

# Marbles Calibration

## Part 1: setting the module to output quantized voltages 1V and 3V.

1. Connect the CV output X1 to a high count (ie 50000 count) multimeter (fig.1)
2. Set the voltage range (J) to +5V (orange LED).
3. Set (E) and (N) to green.
4. Turn the « **Spread** » knob fully counter-clockwise
5. Turn the « **Steps** » knob fully clockwise
6. Turn « **bias** » to select the octave, you need to find the closest value to **1V** (You will probably find a value between 0.91 and 0.99). Then do the same for **3V**.
7. Write down these values in the corresponding cells of the spreadsheet (1V and 3V) and do the same thing for the next CV outputs **X2** and **X3**.



Marbles voltage measurements						
	1v	3v	dac_code1	dac_code3	scale	offset1
1 (Y)	0.94302	2.92737	26555	14129	-6262.00015118	32400.19138257
2 (X1)	0.94749	2.9453	26555	14129	-6219.81069271	32448.20843323
3 (X2)	0.9368	2.93674	26555	14129	-6213.18639559	32375.51301539
4 (X3)	0.94613	2.9263	26555	14129	-6275.21879435	32492.17275789

8. *For the Y output* : hold down the (N) button and turn the « **Spread** » knob fully counter-clockwise and the « **Steps** » knob fully clockwise. You will probably have to adjust the « **rate** » in order to « stabilize » this CV output while you read the voltage value.

## Part 2: copying the voltage measurements to settings.cc, compiling and uploading the firmware.

1. Open the file named `settings.cc` in an editor. You will find the file in `Mutable-dev-environment -> eurorack-modules -> Marbles`
2. Copy and paste the values of **Scale** and **Offset** from the spreadsheet to `settings.cc` (line 179). Don't forget the « f » and make sure the separator is a dot. [0] is Y [1] is X1 etc.
3. Save the file, compile the firmware and upload it to the module.

```
177 c.adc_scale[ADC_CHANNEL_T_RATE] = -120.0f;
178
179 /* Marbles calibration */
180 persistent_data_.calibration_data.dac_offset[0] = 32407.04687500f;
181 persistent_data_.calibration_data.dac_scale[0] = -6216.91699219f;
182 persistent_data_.calibration_data.dac_offset[1] = 32434.53906250f;
183 persistent_data_.calibration_data.dac_scale[1] = -6184.36669922f;
184 persistent_data_.calibration_data.dac_offset[2] = 32367.77929688f;
185 persistent_data_.calibration_data.dac_scale[2] = -6212.68945312f;
186 persistent_data_.calibration_data.dac_offset[3] = 32470.53320312f;
187 persistent_data_.calibration_data.dac_scale[3] = -6202.39453125f;
188 // End edits
189
190 ~ for (size_t i = 0; i < kNumScales; ++i) {
```

## Part 3: ADC calibration.

To calibrate the adc, long-press the rate and spread buttons. Feed **1v** into rate input, press one of the two buttons, feed in **3v**, press button, feed **1v** into spread cv, press button and then feed **3v** into spread cv, press button and the calibration is done.