Outputs module audio input jack.

13.3 Output Output Jacks:
[Headphone Output Jack] Dual monophonic TRS audio output jack.

[Main Output Jack] Monophonic TS audio output jack.

phones

in l   in r
outputs

output

phones

14 Factory Reset

14.1 Digital Settings Factory Reset:

Press and hold **[Hold Button]**, **[Arpeggiator Button]**, and **[Dynamics Mode Button]** for 5 seconds to reset all digital modes and functions to the default settings. This action can not be undone.

15 Paraphonic Calibration

15.1 Paraphonic Calibration

Calibrating Velocity Output for Paraphonic Mode:
The **[Velocity Output Jack]** needs to be calibrated to output the correct offset voltage for Paraphonic Mode. The calibration procedure is simple and results are saved when Taiga is powered off.

1.Turn up the volume for oscillator 1 and oscillator 2. Oscillator 3 is not needed so turn the volume of oscillator 3 full left to off.

2. Make sure the Oscillators 1 and 2 are in tune with each other when a note is played. A tuner can be used for more precision.

3. Enter Paraphonic Mode by pressing **[Velocity/CV Mode Button]** to cycle through the 4 options until 2 Voice Paraphonic Mode is selected. **The velocity mode can only be changed when arpeggiator mode is NOT active.**

Velocity Output Options
○ Pseudo-Random Shift Register Mode (more chance)
● Pseudo-Random Shift Register Mode (more chance)
○ Pseudo-Random Shift Register Mode (small chance)
2 Voice Paraphonic Mode (Patch cable needed. See 5.22)
(All LEDs Off) MIDI Note Velocity 0v to 5v Output

4. Enable Hold Mode by pressing the **[Hold Button].**
5. Play a C note and then a higher C note on a MIDI keyboard. If the higher note sounds sharp or flat compared to the lower note, proceed to the next step.

6. Press and hold the **[Edit Button]** then press the **[Hold Button]**. Use the modulation wheel to adjust the frequency of the higher oscillator. When the oscillators are in tune with each other, the calibration procedure is finished.

15 Calibration

15.2 Pitch and Mod Wheel Calibration

Calibrating Pitch and Mod Wheels:

1. Flip the power switch at the back of Taiga Keyboard off and then back on again
2. Recalibrate the wheels:
      A.Make sure that the Arpeggiator is turned off (press the Arp button so that the Arp light is turned off)
      B. Keep your hands clear of the wheels and the hold down the Edit and Arp buttons
      C). With the Edit and Arp buttons held down, move the wheels through their full ranges one at a time. Move each wheel back and forth to their endpoints 2-3 times, so that accurate high and low values are recorded
      D. Release the Edit and Arp buttons

16 Eurorack Expansion Bay

16.1 Eurorack Expansion Bay Overview:

Taiga Keyboard includes a 24hp expansion bay to personalize the instrument to your needs. The fully modular signal path of Taiga Keyboard means an almost unlimited number of options are available. Add a 4th or 5th oscillator for incredibly big sounds. Add a sampler or sample player for multi-timbral voices. Add more modulation, different types of filters, digital or analog effects, or even a sequencer.

16.2 Eurorack Specs:

Expansion Bay Size: 24hp.
Available Depth: 60mm
Screw Type: M3
Power Headers: 3 Keyed Eurorack Format Power Headers

17 Firmware Update

17.1 Download and Install the Latest Firmware:
How to update Taiga Keyboard firmware

Tools Needed
-Type B USB cable
-Computer

1) Turn on the Taiga Keyboard
2) Connect the Taiga Keyboard to your computer using a USB cable plugged into the Type B USB port on the back of the instrument
3) Open the MultiChip Updater program
4) Click the Load button and select the .dfu file located in the same folder as the Updater. The VID, PID, and Version categories should populate with codes and the Update button should become active. If the Update button does not become active, you may have a loose USB connection or a bad USB cable. Try unplugging and plugging the cable back in or try a different cable
5) Click the Update button. After the progress bar completes, you should get an "Update Successful" message
6) Close all open windows and then unplug the USB cable from the instrument

Once the update is complete, it is recommended that you power cycle the instrument and then recalibrate the Pitch and Mod wheels:
1) Flip the power switch at the back of Taiga Keyboard off and then back on again
2) Recalibrate the wheels:
  A) Make sure that the Arpeggiator is turned off (press the Arp button so that the Arp light is turned off)
  B) Keep your hands clear of the wheels and the hold down the Edit and Arp buttons
  C) With the Edit and Arp buttons held down, move the wheels through their full ranges one at a time. Move each wheel back and forth to their endpoints 2-3 times, so that accurate high and low values are recorded
  D) Release the Edit and Arp buttons

Your Taiga Keyboard should now be fully updated! Have fun!

If you encountering any trouble, please contact us at:
service@pittsburghmodular.com

17 Firmware Update

17.2 Firmware Version 1.1 Changelog:

- USB MIDI Added
- Corrected USB device name to "Taiga_Keyboard"
- Added some slight slew limiting to Aftertouch control to make it more expressively usable/ eliminate some signal noise.
- Rescaled keybed velocity to make use of the full output range.
- Fixed the pitch bend wheel so that it only sends Midi data when outside the center pitch, and also it always returns to zero.
- Pitchbend in Paraphonic Mode Fixed
- Fixed MIDI clock subdivision; was previously not subdividing the MIDI clock.
- Added random wave mode to the oscillators
- Added random filter mode to the filter section
- Edit button now adds an arp note when running the arpeggiator in hold mode.
- Clock properly handles MIDI clock microstepping so that the ARP will deterministically trigger on midi pulse 0 (out of 6) after receiving a MIDI clock start command.
- MIDI mod-wheel CC command is scaled to the value of the mod controller output rather than just outputting the position of the mod wheel, giving access to the mod controller functionality to outboard midi gear when using taiga keys as a midi controller.

- Rewrote the mod wheel functionality to make full use of all 13 scalings for each mod mode, and added more behaviors to the mod modes that are selected with the octave buttons:

    - 0-5v Mode
        - Added 4 Sub-Modes
            - 0-5-0v center low, edges high
            - 5-0-5v center high, edges low
            - 5-0v Inverted
            - 0-5v

    - LFO Mode
        - Increased the range of the LFO, and fixed the phase relationship, also made the LFO update after changing rate rather than after finishing a full cycle to make it more responsive at low frequencies. Also, added 4 Sub-Modes
            - Sine Wave
            - Triangle Wave
            - Saw Wave
            - Square Wave with PWM control rather than gain control

17 Firmware Update

17.2 Firmware Version 1.1 Changelog Continued:

- Envelope Mode
  - Fixed envelope length so that the mod mode value changes the length of the envelope, rescaled the envelope lengths for all 13 values. Also, added 4 Sub-Modes
    - Percussive Envelope
    - Swell-y Triangle Envelope
    - Reversed Percussion Envelope
    - Sustain-y Envelope

- Random Mode
  - Increased the number of different randomness timings, and increased the range of these timings, and made them be more useful values that scale the randomness in a more naturally musical way. Also, added 4 Sub-Modes
    - Soft Random Expression Generator
    - Triangular Random Expression Generator
    - Sawed Random Expression Generator
    - Sample and Hold Generator

18 More Information

18.1 Warranty:

Pittsburgh Modular warrants to the original purchaser that this unit is free of defects in materials and workmanship under normal use and maintenance for a period of one (1) year from the date of original purchase. If the unit fails within the one (1) year period, it will be repaired, or replaced, at Pittsburgh Modular's option, at no charge, when returned prepaid to the Pittsburgh Modular Technical Service Center with proof of purchase – the sales receipt may be used for this purpose. Installation labor is not covered under this warranty.

Pittsburgh Modular reserves the right to change the method by which Pittsburgh Modular may provide warranty service, and any Pittsburgh Modular Product's eligibility to receive a particular method of service. Service will be limited to the options available in the country where service is requested. Service options, parts availability and response times may vary according to country. The original purchaser will be responsible for all shipping and handling charges. Customers that seek service in a country that is not the country of purchase must comply with all applicable import and export laws and regulations and be responsible for all custom duties, V.A.T. and other associated taxes and charges. For international service, Pittsburgh Modular may repair or replace Pittsburgh Modular Products and parts with comparable Pittsburgh Modular Products and parts that comply with local standards.

All replacement parts, whether new or re-manufactured, assume as their warranty period for only the remaining time of this warranty. This warranty does not apply to damage caused by improper use, accident, abuse, improper voltage service, fire, flood, lightning, or other acts of God, or if the product was altered or repaired by anyone other than Pittsburgh Modular Technical Service Center. Consequential and incidental damages are not recoverable under this warranty.

Some regions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply. This warranty gives you specific legal rights, and you may also have other rights, which vary by state and country No portion of this warranty may be copied or duplicated without the expressed written permission of Pittsburgh Modular. THIS WARRANTY IS NOT TRANSFERABLE.

18.2 Service and Contact Information:

Please contact us for service or other information related to Taiga or any other Pittsburgh Modular product. https://www.pittsburghmodular.com/contact