ARP OF DARKNESS
USER MANUAL
Firmware v1.3.1
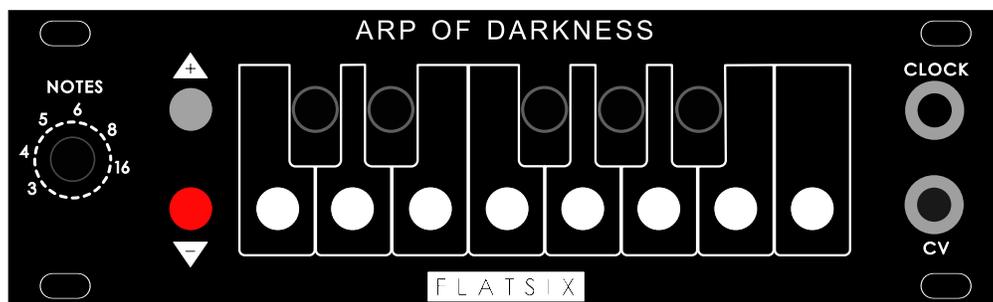
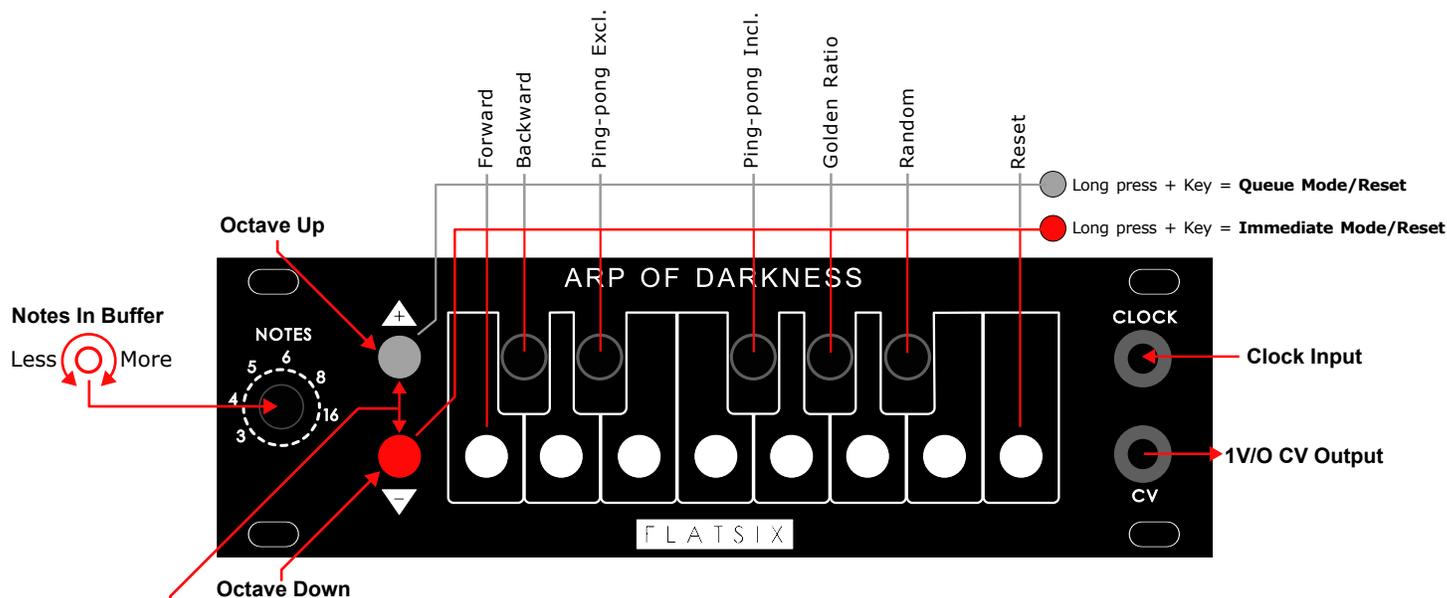**FLATSIX**
MODULAR

ARP OF DARKNESS
QUICK START

FLATSIX

The Arp Of Darkness is an arpeggiator with a unique twist: It's designed to create dynamic and evolving note sequences by utilizing a buffer approach similar to a Turing Machine or Shift Register. Unlike traditional arpeggiators, which typically play chords as individual notes in a predefined pattern, this module allows you to enter notes sequentially into a buffer of variable length, and play it back using 6 playback modes more commonly found in arpeggiators.

Forward
Backward
Ping-pong Excl.
Ping-pong Incl.
Golden Ratio
Random
Reset

Long press + Key = **Queue Mode/Reset**
Long press + Key = **Immediate Mode/Reset**

Octave Up

Notes In Buffer
Less — More

NOTES
5 6
4   8
     16
3

ARP OF DARKNESS

CLOCK

Clock Input

FLATSIX

1V/O CV Output

CV

FLATSIX

Octave Down

Cycle Playback Mode *(Dual press + and -)***:**
Forward, Backward, Exclusive, Inclusive,
Golden Ratio, Random

How it works:

Notes are entered individually via a monophonic keyboard, rather than being played as a chord. Each key press adds a note to the buffer.

The length of the note buffer can be adjusted in real-time using the potentiometer. The available buffer lengths are 3, 4, 5, 6, 8, and 16 notes.

The module plays back the notes in the buffer in a loop, following the order in which they were entered. This creates a sequence that evolves as you add new notes in a fashion not completely unlike a Turing Machine.

The playback speed is controlled by an external clock or gate input, allowing the sequences to synchronize with other gear in your setup. With each incoming gate, the notes in the buffer will advance one time.

Using the potentiometer, you can change the buffer length on the fly. The module seamlessly transitions to the new buffer length at the end of the current cycle, preserving the most recently entered notes. As mentioned above, the buffer note lengths available are 3, 4, 5, 6, 8, and 16 notes.

Playback mode is set to forward by default, but can be changed by pressing both the octave up, and octave down buttons together in order to cycle to the next playback mode or directly choose the playback mode by long pressing and holding the octave up or down button + the desired mode key. There are a total of 6 different playback modes: Forward, Backward, Exclusive Ping-pong, Inclusive Ping-pong, Golden Ratio, and Random. The high C key is a reset as noted in the illistration above. See the rest of the manual for further explanation.

Specifications

Height: 1U (Intellijel format)
Width: 26HP
Depth: 40mm ("Skiff-friendly")
Current Draw: 40 mA +12V, 0 mA -12V, 0 mA +5V
CV Output: +0 to +4V Calibrated to 1V/O Standard
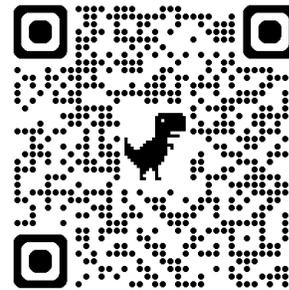**Gate Input:** +5V clock or gate in

6VI

Each module comes pre-calibrated and with the latest firmware version. Check **www.flatsixmodular.com** for more info and firmware updates or share your patches with us on Instagram **@flatsix.modular**
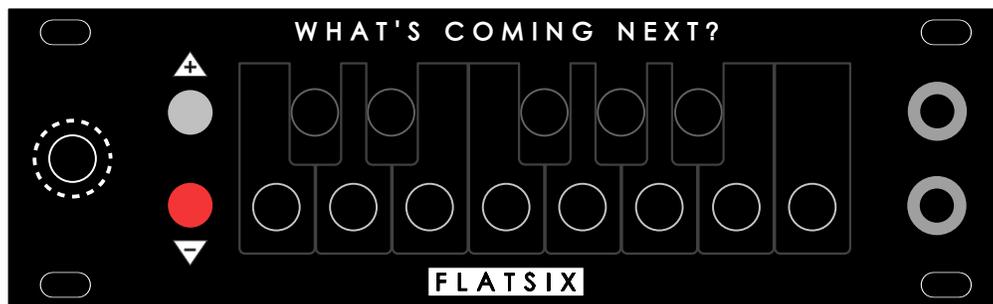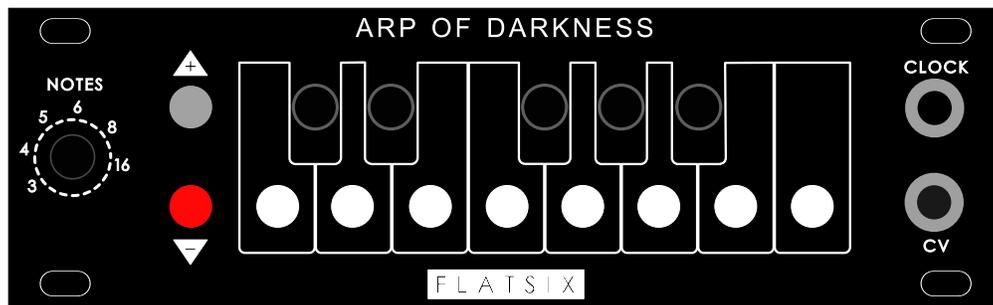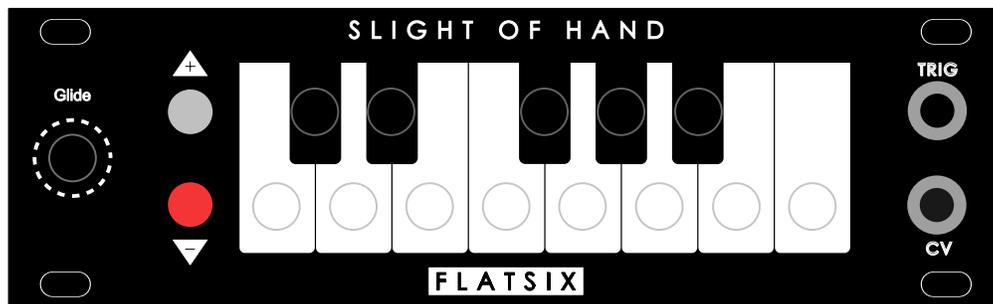
Nocturne Alchemy
PLATFORM

Introducing the **Nocturne Alchemy Platform** – a flexible eurorack module series that redefines versatility and creativity. Each module within the Nocturne Alchemy Platform shares the same robust Arduino-based hardware, allowing you to effortlessly swap functionalities through our intuitive web firmware loader. By purchasing one module, you gain access to the full range of available firmwares, including our current creations, **Slight of Hand** and **Arp Of Darkness**, as well as others planned for future release! This innovative approach means your module can evolve with your music, with new and exciting functionalities just a simple firmware update away. Embrace the magic of endless possibilities with the Nocturne Alchemy Platform.

Install FREE firmwares here:

https://flatsixmodular.com/firmware/

SLIGHT OF HAND

Glide

TRIG

CV

FLATSIX

ARP OF DARKNESS

NOTES

5 6
4   8
3   16

CLOCK

CV

FLATSIX

WHAT'S COMING NEXT?

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The Illusion of Randomness

The Arp Of Darkness is designed to leverage a musician's imperfect memory, creating the illusion of randomness. While the module provides structured playback modes, the human element introduces a layer of unpredictability. As musicians input notes and adjust settings, the evolving sequences can feel spontaneous and ever-changing, much like a Turing Machine or a Shift Register. However, the Arp Of Darkness stands out by inviting the musician's memory and intuition into the creative process, resulting in a unique and personalized musical experience.

Shift Register-ish Behavior

The Arp Of Darkness employs a similar concept to a shift register for handling note entry and playback. As new notes are entered into the buffer, older notes shift through the buffer and eventually "fall off" when the buffer is full. This process creates evolving sequences that change over time, offering a dynamic and engaging musical experience.

Step-by-Step Explanation

Step 1: Initial Note Entry - When you enter the first note using the tactile keyboard, it is stored in the first position of the sequence buffer.

Step 2: Filling the Buffer - As you enter more notes, each new note pushes the existing notes one position forward in the sequence buffer. For example, entering a second note moves the first note to the second position and places the new note in the first position.

Step 3: Buffer Overflow - When the sequence buffer is full (based on the potentiometer setting), entering a new note causes the oldest note to "fall off" the buffer as all notes shift one position forward. The new note is stored in the first position, and the sequence continues to evolve.

Step 4: Continuous Evolution - The Arp Of Darkness allows for continuous evolution of the sequence. As you enter new notes, older notes shift through the buffer, ensuring that the musical pattern is always changing and never static.

Practical Example

Imagine you set the sequence buffer length to 8 notes and begin entering notes:

Enter C -> Buffer: [C]
Enter E -> Buffer: [E, C]
Enter G -> Buffer: [G, E, C]
Enter B -> Buffer: [B, G, E, C]
Enter D -> Buffer: [D, B, G, E, C]
Enter F -> Buffer: [F, D, B, G, E, C]
Enter A -> Buffer: [A, F, D, B, G, E, C]
Enter C -> Buffer: [C, A, F, D, B, G, E, C]
Enter E -> Buffer: [E, C, A, F, D, B, G, E] (Oldest note "C" falls off)

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6

ARP OF DARKNESS
MORE EXPLANATION

FLATSIX
MODULAR

Playback Modes

The Arp Of Darkness currently has six different playback modes. Each of these modes offers a different way to explore and reinterpret the sequence of notes you've entered, providing a wide range of creative possibilities for your musical compositions and performances.

FORWARD - The sequence plays through the notes in the order they were entered, from first to last. When it reaches the end, it loops back to the beginning. This is the default mode when the module is powered on.
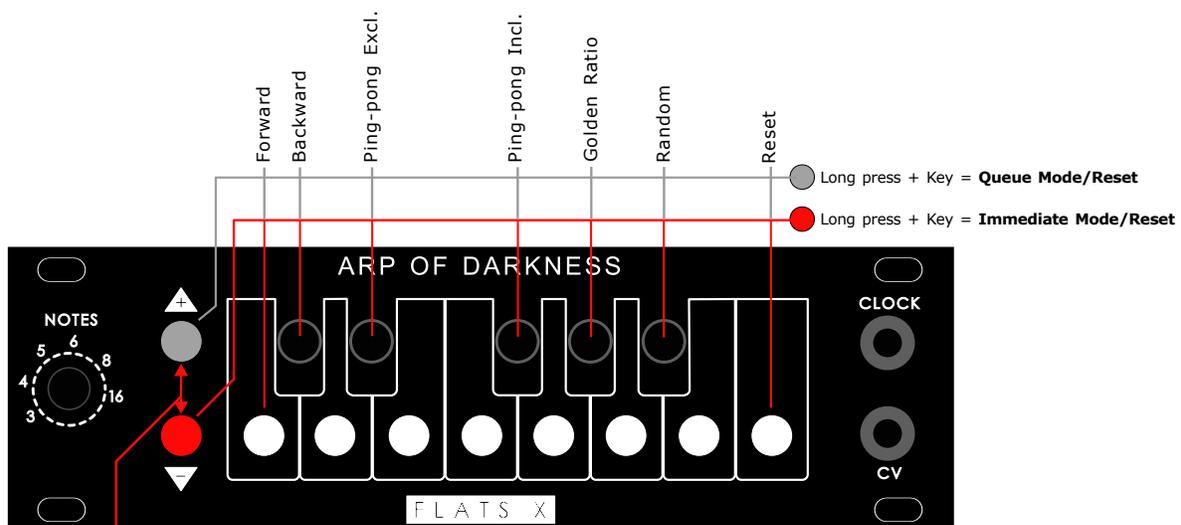
BACKWARD - The sequence plays the notes in reverse order, from the last entered note to the first. Upon reaching the start, it loops back to the end.

EXCLUSIVE PING-PONG - The sequence plays forward from the first note to the last, then backward from the second-to-last note to the second note, creating a bouncing effect. It excludes repeating the first and last notes when changing direction.

INCLUSIVE - PING-PONG - Similar to Exclusive Pingpong, but this mode includes the first and last notes when changing direction. The sequence plays forward from first to last, then backward from last to first, repeating the end notes.

GOLDEN RATIO - This mode unique to the Arp Of Darkness and uses the golden ratio (approximately 1.618) to create an evolving "Fibonacci sequence". It jumps through the notes using intervals based on the golden ratio, creating patterns that feel both musically-structured and yet unrepetetive. (See section on Golden Ratio Mode)

RANDOM - The sequence plays notes in a completely random order, selecting any note from the buffer with equal probability each time. This creates an unpredictable, ever-changing pattern.

Forward · Backward · Ping-pong Excl. · Ping-pong Incl. · Golden Ratio · Random · Reset

Long press + Key = **Queue Mode/Reset**
Long press + Key = **Immediate Mode/Reset**

ARP OF DARKNESS

NOTES
5 6 8
4   16
3

CLOCK

CV

FLATS X

Cycle Playback Mode *(Dual press + and -)***:**
Forward, Backward, Exclusive, Inclusive,
Golden Ratio, Random

Cycling Through Playback Modes

Playback mode is set to forward by default, but by pressing both the octave up, and octave down buttons at the same time, the user can cycle to the next playback mode. Once the buttons are pressed the change is requested of the sequencer, and the playback of the next mode will begin on note one, of the next cycle of the sequence. The order of the cycle is: Forward, Backward, Exclusive Ping-Pong, Inclusive Ping-Pong, Golden Ration, and Random.

ARP OF DARKNESS
MORE EXPLANATION

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Direct Playback Mode Selection (Immediate)

This method (introduced in firmware v1.3.1) allows users to instantly change the playback mode and reset the sequence to the beginning. How it works:

1. Press and hold the Octave Down button (Long press for about one second)
2. While still holding Octave Down, press one of the following keys to select a mode:

   C: FORWARD
   C#: BACKWARD
   D#: EXCLUSIVE PING-PONG
   F#: INCLUSIVE PING-PONG
   G#: GOLDEN RATIO
   A#: RANDOM

3. The mode changes immediately, and the sequence resets to the first note.

Direct Playback Mode Selection (Queued)

This method (introduced in firmware v1.3.1) allows users to directly queue a mode change that will take effect at the start of the next sequence cycle. How it works:

1. Press and hold the Octave Up button (Long press for about one second)
2. While still holding Octave Up, press one of the following keys to select a mode:

   C: FORWARD
   C#: BACKWARD
   D#: EXCLUSIVE PING-PONG
   F#: INCLUSIVE PING-PONG
   G#: GOLDEN RATIO
   A#: RANDOM

3. The mode change is queued and will take effect at the beginning of the next sequence cycle.

Queued Reset Function

This method (introduced in firmware v1.3.1) allows users to change the playback mode and reset the sequence to the beginning on the next incoming gate. How it works:

1. Press and hold the Octave Up button (Long press for about one second)
2. While still holding Octave Up, press the high C button to queue a reset
3. The the sequence resets to the first note on the very next gate.

Immediate Reset Function

This method (introduced in firmware v1.3.1) allows users to instantly change the playback mode and reset the sequence to the beginning. How it works:

1. Press and hold the Octave Down button (Long press for about one second)
2. While still holding Octave down, press the high C button to immediatey reset
3. The the sequence resets to the first note immediately.

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ARP OF DARKNESS
Golden Ratio Mode

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The Golden Ratio playback mode is a unique and innovative feature of the Arp Of Darkness that brings a new level of creativity to your sequences. Inspired by the mathematical concept of the Golden Ratio (approximately 1.618), this mode generates a sequence that feels both natural and harmonically pleasing, yet intriguingly unpredictable.

What is the Golden Ratio?

The Golden Ratio, often represented by the Greek letter φ (phi), is a special number found in nature, art, and architecture. It's known for its aesthetically pleasing properties and its presence in various natural patterns. In music, applying the Golden Ratio can create sequences that have a natural flow and feel less repetitive than traditional linear sequences.

How Does Golden Ratio Playback Work?

In the Golden Ratio mode, the sequencer calculates the next step using a unique algorithm based on the fractional part of the Golden Ratio (φ - 1, approximately 0.618). Instead of moving from one note to the next in a linear or strictly random fashion, this mode calculates each subsequent step based on its current position, multiplied by this fractional value. The result is a pattern that progresses in a way that feels both intentional and organic, creating a captivating and evolving sequence.

Why Use Golden Ratio Playback?

Because it's fricking cool and makes you look smart... Oh... I can't say that? Okay:

Musical Interest: The Golden Ratio creates sequences that avoid the monotony of purely linear patterns and the chaos of random steps. It strikes a balance that can add depth and complexity to your music.:

Natural Flow: Because the Golden Ratio is derived from natural phenomena, sequences generated in this mode often feel more fluid and musically expressive.

Endless Variation: This mode offers a way to explore non-repetitive and evolving musical ideas. Even with a limited number of notes, the Golden Ratio can produce sequences that feel fresh and inspiring.
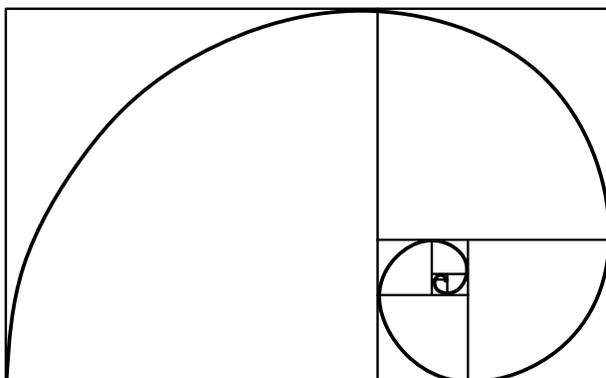

"We'll ride the spiral to the end and may just go where no one's been"

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ARP OF DARKNESS
CALIBRATION MODE

FLATSIX

The Arp Of Darkness features a Calibration Mode that allows users to fine-tune the voltage output for each note, ensuring precise pitch control. This mode is particularly useful for adjusting the module to align with specific musical tuning requirements or to compensate for hardware variances. All modules come pre-calibrated (every note across 4 octaves) to the closest 100th of a volt. Most users will never need to calibrate it, but should you choose to, the following procedure is how it is done:

Tuning — Less / More

Octave Up

NOTES

ARP OF DARKNESS

CLOCK

CV

Octave Down

1V/O CV Output
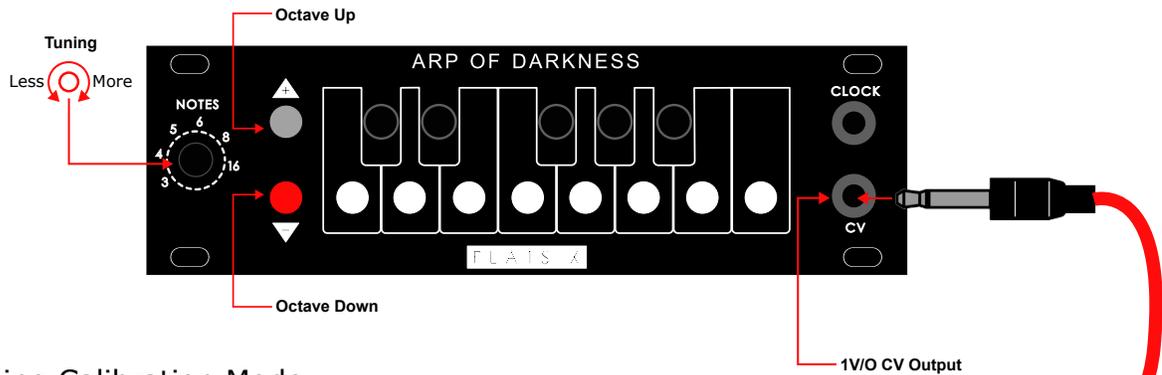
Entering Calibration Mode
Connect multimeter & cable to CV out: Make sure the tip of the cable is connected to signal (red) and the sleeve to the ground (black).

Initiate Calibration Mode: Press and hold both the "Octave Up" and "Octave Down" buttons simultaneously while powering on the device. Confirmation: The module indicates entry into Calibration Mode by setting the gate output to HIGH.

Calibration Process
Selecting a Note: Press any note button (except High C) to select it for calibration. The High C knob acts as a "Shift Key" which enables calibration of the note you selected.

Confirming Selection: Press the High C button to confirm the selection. This action activates the potentiometer for calibration adjustment.

Adjusting Calibration: Turn the potentiometer to adjust the voltage for the selected note. The adjustment range is limited to one full step above and below the default voltage for finer control.

Saving Calibration: Release the High C button to save the adjusted voltage. The new calibration value is stored in EEPROM, ensuring persistence across power cycles. Now move to the next note. A best practice is to start at C0, and work your way up through every note across four octaves. This may take some time. (I know because I have hand-calibrated every unit sold, so you hopefully won't have to.)

Special Note Handling
High C (C4): Because the calibration mode uses the high C button on the keyboard as a "shift" button to confirm editing a pitch, the calibration of the final high C4 note is handled differently. When in calibration mode, the octave buttons will allow the keyboard to shift up one additional octave, forcing C4 into the low C key for tuning. No other pitches in that octave will be calibrated, but this allows for calibration of the final high C4.

Exiting Calibration Mode
Exit: Press and hold both the "Octave Up" and "Octave Down" buttons simultaneously for 2 seconds. The module exits Calibration Mode, indicated by the trigger output set to LOW. Now go make some music.

Eurorack Calibration Table For Reference

C	C#	D	D#	E	F	F#	G	G#	A	A#	B
0.000	0.083	0.167	0.250	0.333	0.417	0.500	0.583	0.667	0.750	0.833	0.917
1.000	1.083	1.167	1.250	1.333	1.417	1.500	1.583	1.667	1.750	1.833	1.917
2.000	2.083	2.167	2.250	2.333	2.417	2.500	2.583	2.667	2.750	2.833	2.917
3.000	3.083	3.167	3.250	3.333	3.417	3.500	3.583	3.667	3.750	3.833	3.917
4.000											

Calibration Mode is designed for precision tuning. It is recommended to use a reliable multimeter for accurate calibration.

Resetting to Default Values
If for any reason you want to reset all of the calibration values to the module defaults, and start calibrating from scratch, use this function:

Initiate Reset: While in Calibration Mode, press and hold the "Octave Down" button for 8 seconds without pressing the "Octave Up" button.

Confirmation: The module confirms the reset by blinking the trigger output 6 times. All notes are reset to their default calibration values.

ARP OF DARKNESS
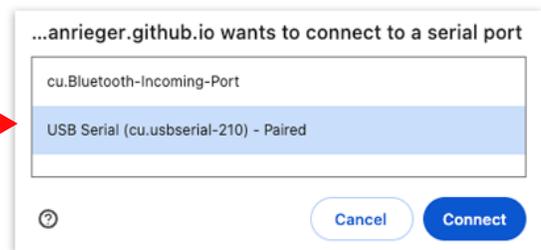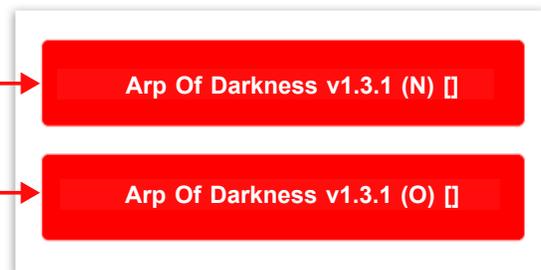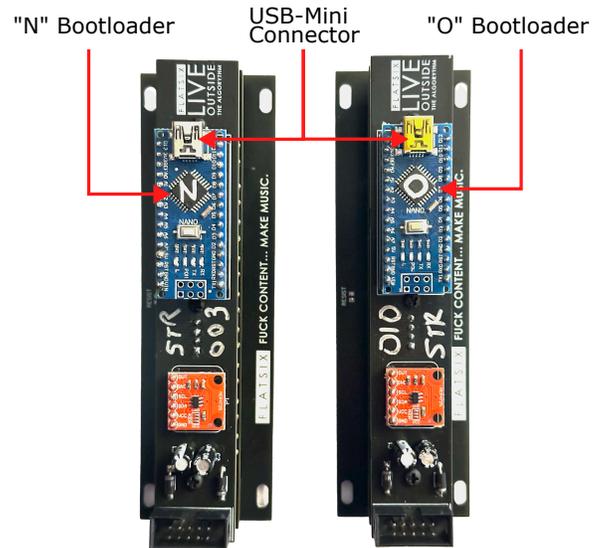# FIRMWARE UPDATE

FLATSIX

The Arp Of Darkness has an Arduino Nano at the heart of it. Firmware updates can be made using a USB-A to USB Mini cable connected from your computer to the Arduino underneath the module. One can always find the latest firmware version and a link to an online uploader utility at
www.flatsixmodular.com/firmware/

Browse to the Firmware Web Uploader Page

The firmware uploader for Arduino-based modules such as the Arp Of Darkness only works in Google Chrome on a Mac or PC. You will also need a USB-A to USB Mini cable. If you don't have one laying around, you can find many inexpensive ones on Amazon

- Make sure to unplug your module from the Eurorack power cable first!

- Plug in your USB cable to the mini USB port on the Arp Of Darkness. It's okay to leave the Arduino plugged in to the sockets of the module.

- The chip next to the USB port will have an "O" or an "N" written on it - On the web uploader page, click the matching red button to upload that firmware.

- Note: If you don't have an "N" or "O" on the chip, try "O" first, then "N". Guessing won't hurt anything because the uploader will just fail. If it does fail, try the other one (It has to be one or the other and you have a 50/50 chance of getting it right the first time!)

- Select the "USB Serial" option from the prompt that pops up. It should be highlighted when selected.

- Click "Connect" and wait while the file uploads until the button says [Done!]

- That's it. Unplug from the USB cable, plug in the case power, and go make some music.

"N" Bootloader   USB-Mini Connector   "O" Bootloader

Arp Of Darkness v1.3.1 (N) []

Arp Of Darkness v1.3.1 (O) []

...anrieger.github.io wants to connect to a serial port

cu.Bluetooth-Incoming-Port

USB Serial (cu.usbserial-210) - Paired

Cancel   Connect

Arp Of Darkness v1.3.1 (O) [Done!]

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