

malletStation Learn Mode Tools v2

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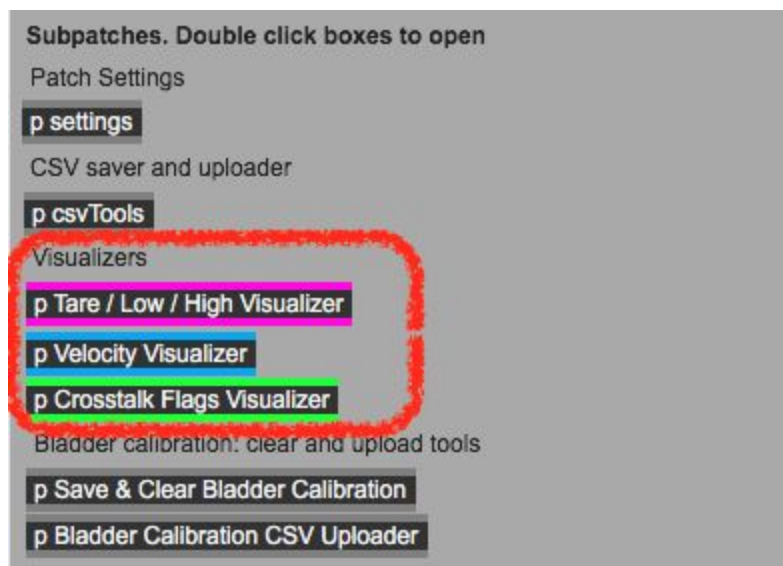
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What's in this application?

This application contains multiple different Max tools used for Learn Mode investigations. This includes:

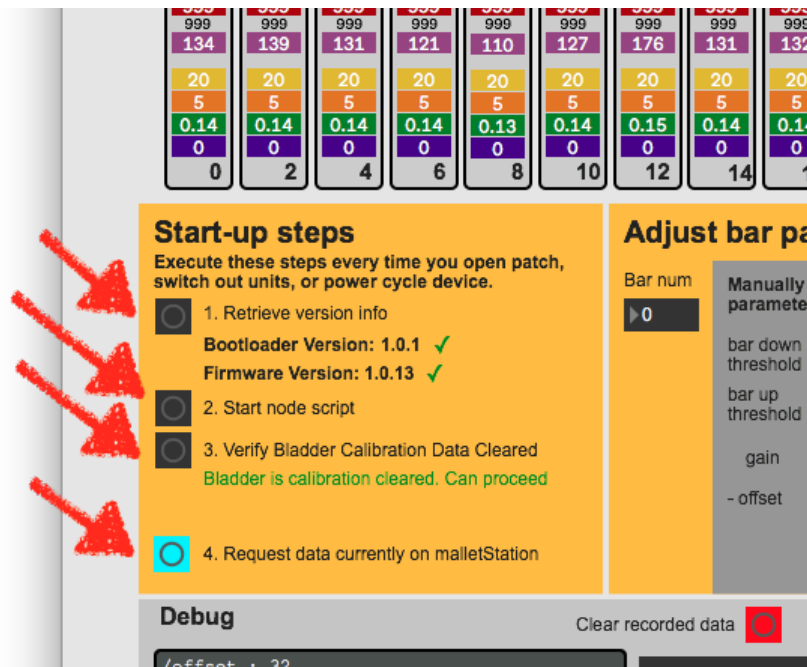
1. The Main app that launches on startup (f.k.a The Gain Offset Adjuster). This is where you can go through the Learn Mode algorithm process, as well as manually set bar parameters.
2. The Tare / Low / High Visualizer. This subpatcher plots the low strike velocities, high strike velocities, and tares of all bars. This is a good way to how much dynamic range each bar has.
3. The Velocity Visualizer. This allows you to visualize Raw Velocity (sent out when the device is in Learn mode) and MIDI velocity. This is helpful in assessing how well the Learn Mode algorithm performed on calibrated bars.
4. The Crosstalk Flags Visualizer. This subpatch allows you to view which bars are being flagged as crosstalk in Darren's crosstalk algorithms. It requires the device to be in Normal Mode, and loaded with a special firmware that includes these debug flag messages. There's some worry that these debug messages could increase the amount of cooking time, and misrepresent the current firmwares playability, so as of now, it should not be used when testing the device for dropped notes in chord playing. With the firmware loaded, crosstalk flags are sent from the malletsStation as CC messages.

To access the sub-patchers, double click them from the Subpatchers menu in the main view.



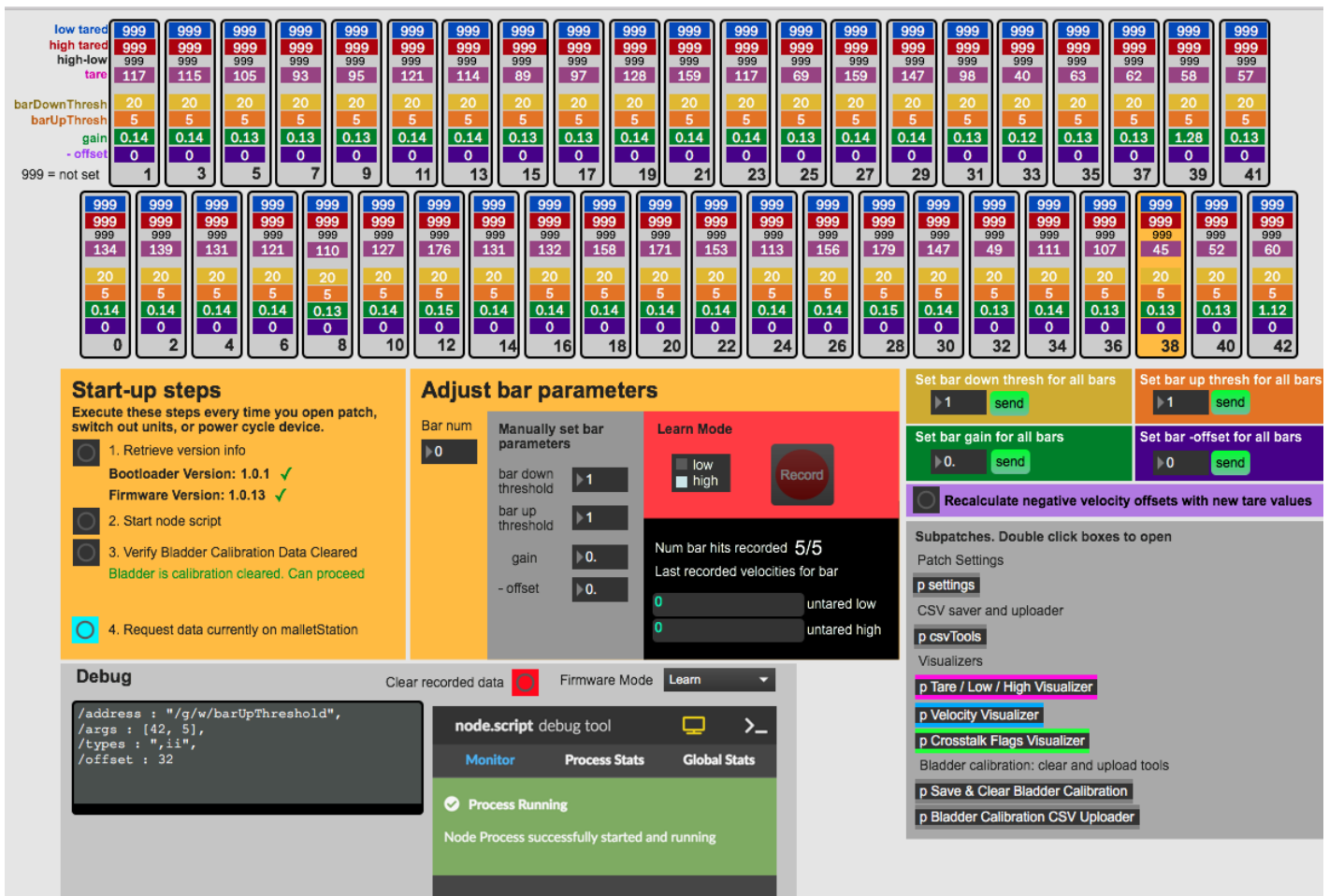
Startup

1. With the MalletStation plugged in, open the LearnModeTools_v2 app
 - a. If you are prohibited from opening the app by the OS, try right clicking (or control + click) the app, and clicking Open from the dropdown.
https://support.apple.com/kb/ph25088?locale=en_US
2. Every time you open the app, switch out MalletStations, execute the 4 steps in the “Start-up Steps”
 - a. If only power cycling device, without closing app, you may skip the first 3 steps and just execute Step 4 (Request data currently on MalletStation) to pull new tare values.



If you get an error saying “Bladder calibration data on device not cleared,” follow the steps in this guide under the section entitled “Save bladder data to CSV, then clear from device”

After completing the Start-up steps, the visualizer should look something like this



(the only 999 values should be in the low and high tared boxes, firmware and bootloader should have a checkmark next to them, bladder calibration should display success message, and node.script debug tool should display "Process Running")

Calibrating with Learn Mode

1. Click on the bar you wish to calibrate. (Or, enable "Select with bar hit" from the Settings (double click p settings) window to select the bar by striking it).
2. Record 5 "low" hits and 5 "high" hits. By default, the algorithm tunes the output such that a "low" hit corresponds to a MIDI velocity of 5, and a high hit corresponds roughly to a MIDI velocity of 127. After you're finished recording, you should see a new gain and negative velocity offset for the bar.

The top section displays a row of 8 bar units. Each unit has a color-coded header (blue, red, yellow, blue, blue, blue, blue, blue) and contains several numerical values. The third unit (yellow header) is highlighted.

Unit 1	Unit 2	Unit 3 (Highlighted)	Unit 4	Unit 5	Unit 6	Unit 7	Unit 8
999	999	32	999	999	999	999	999
999	999	76	999	999	999	999	999
999	999	44	999	999	999	999	999
170	122	140	157	170	157	114	153
20	20	20	20	20	20	20	20
5	5	5	5	5	5	5	5
1.00	1.00	1.81	1.00	1.00	2.27	1.00	1.00
6	6	8	6	6	6	6	6
12	14	16	18	20	22	24	26

The bottom section is a settings panel titled "3. Select bar to perform learn mode algo, and update bar parameters". It has two main tabs: "Manually set bar parameters" and "Learn Mode".

Manually set bar parameters:

- Bar num: 16
- bar down threshold: 20
- bar up threshold: 5
- gain: 1.
- offset: 6.

Learn Mode:

- low/high toggle: low
- Record button
- shortcut ` (above tab)
- shortcut: tab
- Num bar hits recorded: 5/5
- Last recorded velocities for bar:
 - min: 165 178 171 176 174
 - max: 218 210 216 216 224

Troubleshooting

- If you are having trouble triggering the bar while Recording,
 - try lowering the *bar down threshold* via the "Manually set bar parameters" section
 - In the Settings window (p settings), increase the "Recording gain value" (this is a temporary gain value sent to the bar during Recording).
- If device is not responding to changes in bar down/up thresholds, gain, or -offset:
 - Try re-initializing the patch by re-clicking the buttons in the start up section
 - Force-quit the application, power cycle the device, then re-open the application

Save bladder data to CSV, then clear from device

This only needs to be done if the Bladder Calibration Data was not cleared on device.

In order to generate appropriate gain and negative velocity offset values for the learn mode algorithm, you'll need to clear the bladder calibration data on the device. These steps walk you through saving the current bladder calibration data to a CSV, and then clearing the bladder data on device (setting all bars to unity gain).

1. Click the bang next to "1. Start parsing incoming sysex", then click *p Save & Clear Bladder Calibration*

switch out units, or power cycle device.

- 1. Retrieve version info
Bootloader Version: 1.0.1 ✓
Firmware Version: 1.0.13 ✓
- 2. Start node script
- 3. Verify Bladder Calibration Data Cleared
bladder calibration on device not cleared: use subpatcher "Save & Clear Bladder Calibration" before proceeding
- 4. Request data currently on malletStation

Bar num: 0

Manually set bar parameters

bar down threshold: 1
bar up threshold: 1
gain: 0.0
- offset: 0.0

Learn Mode

low high
Record

Num bar hits recorded 5/5
Last recorded velocities for bar
0 untared low
0 untared high

Set bar gain for all bars: 0.0 send
Set bar -offset for all bars: 0.0 send

Recalculate negative velocity offsets with new tare values

Subpatches. Double click boxes to open

Patch Settings

p settings
CSV saver and uploader
p csvTools

Visualizers

p Tare / Low / High Visualizer
p Velocity Visualizer
p Crosstalk Flags Visualizer

Bladder calibration: clear and upload

p Save & Clear Bladder Calibration
p Bladder Calibration CSV Uploader

Debug

Clear recorded data Firmware Mode Calibrate

node.script debug tool

Monitor Process Stats Global Stats

Process Running
Node Process successfully started and running

if you get this error...

...double click "Save & Clear Bladder Calibration"

2. Follow the instructions in the window that pops up:

[temporarySetupPatch]

Saving calibration data to file, and erasing bladder calibration

- Step 1: Bang to set unit to "Calibrate Mode"
- Step 2: Bang to fetch current calibration values.
- Step 3: Bang to create CSV of values. This will save to ~/Desktop/ with filename "bladderCalibration_UNITNUM_TIMESTAMP"

Bladder calibration per bar

Global calibration gain

unset

It is okay to rename the filename after it's created

The CSV created after step 2 should look something like this →

The "Global Calibration Gain" should be recorded at the bottom of the CSV

Do not click the button labeled "bang to erase calibration data on device" if the CSV was not created properly (this CSV is necessary to restore the bladder calibration on the device)

	A	B
1	bladder calibration data	
2		147
3		150
4		130
5		200
6		123
7		164
8		109
9		90
10		124
11		124
12		128
13		192
14		128
15		178
16		134
17		145
18		122
19		80
20		87
21		190
22		200
23		130
24		120
25		210
26		123
27		142
28		130

calibration_2019_7_3

Sheet 1 of 1

Reupload bladder calibration data to device

These optional steps go over restoring the original bladder calibration on the device, using a CSV created in “Save bladder data to CSV, then clear from device”

1. Click the bang next to “1. Start parsing incoming sysex (if you have not yet started the node script) then double click *p Bladder Calibration CSV Uploader*

The screenshot shows a Pure Data patch window with several subpatches and controls. At the top, there are 11 bar displays, each with a value (e.g., 0.14, 0.15, 0.13, 0.14, 0.13, 0.13, 0.13, 1.12) and a '0' below it. Below these are four control boxes: 'Set bar down thresh for all bars' (value 1), 'Set bar up thresh for all bars' (value 1), 'Set bar gain for all bars' (value 0), and 'Set bar -offset for all bars' (value 0). A 'Record' button is visible on the left. A 'Recalculate negative velocity offsets with new tare values' button is also present. A 'Stats' panel on the left shows '5/5' and 'untared low'/'untared high'. A 'Subpatches' list on the right includes 'p settings', 'CSV saver and uploader', 'p csvTools', 'Visualizers', 'p Tare / Low / High Visualizer', 'p Velocity Visualizer', 'p Crosstalk Flags Visualizer', 'Bladder calibration: clear and upload tools', 'p Save & Clear Bladder Calibration', and 'p Bladder Calibration CSV Uploader'. A red arrow points to the 'p Bladder Calibration CSV Uploader' subpatch with the text 'double click'.

2. Follow instructions in pop-up window. Upload the CSV that was made via the *p Save & Clear Bladder Calibration...* they are already in the correct format for this tool.

[uploadCalibrationCSV]

malletStation calibration CSV uploader

Use this patch to upload CSVs of calibration data to the malletStation
Format of the CSV should be:

title row (can be any string)	
8bit calibration value for bar 0	
8bit calibration value for bar 1	
...	
8bit calibration value for bar 42	
8bit Global Calibration value	

☐ Step 1: Click to start node script and set unit to Calibrate mode

☐ Step 2: Click to upload calibration CSV, and wait until loading complete.

upload progress

Step 3: Once complete, verify data below corresponds to values in CSV

array: 10 11 12 13 14 15 16 17 18 19 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42

Global Calibration Gain: -0.5

Note: after you have restored the calibration values, you will need to re-erase (set all bars to unity gain) them using the *p Save & Clear Bladder Calibration* window next time you wish to run learn mode