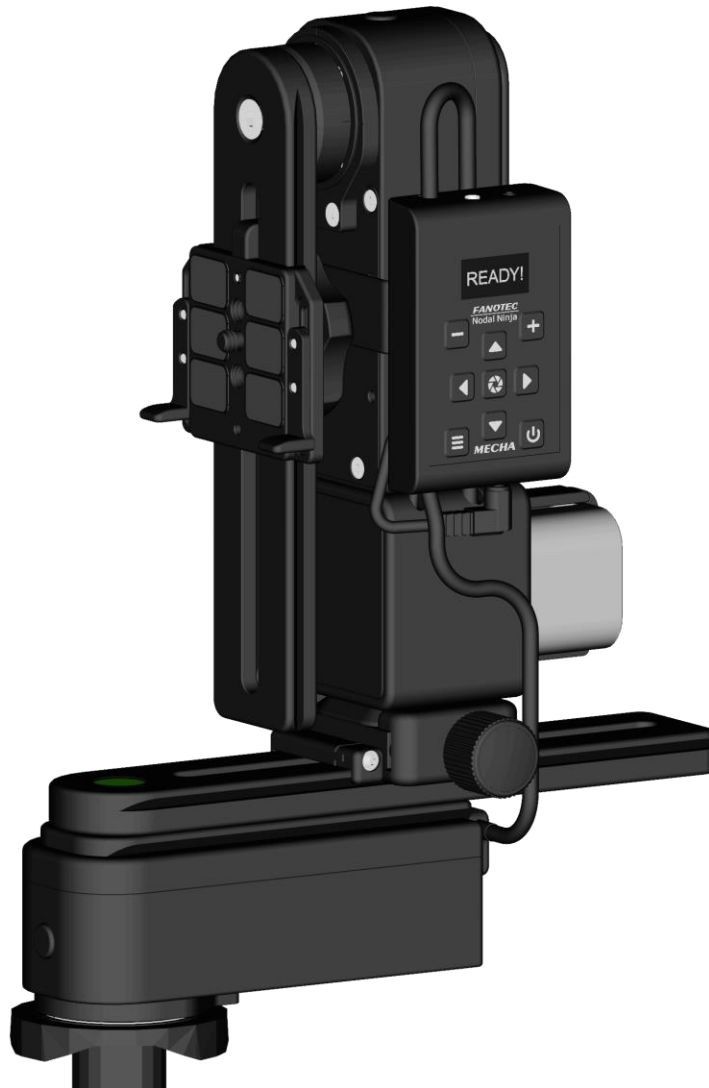


MECHA


C2 USER'S GUIDE



December 10, 2024

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MECHA C2 User's Guide



For firmware version **(1)2428** or newer.

NOTE. Images shown in this guide may not be an exact representation of the current firmware version.

Download the latest version of this guide from

<https://www.nodalninja.com/Manuals/c2-guide.pdf>

Web: www.nodalninja.com

Support email address: mecha@nodalninja.com

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How to use this User's Guide

Welcome to the MECHA C2 User's Guide!

C2 is our second generation of controllers, with an OLED display, external battery, and support for two MECHA rotators.

Before you start reading page-by-page, skim section-by-section, looking at titles, tables, highlighted paragraphs, images, etc. Although there is a lot of information you haven't read yet, this will give you an idea of what you are about to read.

After that, go back to the beginning and read the **Introduction** and **Before First Use** chapters. Please move on only after you become familiar with the basic operations we present here. You can then leave aside the more complex chapters and delve deeper into the parts that interest you most.



Even if you are an experienced user, please pay attention to the warnings.

If you find the firmware updates and other operations difficult, you can receive support and guidance at **mecha@nodalninja.com**.







Let's get started!

WARNINGS

WARNINGS to Dual Axis MECHA Users

- Test MECHA WITHOUT a camera mounted first!
- Test any preset supplied or adjusted WITHOUT a camera mounted FIRST, especially when the clearance is not enough.
- CHECK for clearance with the shutter cable attached!
- Use a short cable with extreme caution.
- The power button, , can always be used as an emergency stop, except during the speed calibration procedure.
- If the movement is not as expected or there is any danger of moving parts hitting something, please press , the MECHA's power button, to stop the movement immediately.



In this user guide, we assume that some settings on the *Configuration* page – such as the rotation intervals for the     buttons – have their default values. So, when we say "Press  then quickly press  for a rotation of 90°...", this statement is valid if the *Arrow buttons Interval 2* setting is indeed 90°.

Regulatory Information

Declaration of Conformity

Trade Name: Nodal Ninja Mecha Controller C2

FCC ID: 2AYQJ-C2


Responsible Party: Fanotec International Limited

Address: Room B27, Floor 8, Yau Tak Indl. Bldg., 21 San On Street, Tuen Mun, N.T., Hong Kong.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.



Simple Mode

Before practicing what you read in this section, please ensure that C2 operates in *C1₀ SIMPLE MODE*.

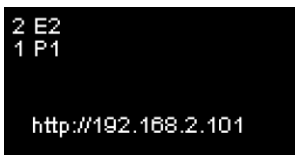
Power on MECHA by pressing the  button for 3 to 5 seconds (long press). It may take approximately 35-45 seconds to start; then MECHA reaches the idle status, and the display will show (1) either the *(P) Preset Menu* or (2) the rotators in use and the dynamic IP address.




Case 1. The display shows the *(P) Preset Menu*:



- Press the  button to switch to the (C) Config Menu.
- If the first option in this menu is *C1₀ SIMPLE MODE is ON*, leave it unchanged. Otherwise, press the  button to change it to *C1₀ SIMPLE MODE is ON*.

Case 2. The display shows the rotators in use and the IP address:



- Long-press the  button to enter menu mode.
- Press the  button to switch to the (C) Config Menu.
- Press the  button to change the first option to *C1₀ SIMPLE MODE is ON*.



<https://youtu.be/94oIpK7xwJQ>

Using IR Remote Commander and Receiver to Launch Presets – MECHA DAC and Single Axis

Introduction

You may already know, from the documentation available at this time, that MECHA consists of a rotator (E1, E2, or P1) and a controller (C1), and is generally used to automate the movement of various devices, such as a panoramic head

mounted on a tripod or a turntable holding an object for filming or photography.

Two such paired MECHA units – the MECHA Dual Axis Combo (DAC) – can be used for dual-axis applications, for example, in panoramic photography.



<https://youtu.be/wY-HxTqcswk>

MECHA Overview

The controller is the part of MECHA where the buttons are located and allows you to send various commands to the rotators or update the firmware, for example, when you do not want to use the User Interface (UI).



Dual Axis MECHA Controller C2

The new controller – C2 – which we present in this user guide, is a dedicated dual-axis controller with an OLED display and external battery. It is similar to C1 and can control the same rotators – E1, E2, and P1 – so now you can choose the controller that best suits your needs and preferences.



MECHA Controller C1 With Rotator E1

Please see [C2 – C1 Differences and Similarities](#) for more details.

The OLED display guides you through all the major operations and settings, making C2 much more intuitive than the single-axis C1 Controller with LED indicators only.

The use of an external battery means you can carry spare batteries and quickly refuel MECHA before or during a shooting session. An optional power cable splitter is available for using two sets of batteries simultaneously for extended operation and/or changing batteries without pausing.

MECHA Controller C2 Features

- Control of two MECHA rotators.
- Compact design with an OLED display.
- Nine buttons for controls and inputs, including a button to trigger camera shutter release.
- Shortcut keys to run presets stored in memory, which can be configured via the OLED display and web page interface.

- Wi-Fi remote control from smartphones, tablets, PCs using a simple web page interface.
- Connection via a Wi-Fi access point and remote control over the internet.
- Over-the-air firmware updates.
- Linking and controlling multiple controllers via Wi-Fi (future firmware development).
- External power input (DC 9-19V, 2A rated, plug 1.7x4.0x9.5mm) for use with different battery packs, or regulated power supplies for continuous operation.
- CAM port to trigger camera focus and shutter release.
- Support for any camera with a wired remote release port.
- Multipurpose AUX port for:
 - Commanding MECHA Start/Stop and other functions with a wired or wireless RF remote.
 - Commanding MECHA various functions with NN IR remote.
 - Triggering a camera with an IR remote emitter.
 - Camera shutter release confirmation.

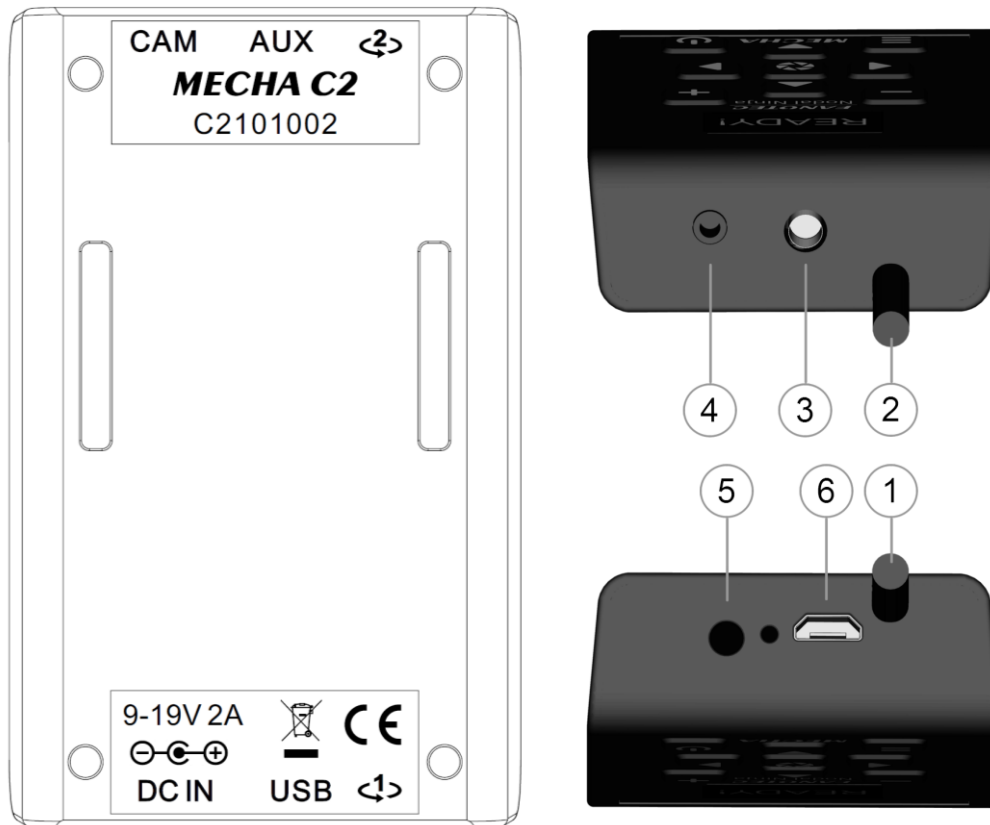
Before First Use

Get Your Equipment Ready

Note the numbers 1 and 2 printed on the back of the controller, and then connect the controller to the rotators as follows:

- The end of cable 1 to the lower rotator.

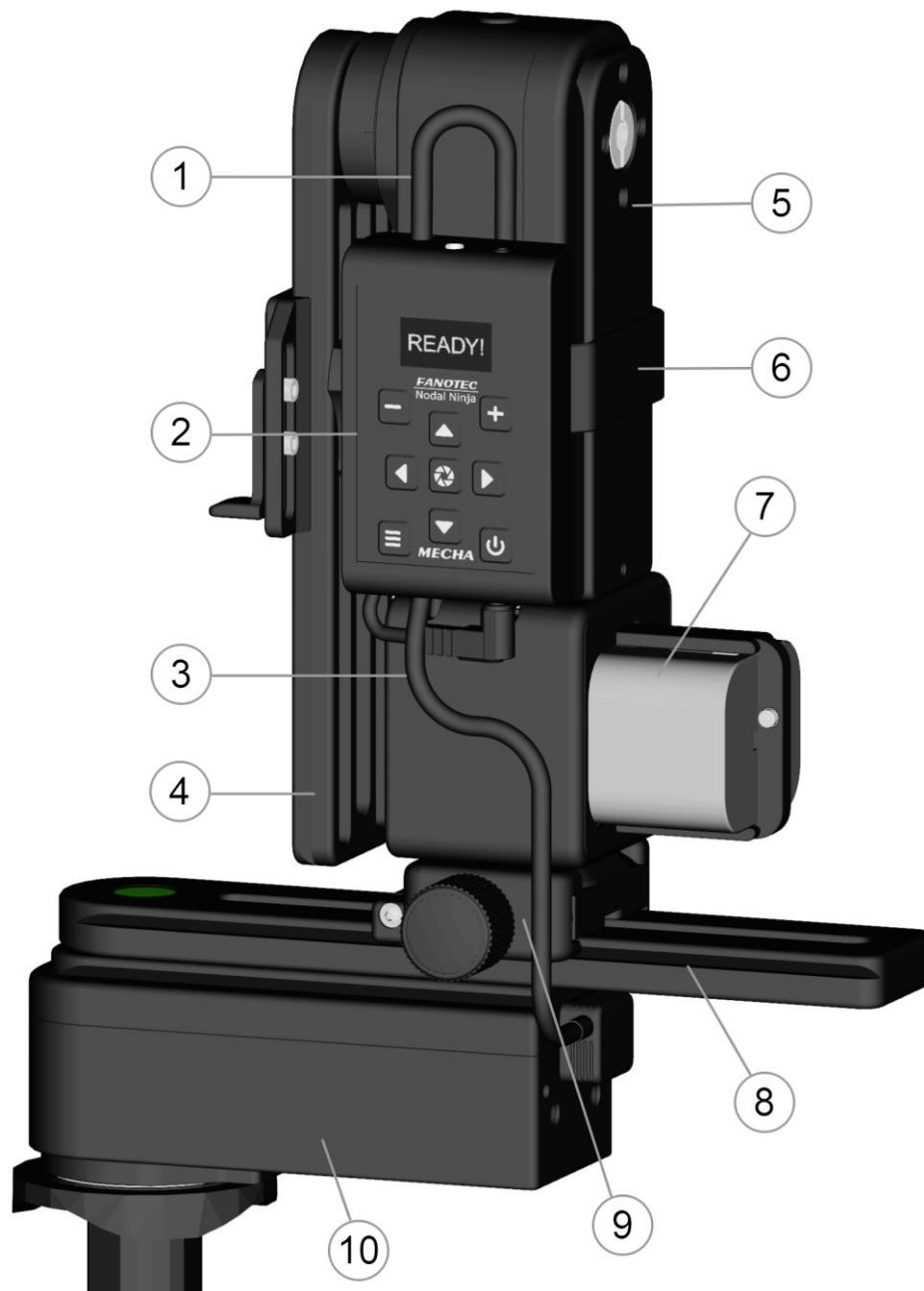
- The end of cable 2 to the upper rotator.



- 1 — Controller to lower rotator built-in cable*
- 2 — Controller to upper rotator built-in cable*
- 3 — Aux Port*
- 4 — Camera Trigger Port*
- 5 — DC Power Input Port*
- 6 — USB Port (mainly for programming and troubleshooting)*

In the image below, the lower rotator – or Rotator 1 – is the rotator mounted under the lower rail of the device, and the upper rotator – or Rotator 2 – is the vertical rotator mounted on the upper rail.

Although the controller can be mounted in several ways, we recommend mounting it on the upper rotator using its attachment strap, as shown in the image below.



1 — Controller to upper rotator built-in cable

2 — C2 Controller

3 — Controller to lower rotator built-in cable

4 — Upper rail

5 — Upper rotator

6 — Attachment strap

7 — *External battery*

8 — *Lower rail*

9 — *Nadir adapter*

10 — *Lower rotator*

Related Videos



<https://youtu.be/94oIpK7xwJQ>

Using IR Remote Commander and Receiver to Launch Presets – MECHA DAC and Single Axis



<https://youtu.be/X3AZjPZ-re4>

Installation Instruction for Dual-Axis MECHA C2-E2 With NN6 (F9922)



<https://youtu.be/iEyR3Jq9j34>

Installation Instruction for Dual-Axis MECHA C2-E1 With NN3 MK2 (F9920) First Batch



<https://youtu.be/VKEyS24MNyY>

Installation Instruction for Dual-Axis MECHA C2-E1 With NN3 MK3 (F9921) First Batch



<https://youtu.be/foEr50L0dZU>

Power On and Test – MECHA C2

C2's Buttons

Here are some of the functions of the buttons to give you a quick overview. We will provide more details later when we use the buttons.





− Minus button — Use it to adjust values in edit mode and delete editable presets; hold it down to speed up the adjustment. It is also needed for simple rotations.


+ Plus button — Use it to adjust values in edit mode, create presets and enter edit mode; hold it down to speed up the adjustment. It is also needed for simple rotations.

☰ Menu button — Use it to switch between menus and to show information about parameters in edit mode.

◀ ▶ Left and right buttons — These are menu navigation buttons. In edit mode, they increase/decrease 10 times the current value of some parameters in the (C) *Config Menu*. Use them to rotate the system manually to the left and right, respectively, and also to specify the direction when launching a preset.

 Up and down buttons — These are menu navigation buttons and control the up and down movement of the upper rotator.

 Center button — This has a camera trigger function, confirms the execution of a preset selected from the *(P) Preset Menu*, or confirms the adjustment of values in edit mode. It can also be used to switch between pair options (ON/OFF) and show details about the current option.


 Power button — Use it to power on/off MECHA (long press), confirm or cancel some operations, and show the battery percentage.

NOTE. A long press of the power button is only necessary for powering on/off. In all other cases, use a normal press.

Power On and Test



Position the upper rail as shown in the image below (**parked** position), then power on MECHA and perform the test below **without mounting a camera**.




Power on MECHA by pressing the  button for 3 to 5 seconds (long press). It may take about 35-45 seconds to start, then MECHA reaches the **idle status**, and the display will show the (P) *Preset Menu*:



TEST Without Camera Mounted

Use the   buttons to find the *P1₂ PANORAMA TEST PARKED* option, which tells the MECHA C2 to execute a panorama to the right as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from the **parked** position.

Press the  button to launch the test and wait until the test is performed and *P1₂ PANORAMA TEST PARKED* is shown on the display again.

NOTE. The  button can always be used as an emergency stop.


Power off MECHA by pressing its power button for 3 to 5 seconds.



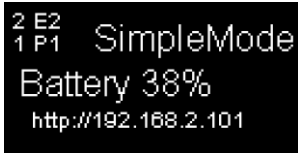
If the above test is not successful and you need assistance, please contact us at mecha@nodalninja.com

Checking the Battery Level


Power on MECHA as shown above.

After that, press the  button to view the battery percentage displayed on the screen. The battery symbol is located in the upper left corner of the screen and alternates with the rotators in use. The dynamic IP address is also displayed at the bottom of the screen.

If necessary, replace the battery. Always use a 9-19V battery, as specified in the technical specifications.



If the display shows nothing, the battery may be completely discharged and needs to be replaced.

NOTE. When the *BATTERY* warning appears on C2's display, it can be canceled by pressing the  button.




https://youtu.be/7X6QS_4KYk

Check the Battery Level and Set Low Battery Warnings – MECHA C2













Simple Rotations

Power on MECHA as shown above.









In the *(P) Preset Menu*, select – or navigate to – the first option, which is *P1o SIMPLE ROTATIONS*, then press the  button to confirm. The display will show: *Set POSITION*, as in the image below.



For the lower rotator


- For 45° rotations:
 - Press , then quickly press .
 - Press , then quickly press  for the opposite direction.
- For 90° rotations:
 - Press , then quickly press .
 - Press , then quickly press  for the opposite direction.
- For 180° rotations:
 - Press , then quickly press .
 - Press , then quickly press  for the opposite direction.



For the upper rotator, do the same, but use the up and down buttons instead of the left and right buttons:

- For 45° rotations:
 - Press , then quickly press .
 - Press , then quickly press  for the opposite direction.
- For 90° rotations:
 - Press , then quickly press .
 - Press , then quickly press  for the opposite direction.
- For 180° rotations:

- Press , then quickly press .
- Press , then quickly press  for the opposite direction.

Note that the rotation angle for the above button combinations can be set in the (C) *Config Menu* or on the *Configuration* page.

For continuous rotation, press and hold the arrow buttons one at a time. For example, for continuous left rotation, press and hold .





 When you press the  button and the battery percentage is shown on the display, you can also perform simple rotations.

Use the  button to exit.



<https://youtu.be/0YVjtnbwnFM>

Simple Rotations – MECHA C2

 If the above simple rotations do not work as expected, the rotators in use may not be set correctly (see [Setting the Rotators Using C2's Menu](#)), or the *INTERVALS* 1 , 2 , and 3  are not the default ones in the (C) *Config Menu* or on the *Configuration* page.

Parked, Level, and Raised Positions

The Simple Rotations mentioned above are very helpful when the upper rail needs to be in a certain position. The basic positions required for presets are shown in the image below:


Parked (1) — The most compact position; the upper rail is oriented vertically downward.

Level (2) — The upper rail is in the horizontal position.

Raised (3) — The opposite of **parked**, the upper rail is oriented vertically upward.



The naming conventions for starting and ending positions for dual-axis presets available via **More from Server...**

Adjust the position by using the  and  buttons to match the preset before starting the preset.

For example, if the current position is **parked** and the preset requires **raised**, you can achieve this with **one of the following Simple Rotations**:

- Press  then quickly press , and do this twice ($90^\circ \times 2 = 180^\circ$).





- Press  then quickly press .
- Press and hold  until the upper rail reaches the desired position.


Firmware Update Using a Hotspot

MECHA's firmware acts as the device's complete operating system, performing all control, monitoring, and data manipulation functions. It is important to have the latest version installed to benefit from all the features implemented in MECHA. However, if you prefer not to update it at this time or are not comfortable with the firmware update procedure, you can skip it for now and read the next section.


Use this update method for version (1)2201 or newer.

For this simple method of updating the firmware, we assume that you know how to set up a hotspot on your 3G, 4G, or 5G smartphone – a smartphone with mobile data enabled and internet access. In other words, you can navigate the internet using that smartphone alone, without it being connected to Wi-Fi.

- First, set up a hotspot named **MECHA-UPDATE** with the password **87654321** (default) in the 2.4 GHz band.
- Press the  button for about 3 to 5 seconds to power on MECHA, and wait until MECHA reaches the idle status (and the (P) *Preset Menu* is shown on C2's display).
- If MECHA doesn't reach this status, please power it off by pressing the  button for 3 seconds and contact us at mecha@nodalninja.com.
- Press the  button to switch to the (C) *Config Menu*.
- Press the  button to select page 8.

- Press the  button several times until **C8₃ UPDATE USING H-SPOT** appears on the display, as shown in the image below.



Press the  button to launch the update. Now MECHA starts scanning for existing networks, and when it connects to the previously created hotspot, two beeps are heard. The **C8₃ UPDATE USING H-SPOT** option will update the firmware using the MECHA-UPDATE hotspot you set up.

- Now, deactivate the hotspot, power off MECHA, then power it on again.



The response shown on the display will be *"No update found!"* if the update cannot be done at that time.

If you use the above option without creating the hotspot, the firmware will be updated later, when internet access is available.

The update may take up to 5 minutes but could take longer in case of a slow internet connection.

For more details on using C2's menus, please read [C2's Menu Mode](#).



Please do not turn off MECHA while updating the firmware!



<https://youtu.be/rZu4EI5AbIw>

Firmware Update Using a Hotspot – MECHA C2

C2's Menu Mode

Using C2's Menus

C2's current menus are the (P) *Preset Menu* and the (C) *Config Menu*.

A **preset** is a set of instructions and configuration settings, that can be saved and used when needed to perform specific operations much faster. For example, some presets contain all the information MECHA needs to execute a whole panorama.

(P) Preset Menu contains:

- Default presets – displayed on page 1:
 - **Test presets:** *P1₁ PANORAMA TEST SINGLE 6, P1₂ PANORAMA TEST PARKED, P1₃ PANORAMA TEST LEVEL, P1₄ PANORAMA TEST RAISED.*
 - **Factory presets:** *P1₅ KIT LENS 18(29) LEVEL, P1₆ FE 12mm NZ Level, P1₆ FE 16mm NZ Level, P1₆ FE 20mm NZ Level, P1₆ FE 24mm NZ Level.*

One of the differences between a Test and Factory preset is that the Test preset does not require position confirmations when executing it.

- *EMPTY* options where you can display or create your own presets on pages 2-8.
- Other options:
 - *P1₀ SIMPLE ROTATIONS*

(C) Config Menu consists of various options, such as *C1₀ SIMPLE/ADVANCED MODE*, *C1₂ MECHA ID*, *C1₃ MAC ADDRESS*, *C1₄ IP ADDRESS*, *C1₅ BATTERY PERCENTAGE*, *C1₆ BATT. WARNING*, *C2₀ STEP by STEP ...*, *C6₁ IR REMOTE TEST*, *C8₂ FIRMWARE VERSION*, *C7₀ ROTATOR 1*, *C7₁ ROTATOR 2*, and *C8₃ UPDATE USING H-SPOT* that can be used to update the firmware, as shown in [Firmware Update Using a Hotspot](#).





After powering on MECHA, the (P) Preset Menu is shown on the display.



P 1₀ 2 3 4 5 6 7 8
SIMPLE
ROTATIONS

Each menu consists of 8 pages, and a page can contain 10 presets or other options.

P 1₁ 2 3 4 5 6 7 8
PANORAMA
TEST SINGLE 6

Press the  button to display the next option. Press the  button to display the previous option.



P 1 2₄ 3 4 5 6 7 8
+50mmT1 E:1/2
25%360x180L >

Press the  button to go to the next page, and the  button to go to the previous page. Blank page numbers will be displayed in smaller fonts.





Press the center button of C2 to confirm, execute, or show details about the current option.







Use these buttons to adjust values in edit mode. Press the  button to delete an editable preset, and  button to enter edit mode.




Press the  button to switch to another menu. The first option in the (C) *Config Menu* is *C1_0 SIMPLE MODE is ON*.

Press the  button when you need to change it (switch) to *C1_0 ADVANCED MODE is ON*.

To execute a preset, press the  button when the preset name is shown on the display, then press either the  or  button to specify the direction of rotation, or provide the information required by the preset.


As we will see in the next section, if the preset name contains direction information, there is no need to press the left or right buttons; the preset is executed automatically when you press the  button.




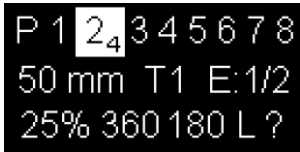
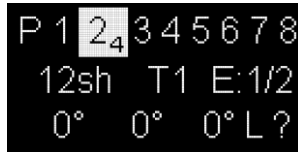
After 10 seconds of inactivity, in some cases, the display shows contextual information that will help you use MECHA even without knowing too much about it. The *C4_0 SHOW HINTS...* option in the (C) *Config Menu* allows you to enable / disable contextual information using the  button.


Creating a Preset in C2's Menu Mode


Creating a preset in C2's menu mode is very simple, fast, and preferable when you do not want to access the User Interface for various reasons. The preset can be used immediately to shoot a panorama and can also be edited later or deleted if no longer needed.




- In the (P) *Preset Menu*, use the  button to find an empty option, for example, *024 EMPTY*.

- Press the  button to enter edit mode and adjust the preset parameters, which are:


- **Focal length** (50mm – in the first image above) alternates with **Number of shots** (12sh – in the second image above) and AUTO; press the  button to toggle between the three parameters.

Press the  button to find out information about a flashing parameter – *explained show* (see the third image above) – and press it again to return to the *concise show*.

Use the   buttons to adjust the current value. Use the  button to go to the next parameter.


- **Number of camera trigger signals per position.** T1 means one camera trigger signal. For example, if you increase the value to 3 (T3) using the  button, there will be three camera trigger signals per position.
- **Exposure** (in seconds). E1/2 means an exposure of half a second. If you try to decrease the value below zero, notice that shutter/button confirmation options are displayed instead – E:SHT C., E:SHT C1, E:BTN > C, E:BTN > C1 – which are explained in the User Interface chapter.

Image overlap and **coverage area** can be set only when **AUTO** or **focal length** is specified (see the first image above).

- **Image overlap** (percent). Values in the range of 5-80% are allowed, or go to the next parameter if you do not want to change the current value.
- **Coverage area:**
 - 360° 180° for a full panorama
 - or less for a partial panorama vertically centered.

Up to three **rows** and their corresponding **tilts** can be set only when the **number of shots** is specified (see the second image above).

- **Rows and tilts** examples (see the note above):
 - 12sh 0° 0° 0° — one row of 12 shots at a tilt of 0°
 - 6sh 7.5° 0° 0° — one row of 6 shots at a tilt of 7.5°
 - 8sh 30° -30° 0° — two rows of 8 shots: one at a tilt of 30° and the other at -30°
 - 12sh 0° 45° -45° — three rows of 12 shots, one at a tilt of 0°, one at 45°, and the other at -45°.
- **Position of the upper rail** (when running this preset, the upper rail must be in this position):
 - parked (P),
 - level (L),
 - or raised (R).
- **Direction of rotation:**
 - right,
 - left,
 - or unspecified (?), in which case the direction of rotation must be provided when the preset is executed.

The following parameters are displayed on the second and third OLED screens and explained in the User Interface chapter. For now, you can simply leave them as they are in the template.

```
24      M:1
AF OFF  W:2.0
B:0.0   A:1.0
```

```
24      MDU,ZZ,NN
Normal  Sphere
Portrait 25% W
```

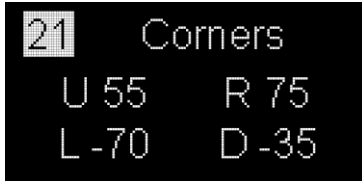
```
24      Medium
6.0 rpm 32+128s
Wait
```

- **Modifier of exposure** (M) — Modifier of the duration of the shutter button signal.
- **Auto-Focus** (AF) — Duration of the AF signal time.

- **Wake** (W) — Delay for camera wake-up.
- **Before** (B) — Delay before each triggering sequence.
- **After** (A) — Delay after each triggering sequence or individual triggering.
- **Row order.** Possible values for row order are: *MDU, MUD, UMD, UDM, DMU, DUM, MD, MU, UM, UD, DM, DU, M, D, U*, where **M** means middle row, **D** – down, **U** – up. Let's look at some examples:
 - *MDU* — The middle row will be photographed first, then the down row(s), then the up row(s).
 - *MD* — The middle row first, then the down row(s). The preset will not contain the up row(s).
 - *UD* and *DU* are special values — Although the preset will not contain the middle row, the area corresponding to it will not be missing from the panorama, as there will be an overlap in the middle, meaning that the top row closest to the middle and the bottom row closest to the middle will overlap. *UD* means the up row(s) first, then the down row(s), while *DU* is the reverse.
 - *M* — The preset will only contain the middle row.
 - *D* — The preset will only contain the down row(s).
 - *U* — The preset will only contain the up row(s).
- **Zenith and Nadir shots:**
 - --- — No shots.
 - *Z* — One zenith shot.
 - *N* — One nadir shot.
 - *Z,N* — One zenith + one nadir shot.
 - *N,Z* — One nadir + one zenith shot.
 - *ZZ* — Two zenith shots 90° apart.
 - *NN* — Two nadir shots 90° apart.
 - *ZZ,N* — Two zenith shots 90° apart + one nadir shot.
 - *NN,Z* — Two nadir shots 90° apart + one zenith shot.

- *Z,NN* — One zenith shot + two nadir shots 90° apart.
 - *N,ZZ* — One nadir shot + two zenith shots 90° apart.
 - *ZZ,NN* — Two zenith + two nadir shots 90° apart.
 - *NN,ZZ* — Two nadir + two zenith shots 90° apart.
 - *Zx2* — Two zenith shots 180° apart.
 - *Nx2* — Two nadir shots 180° apart.
 - *Zx2,N* — Two zenith shots 180° apart + one nadir shot.
 - *Nx2,Z* — Two nadir shots 180° apart + one zenith shot.
 - *Zx2,Nx2* — Two zenith + two nadir shots 180° apart.
 - *Nx2,Zx2* — Two nadir + two zenith shots 180° apart.
 - *N,PN* — One nadir shot + a pause for preparations* for the extra nadir shot.
 - *Z,N,PN* — One zenith + one nadir shot + a pause for preparations* for the extra nadir shot.
 - *ZZ,N,PN* — Two zenith shots + one nadir shot + a pause for preparations* for the extra nadir shot.
 - *ZZNN,PN* — Two zenith + two nadir shots + a pause for preparations* for the extra nadir shot.
 - * For example, rotating the nadir adapter and moving the tripod.
- **Normal / Zigzag** — Horizontally, how to take photos in rows, row by row:
 - *Normal*: after the last position of the first row, move to the first position of the second row, and so on.
 - *Zigzag*: after the last position of the first row, move to the last position of the second row, then the first position of the third row, and so on.
 - **Sphere / Grid** — Mapping type. The number of positions will be the same on every row when *Grid* is specified. *Grid* mapping is sometimes required when stitching photos for high-resolution or multi-resolution panoramas.
 - **Portrait / Landscape** — Camera orientation when taking photos.

- **Overlap W** (percent) — Custom overlap on width. Values in the range 5-80% are allowed. When the main overlap (*Image overlap*) is adjusted, *Overlap W* will also be set to the same value. Edit the main overlap first, then edit *Overlap W* if needed.











- **Corners** — These are the corners of a partial panorama, similar to the corners set with the two-axis slider. UL defines the top left corner (or image), and RD, the down right corner (or image). Example: *L: -70, U: 55, R: 75, D: -35*. The values can also be obtained from the PTGui/Hugin project. Press either the **+** or **-** button when the *Corners* option flashes, to remove all corners.
- **Load profile** — Light, Medium, and Heavy.
- **Speed** in revolutions per minute.
- **Micro-stepping** value, simple or combined.
- **Wait / Rewind** — These options tell MECHA to wait after the last shot or to rewind to the initial position.
- **Crop factor** — Values: 0.64x, 0.79x, FF (full frame), 1.3x, 1.5x, 1.6x, 1.7x, 2.0x, 2.7x, 3.9x, 4.5x, 4.8x, 5.6x, 6.0x.
- **Repeat** — Values: *NO Repeat* (if no repeat is needed), or *times*minutes* (to specify how many times MECHA should repeat the shooting sequence and with what delay). See the User Interface chapter for more information about *Repeat*.







https://youtu.be/_u6-kxD4_uE

Preset Repeat with MECHA C2 Controller

Press the  button to cancel and exit edit mode, if necessary.

- A flashing parameter means the value can be adjusted using the  and  buttons (hold down the desired button to speed up the adjustment).
- Use any of the four     buttons to quickly navigate to another parameter.
- The preset is automatically saved when you confirm the adjustments by pressing the  button.

As soon as a preset is saved, you can start shooting or use it anytime later. Press the  button to execute the preset.






- After launching the preset, the display will show *Set POSITION*, meaning you can set the initial view and position the upper rail before continuing, as shown in Simple Rotations. Press the  button to skip this step if no change is needed.
- Note the + (plus) sign at the beginning of the preset name. This preset is editable and it can be:
 - deleted with the  button,
 - edited with the  button.



The most recently selected preset serves as a template for the next one. Thus, if it is deleted by mistake, you only need to create a new preset to have the deleted one back.

What happens if the direction of rotation is not specified?


If the direction of rotation is not specified when a preset is created, then when launching the preset from the (P) *Preset Menu* it will ask for direction (ROT. SENSE), as shown in the second image below.

- First, optionally, use the     buttons to set the initial view and level the upper rail, if necessary, as shown in [Simple Rotations](#), then press the  button to confirm. Use the  button to skip this step if the position of the upper rail is correct (**level**, in our example) and no other adjustments are needed.

The LCD screen displays the following text:
 2 E2
 1 P1 Level
 024 ^v < > ?
 Set POSITION

- Use the  or  button to execute the preset to the left or right.

The LCD screen displays the following text:
 2 E2
 1 P1
 024 < > ?
 ROT. SENSE

- When launched by mistake, use the  button to cancel.

Panorama with Automatic Shooting Pattern Using C2's Menu

This method requires firmware version (1)2272 or newer and works for any lens from 4mm to 1000mm, including fisheye lenses.




MECHA will compute a preset for your lens based on the data it receives when performing the following procedure:

- Power on MECHA as usual.
- Make sure the upper rail is in the **level** position.






- Place a small object in front of MECHA so that it is right in the center of the frame. The distance to the target object is not important.
- The camera and lens must be set the same as for shooting the actual panorama.




The above three settings can be made either now or later when the display shows **Set POSITION**.

- Now, in the (P) Preset Menu, use the  button to find an empty option or editable preset.
- Press the  button to enter edit mode.
- The first parameter is already selected and flashes, which means you can adjust it. Use the  button to find the **AUTO** value. You can adjust the other

parameters if necessary. We assume that you have read the chapter on editing presets and therefore know how to work with parameters.

- Press the  button to confirm.
- Press the  button again to launch the preset.
- When the preset asks you to *Set POSITION*, you just have to press the  button to confirm, assuming that the upper rail is in the **level** position and the target object is already in the center of the frame.
- The following message appears on the display to remind you what to do next, and you have 10 seconds to read it:

Press Power if
the central feature
goes out of view

- After 10 seconds, MECHA starts to rotate slowly to the right, and you have to press the  button when the target object is out of the camera's frame, as stated in the message.
- Then MECHA goes back to the initial position and starts to slowly tilt down, and you have to press the  button again when the target object is out of the camera's frame.
- Then MECHA goes back to the initial position, and the computed preset is ready for use. Press the  button to launch it immediately, or use it later like any other preset.



<https://youtu.be/zYqLbYMZjjs>

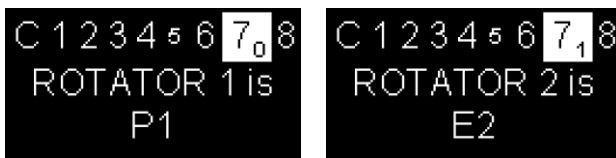
Creating a Panorama Preset Without UI – MECHA C2

Panorama Using C2's Menu


Power on MECHA and wait until it reaches the idle status.

Setting the Rotators Using C2's Menu

The following options available in the *(C) Config Menu* can be used to tell MECHA what type of rotators are connected to it. Use these options if you purchased them separately, changed the rotator type, or want to ensure MECHA has the correct one set.



- *C7₀ ROTATOR 1 is ...* – Use this option to set the lower rotator.
- *C7₁ ROTATOR 2 is ...* – Use this option to set the upper rotator.

First, find the option you need and enter edit mode using the **+** button. Then use the **-** and **+** buttons to find the right type of rotator, and confirm by pressing the  button.



<https://youtu.be/R0OIwuGq9IE>


Setting the Rotators Using C2's Menu

Test Panoramas

Now let's continue with some tests **without mounting a camera**.

Position the upper rail in the **parked, level, or raised** position as required for each of the following tests, as shown in the [Simple Rotations](#) section. If the upper rail of your device is already in one of these three positions, you can only perform the corresponding test.

In the (P) *Preset Menu* page 1, use the ▼▲ buttons to find the option specified in each test below.

Confirm by pressing the  button.

Test without Camera – Parked Position

With the upper rail in the **parked** position, as shown in the image below, select the *P1₂ PANORAMA TEST PARKED* option:



Press the  button to confirm.

This option tells the MECHA C2 to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from the **parked** position.

Test without Camera – Level Position

With the upper rail in the **level** position, as shown in the image below, select the *P1₃ PANORAMA TEST LEVEL* option:



Press the  button to confirm.

This option tells the MECHA C2 to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from the **level** position.

Test without Camera – Raised Position

With the upper rail in the **raised** position, as shown in the image below, select the *P1₄ PANORAMA TEST RAISED* option:

```
P 1 2 3 4 5 6 7 8
  PANORAMA
  TEST RAISED
```



Press the  button to confirm.

This option tells the MECHA C2 to execute a panorama to the left or right, as follows: 12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir, starting from the **raised** position.


Panorama with Camera Mounted

If the above tests are successful, repeat at least one of them with a camera mounted.

Mount the camera on the upper rail using the camera mounting knob shown in the image below. Plug the right shutter cable for the camera in use into the Camera Port (CAM). This allows the shutter to be triggered automatically.












Use the test panoramas mentioned above whenever you want to quickly shoot this type of panorama without using the User Interface.

As we have already mentioned, a test preset does not require position confirmation when executing it. Therefore, make sure the initial view and the position of the upper rail are correct before selecting the preset you need and pressing the  button to confirm, just as you would for tests without a camera.

Basic Information About Shooting

- If none of the available presets are suitable for the type of panorama you want to shoot, select any *EMPTY* option in the (P) *Preset Menu* and create a new preset as we have already shown in the [Creating a preset in C2's Menu Mode](#) section.

- Before executing any test preset with the camera mounted, make sure the initial view and the position of the upper rail are correctly set, as test presets are executed without asking about positions.
- Use the     buttons to find the preset you want to use and press the  button to confirm.
- All presets, except test presets, prompt you to set some positions – *Set POSITION* – meaning you can set the initial view and position the upper rail before continuing, as shown in [Simple Rotations](#). You can also set two corners to define a partial panorama if needed. Press the  button to confirm or skip this step.
- You may also need to set the sense of rotation – *ROT. SENSE* – which can only be left or right, so press either the  or  button to start shooting.
- Press the  button to cancel shooting.

Shooting in Step-by-Step Mode


- In the (C) *Config Menu*, find the *C2₀ STEP by STEP is OFF* option and activate it by pressing the .




C 1 2₀ 3 4 5 6 7 8
STEP by STEP
is OFF




C 1 2₀ 3 4 5 6 7 8
STEP by STEP
is ON

- In the (P) *Preset Menu*, find the preset you want to use and, depending on the preset type, launch it as shown above.
- With *STEP by STEP* being *ON*, MECHA pauses before each position and waits for you to press the  button to take the photo and go to the next position, resulting in step-by-step movement.


- Press the  button to exit step-by-step mode and continue automatically.
- There is no need to change *C2₀ STEP by STEP* from *ON* to *OFF*, as this change is done automatically.

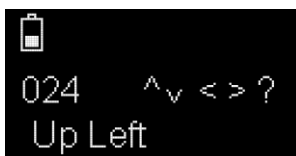
Custom Partial Panorama Using Two Corners


When creating a preset using the C2's *(P) Preset Menu*, one can set a *Coverage area* less than 360°x180° if a partial panorama is needed. But this partial panorama is vertically centered. To be able to shoot a custom partial panorama, MECHA needs to know the **upper left** corner and (lower) **down right** corner of the area to be photographed. Let's see how this can be done.

- Launch any preset created using C2's *(P) Preset Menu* by pressing the  button when the preset name is shown on the display (remember that this type of preset has the plus sign at the beginning of its name). The display will show *Set POSITION*, as in the image below.




- If necessary, position the upper rail as required in the preset by using the arrow buttons. In our example, notice that the position is level.
- Press the  button and note that the display shows **Up Left**, as in the image below, which means that now the upper left corner should be set.




- Use the arrow buttons to rotate the panoramic head to point to the upper left corner of the desired area, then press the  button to confirm.


- Now the display shows **Down Right**, as in the image below, and you should set the lower right corner.




- Use the arrow buttons to rotate the panoramic head to point to the lower right corner of the desired area, then press the  button to confirm (*Set POSITION* is shown again on the display).

Once the second corner is confirmed, both corners are saved in the preset.

- By pressing the  button again, MECHA walks through the two corners, which can be further adjusted. This step is not required, but allows you to make sure the corners are correctly set.

 The rotational speed when a button is held down can be adjusted using the *C3₂ ARROWS speed ... RPM* option in the *(C) Config Menu*.


- If necessary, after you finish setting the corners and *Set POSITION* is shown again on the display, you can set the initial view by using the arrow buttons. Also, notice the corner symbols next to the battery symbol.
- Then press the  button to execute the preset.



<https://youtu.be/bleU7YEFZSc>



Partial Panorama Using Two Corners – MECHA C2



To ignore the set corners when launching a preset, press the  button when the display shows *Set POSITION*.

To delete the set corners and save the preset without corners:





First, ignore the corners (by pressing the  button when the display shows *Set POSITION*).



Then adjust the corners (by pressing the  button) and press the  button twice, once when the display shows ***Up Left***, and once when it shows ***Down Right***.

This is equivalent to setting null corners and, after confirming the second corner, the preset is saved as such.









C2's Menu Options





This chapter briefly describes C2's menu options to give you an idea of what you can do using the menu.

First, to use a certain option, find or navigate to that option using the navigational buttons –     – then follow the instructions below and access the links provided for more details.

Usually, you can use the  button to confirm or switch between ON/OFF options and the  button to exit or cancel.


(P) Preset Menu




- *P1₀ SIMPLE ROTATIONS* — Press the  button to confirm you want to perform Simple Rotations.
 - Use a button in the     set in combination with one in the    set for a rotation with the angle specified in *INTERVAL 1, 2 or 3*,
 - or press and hold a button in the first set if you need a continuous rotation.

- *P1₁ PANORAMA TEST SINGLE 6* — A **test** preset for a single-row panorama: 6 shots around. For dual-axis applications, make sure the upper rail is in the **level** position, then press the  button to launch the preset.
- *P1₂ PANORAMA TEST PARKED* — A **test** preset for a multi-row panorama: 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir. Make sure the upper rail is in the **parked** position, then press the  button to launch the preset.
- *P1₃ PANORAMA TEST LEVEL* — A **test** preset for a multi-row panorama: 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir. Make sure the upper rail is in the **level** position, then press the  button to launch the preset.
- *P1₄ PANORAMA TEST RAISED* — A **test** preset for a multi-row panorama: 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir. Make sure the upper rail is in the **raised** position, then press the  button to launch the preset.






- *P1₅ KIT LENS 18(29) LEVEL* — A preset for a multi-row panorama: 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir.











- *P1₆ FE 12mm NZ Level* — A preset for 12mm fisheye lenses, 4 shots around, plus nadir and zenith.
- *P1₆ FE 16mm NZ Level* — A preset for 16mm fisheye lenses, 6 shots around, plus nadir and zenith.
- *P1₆ FE 24mm NZ Level* — A preset for 24mm fisheye lenses, 8 shots around, 2 rows – at -30° and +30° – plus zenith and nadir.

After pressing the  button to launch the preset, the four presets above will require confirmation of position and direction of rotation:

- *Set POSITION:* position the upper rail in the **level** position as shown in Simple Rotations. Press the  button to confirm.
- *ROT. SENSE:* press either the  or  button to start shooting.

(C) Config Menu





- *C1₀ SIMPLE / ADVANCED MODE is ON* — Press the  button to switch between the two options. The main difference between the two modes is that in *C1₀ SIMPLE MODE* you are always in one of C2's menus and some operations are therefore easier to perform.
- *C1₁ USER'S GUIDE QR CODE* — Press the  button to show the QR code.
 - By pressing the  button, the QR code will be displayed on a white background. With a second button press, the display will show the web address to which the code points. Press the  button again to exit immediately.
- *C1₂ MECHA ID* — Press the  button to show the MECHA's ID, which is an identifier comprised of letters and numbers and is part of the *MAC ADDRESS*.




- *C1₃ MAC ADDRESS* — Press the  button to show the entire MAC address (media access control address), which uniquely identifies your MECHA.
- *C1₄ IP ADDRESS* — Press the  button to show the full (dynamic) IP address; you will need it to access the MECHA's User Interface on your computer.
- *C1₅ BATTERY PERCENTAGE* — Press the  button to show the battery percentage. You can also use the  button whenever you want to show the battery percentage, but not in edit mode or when a preset is executed, because in these cases the  button has a cancel/exit function.
- *C1₆ BATT. WARNING AT ...* — Press either  or  button to enter edit mode and set the *Battery min*. For a voltage close to *Battery min*, you will see the *BATTERY* warning shown on the display (see [Checking the Battery Level](#)).
- *C1₇ ALWAYS ON NO POWER OFF* — Press either  or  button to enter edit mode and set MECHA to shut down automatically after a certain number of minutes of inactivity, or vice versa, to keep it always on.
- *C1₈ FCC ID* — Press the  button to show the C2 FCC ID.
- *C1₉ +ASSISTANT...* — This option allows you to specify the IP address of a second MECHA, such as a C1 mounted on a hot-shoe, which can be used for triggering purposes without any cable between the moving parts of the gear. This particular MECHA +ASSISTANT can be either a C1 or a C2 connected directly to the AP of the main C2 unit, or in the same local network.
 - If the +ASSISTANT is connected to the AP of main C2, +ASSISTANT needs to be in STA mode.
 - If the +ASSISTANT is on the same local network as C2, +ASSISTANT can be in both AP+STA and STA modes.

+ASSISTANT will receive and echo any camera trigger signal sent by C2.


You can set a fixed IP address for the +ASSISTANT unit in its *Configuration* page, like IP:192.168.8.110 SN:255.255.255.0 GW&DNS:192.168.8.1.



A C2 using a +*ASSISTANT* will be referred to as C2+ in the supporting materials. A C2+ commands itself and the +*ASSISTANT* at the same time.

Press the  button to enter edit mode, then use the  and  buttons to change the last part of the IP address, which is 192.168.8.XXX, or choose *OFF* to disable the assistant unit. Confirm using the  button, as usual.

-
- *C2₀ STEP by STEP is ON / OFF* — Press the  button to switch between the two options (see [Shooting in Step-by-Step Mode](#)).
 - *C2₁ MOTOR 1 is ENABLED / DISABLED* — Press the  button to switch between the two options. The **lower** motor will be enabled/disabled.
 - *C2₂ MOTOR 2 is ENABLED / DISABLED* — Press the  button to switch between the two options. The **upper** motor will be enabled/disabled.





MECHA can execute presets for dual-axis applications even if it is only connected to the lower rotator (Rotator 1) – assuming there is no upper rotator (Rotator 2) – but you need to tilt the second axis manually.

If *MOTOR 2 is ENABLED*, MECHA pauses when sending commands to the Rotator 2 and displays the target position in degrees on the OLED, then waits for you to tilt the second axis manually, and will not continue until you press the  button to confirm it is tilted.

- *C2₃ DISABLE / ENABLE MOTOR 1 & 2* — Press the  button to switch between the two options. **Both** the lower and upper motors will be disabled/enabled.
- *C2₄ DEGREES / REAL MOVE is ON* — Press the  button to switch between the two options. **Note that this is only possible if the Allow DEGREES - REAL MOVE Switching is enabled on the Configuration page.**

The C2₄ *REAL MOVE* option allows the use of MECHA C2 to control real world devices, such as linear rails – including macro, focus and so on – but also rotational devices, say a MECHA P1 rotator is driving a large turntable using a gearbox with ratio unknown or using a belt.




To use the *C2₄ REAL MOVE* option:








- Mark a reference point for a REAL device driven by Rotator 1 (or lower rotator), say, on a rail.
- Switch to *C2₄ DEGREES MOVE* if it is not already *ON*.
- Set *1.0 TUR* (1 turn or 360°) for *C3₇ INTERVAL 3*. You can use other values if *1 TUR* is not appropriate for the device used, for example, it is too small or too large.
- Press either  or  then  for one full rotation (or according to your setting), and wait until the movement is complete. Now measure or calculate the distance the REAL device has moved from the reference point.
- Press the  button to exit, then navigate to *C7₄ i3 REAL MOVE 1* option and enter the value calculated or measured before. Say 100.0 for 100.0mm.
- Switch to *C2₄ REAL MOVE*. Now MECHA creates a conversion factor and will interpret all the numeric values as real values. 100.0 will be 100mm on the REAL device wherever these numeric values are used, in button intervals, presets, or scripts.



To go back to values interpreted as degrees, switch to *C2₄ DEGREES MOVE*.





Do the same for the Rotator 2 (or upper rotator), if needed, with *C7₅ i3 REAL MOVE 2* as final adjustment.

There is no need to repeat this process unless you have changed the REAL device type used. When *C2₄ DEGREES MOVE* is *ON*, you can set the desired value for *C3₇ INTERVAL 3*, and the conversion factor already created will not change.

-
- *C3₀ CHANGE SENSE LEFT-RIGHT* — Press the  button to change the sense of left/right rotation when it is done manually using the  and  buttons.

- *C3₁ CHANGE SENSE UP-DOWN* — Press the  button to change the sense of up/down rotation when it is done manually using the  and  buttons.
- *C3₂ ARROWS speed ... RPM* — Press either  or  button to enter edit mode and adjust the rotational speed when a button is held down (see [Arrow Buttons](#)).
- *C3₃ INTERVAL 1, C3₅ INTERVAL 2, C3₇ INTERVAL 3, and C3₄ Interval 1 speed, C3₆ Interval 2 speed, C3₈ Interval 3 speed* are the angles of rotation and corresponding speeds for [Simple Rotations](#). Press either  or  button to enter edit mode and adjust their value.

-
- *C3₉ LEVEL AMOUNT* — This setting determines the angle at which the upper rail is rotated after powering on MECHA if you press the  button when the display shows .

The upper rail should be in the **parked** position at power-on. After leveling, the *C3₉ LEVEL AMOUNT* option is displayed for easy access in case adjustments are needed. Press the  button to enter edit mode, then adjust the value as usual. You can set a value specifically for the current work session by pressing the  button to confirm the change instead of the  button. The *C3₉ LEVEL AMOUNT* adjustment can be made at any time, but after the initial setup, the  button will function as usual (exiting editing mode).

- **If the upper rotator is either E2 or P1** and equipped with a position sensor, MECHA will use it for more accurate rotation.



The sensor search covers a 360° range. To avoid potential issues during this process, ensure no lens is attached that could hit the lower rail and disconnect any cables from the camera. Perform this test in the following situations:

1. The first time you use MECHA after purchase.

2. After disassembling and reassembling the upper rail (for example, after using it in turntable applications).

When adjusting *C3₉ LEVEL AMOUNT* with *C7₈ ROT. 2 SENSOR* enabled, the display may show:

- **...[-][+]X** – The upper rail is within the level range, and the rail assembly and sensor detection are functioning correctly for safe use.












- **Rot.2 SENSOR NOT DETECTED** – The sensor is not detected. Disable it at *C7₈ ROT. SENSOR...*
- **UPPER RAIL INVERTED !** – The upper rail appears to be approximately 180° from level. Disassemble and reassemble the upper rail, rotating it by 180°.
- **If the upper rotator is E1** (which does not have a position sensor) **or E2/P1** with the sensor disabled in the *(C) Config Menu (C7₈ ROT. 2 SENSOR is DISABLED)*, the sensor cannot be detected, and the display shows an exclamation mark: **!**.



<https://youtu.be/BaS6pLjzw5g>

Leveling the Upper Rail when Powering On MECHA – C2 Controller





- *C4₀ SHOW HINTS* is ON / OFF — Press the  button to switch between the two options. When enabled, contextual information appears on the display to assist with using C2's menus.
- *C4₁ Default Wi-Fi* is AP / STA / AP+STA / OFF — Press either the  or  button to enter edit mode and select the desired option.








- *C4₂ CONNECT TO Wi-Fi* — Pressing the  button when this option is displayed instructs MECHA to attempt connection to the last known Wi-Fi network.
- *C4₃ Wi-Fi Test* — Selecting this option displays the quality of the Wi-Fi connection on a scale from 0 to 9 on the OLED display of the virtual controller, accessible at *MECHA-IP/c2*
- *C4₄ KEEP PAGE is ON / OFF* — Press the  button to switch between the two options. When enabled, the  and  buttons will not change pages, preventing cycling through all options across multiple pages.
- *C6₀ USE NN IR or SW is ON / OFF* — Press the  button to switch between the two options. Choose *ON* to enable the use of the Nodal Ninja IR Remote.
- *C6₁ IR REMOTE TEST* — This option allows you to test the IR Remote. Pressing the  button initiates the test. During the test, MECHA will not execute commands from the IR Commander's buttons but will beep and display the code of the pressed button (after release) on its display.



<https://youtu.be/agfwRVSfII8>

IR Remote Test – C1 and C2 MECHA Controllers

- *C6₂ at SHOOT, OLED is ON / OFF* — Press the  button to switch between the two options. *ON* keeps the display active during exposure, while *OFF* turns it off.
- *C6₃ OLED TEST* — This option allows you to verify if the OLED is functioning correctly.
- *C6₄ OLED Brightness* — Press the  button to enter edit mode, then use either the  or  button to adjust the brightness of the OLED display (values range from 1 to 255). Lower brightness settings extend the OLED's lifespan and slightly conserve battery power.







- *C6₅ OLED Offset X* — Use this option to correct horizontal offset issues. Press the  button to enter edit mode, then use either  or  for adjustments.
- *C6₆ OLED Offset Y* — Use this option to correct vertical offset issues. Press the  button to enter edit mode, then use either  or  for adjustments.
This can also be used creatively, for example, to display page numbers on the middle row of the OLED screen. Note that these adjustments are not reflected on the virtual OLED on the /c2 page, but on the physical OLED.
- *C6₇ Shutter CONF. TEST* — Before launching the test, connect a camera to the MECHA's CAM port using a PC sync cable, then do the following:
 - Find the *C6₇ Shutter CONF. TEST* option on page 6 of the (C) Config Menu and press the  button to launch the test.



- Trigger the camera a few times manually by pressing the camera's trigger button or using a camera remote. Note that if no action is detected, the test ends automatically after 10 seconds.
- MECHA will now count the shutter detections from camera via the AUX port and display the number of detections on C2's display after 10 seconds of idling. For example, if you trigger the camera four times, the display should show **4** if the test is successful.





Use New Shutter Confirmation checkbox is enabled by default on the Configuration page. If the above *Shutter CONF. TEST* fails, please perform the test again with the ***Use New Shutter Confirmation*** disabled.





- *C6₈ RAW Interface is ENABLED / DISABLED* — Press the  button to enable/disable the RAW Interface.
- *C6₉ BETA feat. is ENABLED / DISABLED* — Press the  button to enable/disable the current beta features.
- *C7₀ ROTATOR 1 is ...* — Press either  or  button to enter edit mode and set the desired rotator as the **lower** rotator.
- *C7₁ ROTATOR 2 is ...* — Press either  or  button to enter edit mode and set the desired rotator as the **upper** rotator.

Backlash compensation options








- *C7₂ BACKLASH 1 COMPENSATION* — Compensation of backlash for the **lower** rotator.
- *C7₃ BACKLASH 2 COMPENSATION* — Compensation of backlash for the **upper** rotator.


The purpose of backlash compensation is to improve the precision of left-right and up-down movements. It can be performed after a long period of use.


Press the  button to start the backlash compensation procedure and wait until the power button symbol starts flashing on the display. Then, press the  button when you notice that MECHA starts moving very slightly to the left.

-
- *C7₄ i3 REAL MOVE 1 / C7₅ i3 REAL MOVE 2* — This is the length of a path traveled by a REAL device controlled by Rotator 1/2 for a certain amount of rotation performed by MECHA. See the *C2₄ REAL MOVE* option for more details. Press either  or  button to enter edit mode and adjust its value.
 - *C7₆ ZENITH POS. / C7₇ NADIR POS.* — Press either  or  button to enter edit mode if you need to change the default values, which are 90° and -90°.

Other values may be useful for backlash reasons or to have a certain overlap. MECHA will use these values in scripts that contain Z and N.





- *C7₈ ROT. 2 SENSOR is ENABLED / DISABLED* — Press the  button to switch between the two options. If E2 or P1 have no sensor (like some prototypes), or you do not want it to be used, then it can be disabled with this option. Therefore, the leveling at powering on will be done without a sensor, assuming the upper rail is in the **parked** position.
 - If E2 or P1 is used as the upper rotator with *ROT.2 SENSOR ENABLED*, at **Set POSITION** in *C1₀ SIMPLE MODE* (or out of Menu in *C1₀ ADVANCED MODE*), by pressing  then quickly , MECHA will level the upper rail if the camera is above and near the **level** position, or below the **level** position, down to **parked**.
 - If Rotator 2 sensor is *DISABLED* (or not supported), by pressing  then quickly , MECHA will perform a 90° rotation up, and by pressing  then quickly , it will perform a 90° rotation down.

So now you can set button intervals freely, as there is   and   for 90° rotations.

- *C7₉ ROT. 2 is UP, ROT. 1 is DOWN* — Press the  button to switch to *C7₉ ROT. 1 is UP, ROT. 2 is DOWN* if necessary. In turntable applications, when using the lower cable to connect the controller to the rotator mounted under the turntable, the setting must be *ROT. 1 is DOWN*, meaning the Rotator 1 and C2 Controller are connected via the lower cable. When using the upper cable for this purpose, change the setting to *ROT. 1 is UP*, which means the Rotator 1 and C2 Controller are connected via the upper cable.

<https://youtu.be/IPgU8A7iexc>

Rotating a Turntable Using the MECHA C2 Controller




- *C8₀ UPDATE* — Press the  button to re-update the current firmware. MECHA will use the latest available connection data to connect to the internet.
- *C8₁ REBOOT* — Press the  button to reboot MECHA without power cycling it.
- *C8₂ FIRMWARE VERSION* — Press the  button to show the current firmware version for all MCUs (microcontroller units) and connected rotators. The first – MECHA's firmware – is the one you update over the internet using the *UPDATE* options. The others cannot be updated in the same way, but it is good to know where to find them in case you need assistance.
- *C8₃ UPDATE USING H-SPOT* — Press the  button to update the firmware using a hotspot named **MECHA-UPDATE** with the password **87654321** (default), which needs to be created and active before using this option (see [Firmware Update Using a Hotspot](#)).



Reset options

- *C8₄ RESET CONFIG. TO DEFAULT!* — Resets the configuration settings to their default values, for example: SSID password → 12345678, Password for *Configuration* page → Mecha, Hotspot password for firmware update → 87654321, Default Mode → AP.
- *C8₅ FACTORY RESET!* — Will restore your MECHA to its original factory settings.

https://youtu.be/_-GvflnkwCY

FACTORY RESET – Restoring MECHA C2 to Factory Settings

- Press the  button to start the reset procedure and follow the instructions on the display:
 - After a few seconds, you are asked to repeat the step above, so press again the  button when the reset option appears on the display.
 - Then the power button symbol starts flashing on the display, which means you have to press the  button and wait until the reset procedure is completed.

-
- *C8₆ LESS NOISE E is ENABLED / DISABLED* — Press the  button to enable/disable the equivalent option on the */config* page (*Less Noise for E rotator(s)*).
 - *C8₇ QUIET – LOUD BEEP* — Press the  button to switch between the two options.

<https://youtu.be/1Nps7du7kCQ>

Settings You May Want to Change – C2 Controller

How to Access the UI

About the User Interface

To access the MECHA's User Interface, you need a device with an internet browser. This could be a smartphone, tablet, or computer.

MECHA uses a wireless connection, abbreviated as Wi-Fi. It can be set in AP (Access Point), STA (Station), AP+STA, or no Wi-Fi at all. If no Wi-Fi is selected, control is only possible using buttons.

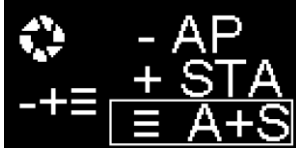
You can set the desired mode as the default in MECHA's *Configuration* page or by pressing a button during startup. This is indicated by **-+≡** on the display during the starting sequence (see image below).






Set MECHA in AP, STA, or AP+STA Mode at on Display

First, power on MECHA by pressing the  button for 3 to 5 seconds.

When  is shown on C2's display:



- Press  to set MECHA in AP mode.
- Press  to set MECHA in STA mode.
- Press  to set MECHA in AP+STA mode.

If you miss the setting time, power MECHA off and on again, making sure to act faster this time. Also, if the desired option is already selected, you don't need to select it again.

When MECHA is in AP or AP+STA mode, it broadcasts an SSID with a specific name containing "MECHA". Your smartphone can connect to this network using a password, which is 12345678 by default.

Once connected to the MECHA's SSID, access the User Interface in your browser at 192.168.8.1.





When MECHA is in STA or AP+STA mode, it can also connect to a different network's SSID (other than its own). In this case, access the User Interface at the address provided by that network, for example: 192.168.1.100.

You can manage the particular network using your smartphone if you enable a hotspot and MECHA connects to it.

Access the User Interface (UI) on a Smartphone

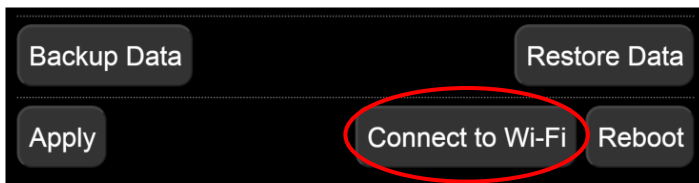


MECHA ACCESS POINT IP
<http://192.168.8.1/>

- Press the power button, , for about 3 to 5 seconds to power on MECHA, and wait until  is shown on the display.
- To connect your smartphone to MECHA's network, MECHA must be in AP mode. So, press either  to set MECHA in AP mode, or  to set MECHA in AP+STA mode.
- Tap the *Settings* icon on your device. Under *Wireless and Networks*, make sure *Wi-Fi* is turned on, then tap *Wi-Fi*. Tap the network name that contains **MECHA** in its name to connect the smartphone to MECHA. The default password for MECHA's network is **12345678**.
- Now MECHA's User Interface (UI) can be accessed on the smartphone's browser at: **192.168.8.1** (which is a static IP address).





Access the User Interface (UI) on Your Computer Connected to a Wireless Network

- The first step is to access the User Interface (UI) on your smartphone, as shown above, and preferably **set the AP+STA mode**. After that:



- Press the *[Connect to Wi-Fi]* button on the *Configuration* page (there is a similar button on the *Row* page).
- Select the name of the Wi-Fi network you want to connect to and enter the password. Please see [User Interface – Connect to Wi-Fi](#) for more details.

In this way, MECHA has the connection data to a Wi-Fi network and is able to connect to this network when needed. The above step is required only once for a certain network. If the network changes or you have deleted the connection data, then you need to repeat this step because MECHA saves only the last accessed network.

- To see MECHA's UI on your PC, MECHA must be in **STA** or **AP+STA** mode.
 - If you set the AP + STA mode, as requested in the previous step, you can proceed to the last step.
 - If, for some reasons, the set mode is AP, power off MECHA, then power it on by pressing the  button for about 3 to 5 seconds and wait until  is shown on the display. Now press either , to set MECHA in STA mode, or , to set MECHA in AP+STA mode. (You can also change this setting on the *Configuration* page.)

- Now you can access the MECHA's UI on your computer's browser by entering the IP address shown on the controller display, like 192.168.2.104, in the browser address bar at the top of the window.

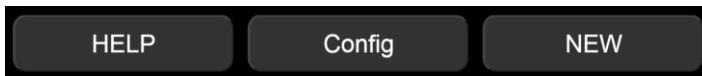
Test Using the UI

Some tests performed before using the C2's *Menu* are now performed using the User Interface. Please [access the User Interface](#) on your smartphone, for example, then access the *Row* page.

Tap the *[info]* button at the top of the *Row* page whenever you want to find out more details about the functions of the controls available on the User Interface.



At the same time, three links to some useful pages are displayed at the top of the page: a quick *help* page, the *configuration* page, and the *new* page.



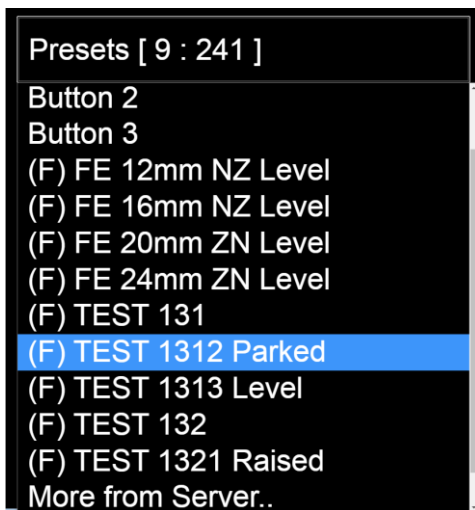
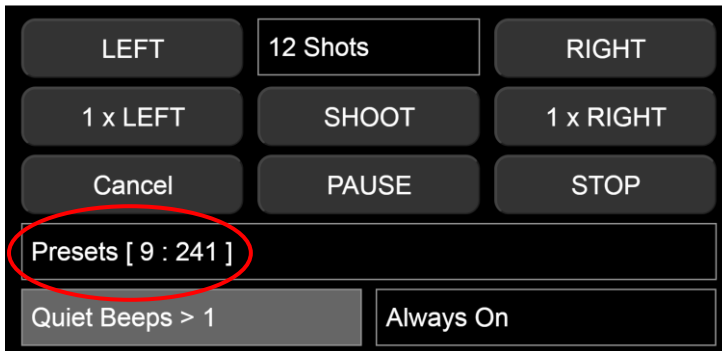
When using the User Interface, you can display all or only some of the controls. To see them all, select A3 from the select list next to the *[info]* button, which is the highest level of complexity for the interface. The other options are: S1, S2, S3, A1, and A2, where **S** means **Simple**, and **A** – **Advanced**.

Although C2 is designed to work for dual-axis applications, you may also use it for single-axis applications. Therefore, with C2, you can use both dual-axis (DAC) and single-axis presets.

UI Test – Parked, Level, Raised

To perform the same tests that you did before using the C2's (P) *Preset Menu*, proceed as follows using the UI buttons:

- On the *Row* page, tap *Presets* and select *TEST 1312 Parked* from the *Presets* list. This is the panorama executed before in the chapter Panorama Using C2's Menu (12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir). If necessary, use the left/right buttons to position the upper rail in the **parked** position.



To load the preset, tap the *[Load]* button if visible under *Presets* list. Otherwise, it means the UI complexity is *S* (Simple), and some buttons and options are not visible. The selected preset is already loaded, so you can proceed to the next step.




- Tap the *[LEFT]* button to execute the preset to the left or the *[RIGHT]* button to execute the preset to the right.



Do the same with the presets *TEST 1313 Level* and *TEST 1321 Raised*. Use the

  buttons to position the upper rail in the **level** or **raised** position.

Advanced Mode

 Note that some operations are only possible in Advanced Mode. Therefore, we recommend that you first ensure Advanced Mode is ON. If the C2's OLED display shows the rotators in use and IP address immediately after MECHA is powered on, it indicates that Advanced Mode is ON. See the [Simple Mode](#) section for details.



https://youtu.be/dj0_XltWV6w

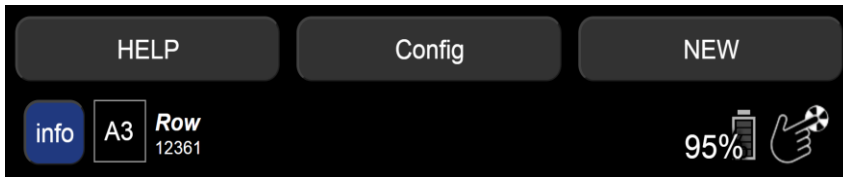
A tour of MECHA's Simplified User Interface

User Interface (UI)

UI Controls

In this chapter, we will explain the functions of the buttons and options available on the *Row* page. The *Ring* and *Turn* pages are similar to the *Row* page.

To access the User Interface, follow the instructions in the chapter [How to Access the UI](#), and then tap/click the *[Row]* button to access the *Row* page.

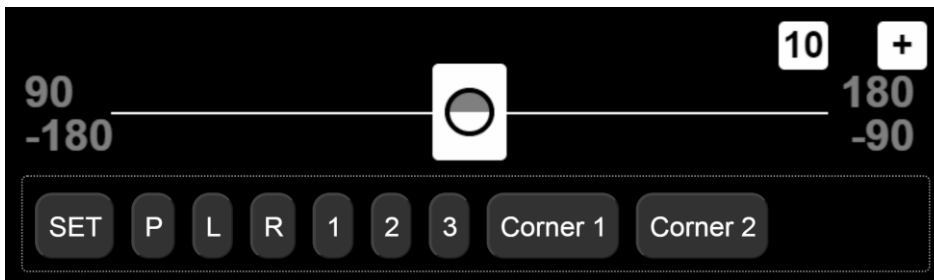


- Tap/click the *[info]* button at the top of the *Row* page to show descriptions for all the controls. At the same time, three more buttons are displayed at the top of the page – *[HELP]*, *[Config]*, and *[NEW]* – for accessing the following pages:
 - *Help* — Useful information and codes. See the [Current Codes List](#) at the end of this guide.
 - *Configuration page* — User: **admin**, and default password: **Mecha**.
 - *What's new?* — The page where you can find information about the current firmware version and the versions published so far.
- *Level of complexity* — Next to the *[info]* button is a list of options to set the level of complexity for the User Interface, from the simplest (*S1*) to the most complex (*A3*). Select *A3* to show all the controls.
- *Firmware version* — Under the *Row* label, note the current firmware version (for example, *(1)2250* in our example). Images shown in this guide may not be an exact representation of the current firmware version. Click this tag to access the *What's new?* page.

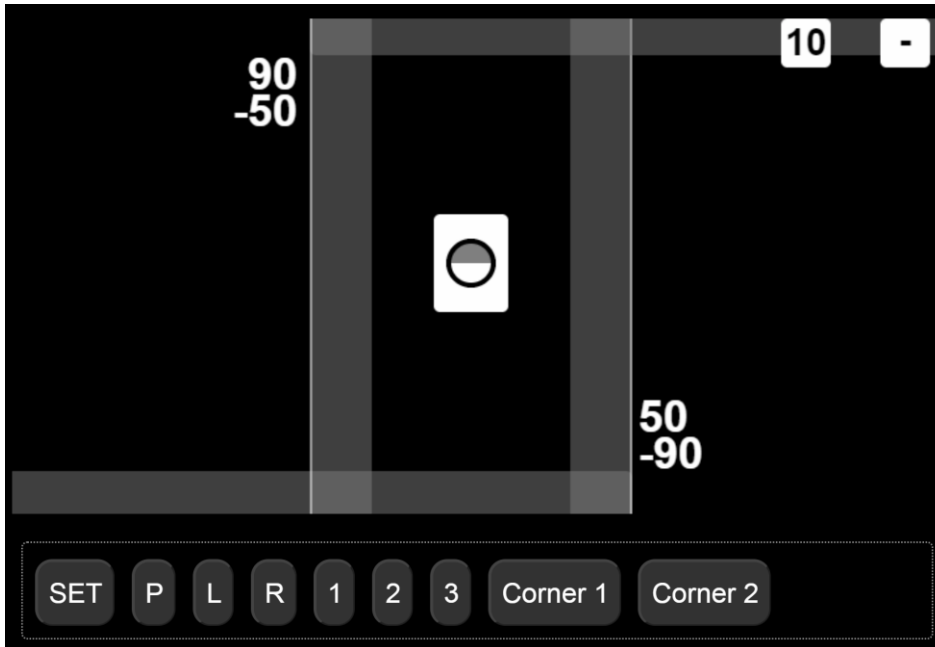
- *Battery voltage* — On the right side of the page, you can see the battery voltage. To display percentages instead of voltage, set the minimum and maximum voltage values on the *Configuration* page.
- *Hand symbol* — Toggles gesture mode. Tap the screen and drag to see how it works. Always ensure there are no objects near the robot, especially when using gesture mode.
- *Status Feedback* — In the next area, the *MECHA's ID*, *Motor/controller status*, *refresh rate*, *Current lower rotator*, *Current angle position* for both rotators, and *Current status* (shots remaining, position, repeat set) are displayed. The *Status Feedback* (SF) also reflects the tilt angle for the second axis. When scripting is used, yaw is shown on *Status Feedback* as well.



- At the right side of this area, note the *Current time*, *Current date or time remaining*, *Current rotation degree interval*, and *Seconds remaining in the current delay*.



- *Two-axis slider* — Only available in complexity levels A3 and S3 of the User Interface. It is a tool that allows you to perform common rotations and specify the extent of partial panoramas by setting the top-left and lower-right corners. The slider step can be changed using the precision button at the top of the slider. Click/tap the slider's plus button to expand the slider. The top-left and bottom-right corners, as well as the slider edges, are draggable and allow you to specify the size of a partial panorama.



<https://youtu.be/-nNGeY25Zlw>


Partial Panorama Using MECHA's Two-Axis Slider – C1 and C2 Controllers

Below is a link to a newer video where you can see that a preset created using the OLED menu can be launched from the User Interface. Additionally, a preset created using the two-axis slider can be launched from the OLED menu. MECHA executes a certain preset in the same way, whether it is launched from the User Interface or from the OLED menu.



<https://youtu.be/NJqz2dR2FTU>

OLED vs UI Partial Panorma Preset – MECHA C2 Controller

- *[SET/GO]* button — Before using the two-axis slider, specify the position of the upper rail of your panoramic head. Ensure the label of this button is *SET*, then click *[P]* if the position is Parked, *[L]* for Level, and *[R]* for Raised. MECHA does not know what position the rail is in, so it is necessary to specify it. Normally, you only need to specify this setting once per work session. However, note that this setting is lost when you press the  button on the

controller, so you must specify the position again afterward.

Specifying the position of your upper rail and positioning it in a certain position are two different things. Click the *[SET]* button and ensure its label becomes *GO*, then use the *[P]*, *[L]*, or *[R]* button to position the upper rail as needed.

- *[1] [2] [3]* — These buttons allow you to set three positions when the label of the first button below the slider is *SET*, and go to those positions when the label of the first button is *GO*.
- *[Corner 1]* button — Depending on the label of the *[SET/GO]* button, the *[Corner 1]* button allows you to set the top-left corner of a partial panorama to the current position of the slider handle or rotate the panoramic head to this position.
- *[Corner 2]* button — Depending on the label of the *[SET/GO]* button, the *[Corner 2]* button allows you to set the lower-right corner of a partial panorama to the current position of the slider handle or rotate the panoramic head to this position.

The controls shown in the image below are directly related to the current preset and settings. The current preset is *sa_7shots* in our example.

LEFT		7 Shots		RIGHT	
NPP Shots			Live NPP		
1 TRG	AF 0.01 sec	W:0 sec	B:0 sec	M:1	
E:0.25 sec	A:1 sec	51.43 °	x 1	Wait	
No Repeat		Single	7 RPM	16+128 uStep	
Medium Load		No Sensor			
1 x LEFT		SHOOT		1 x RIGHT	
Cancel		PAUSE		STOP	
sa_7shots					
Notes					
Load	Save	Rename	Delete	Import	Export
MAP	Probe	Template	goVM	Empty	>
Load 0		Load 1		Load 2	
Save 0		Save 1		Save 2	
				Load 3	
				Save 3	

- **[LEFT]** button — Shoots a 360° panorama counter-clockwise. In our example, the panorama consists of seven photos, with the first photo taken in the current position, followed by the second, 51.43° from the first, and so on.
- **Shots** — Number of shots around for a 360° row. Select the number of shots from the list, or select *Custom* and enter the desired number of shots or the focal length of the lens used followed by *mm*. The *mm2* notation is also accepted. For example, *28mm2* will compute the full spherical panorama for a 28mm lens, using *Repeat*. If the number of shots is 1, using the **[LEFT]** button, only one photo is taken followed by a rotation of 360° (return to the initial position) if the *Wait* option is selected. Useful when shooting (filming) 360°. If the *Rewind* option is selected, the rotation is 0° (no rotation).

- *[RIGHT]* button — Shoots a 360° panorama clockwise. It functions similarly to the *[LEFT]* button, but the rotation is to the right.
- *[NPP Shots]* button — Takes two shots for NPP (No-Parallax Point) check.
- *[Live NPP]* button — Displays instructions for determining the NPP along the lens axis using camera live view, as follows:
 - Use two vertical reference points with one far behind the other. Turn on live view mode and position the tripod to line them up at the image center. Use the grid and magnified view for greater accuracy.
 - Scroll left to see the reference points. Slide the lens back or forth to line them up, **being careful not to move the tripod!**
 - Scroll right to see the reference points. Carefully slide the lens back or forth to line them up, if needed.
 - Check if the reference points are still perfectly lined up at the image center. Nudge the tripod to line them up, if needed.
 - Check if the reference points are lined up to the same extent as in the previous step. Carefully adjust to achieve similar alignment.
 - End of Live NPP procedure. Repeat the process to confirm alignment, if needed.

1 TRG	AF 0.01 sec	W:0 sec	B:0 sec	M:1
E:0.25 sec	A:1 sec	51.43 °	x 1	Wait
No Repeat	Single	7 RPM	16+128 uStep	
Medium Load	No Sensor			

- *TRG* — Number of camera trigger signals per position. Select zero if no camera trigger signal is needed. When using automatic exposure bracketing in continuous shooting or self-timer mode, MECHA treats it as one camera trigger signal. In our example: one camera trigger signal is generated. Negative values can be used for simulation purposes, meaning that there will be no *AF* or *E* signals, but only the delays and durations set.

<https://youtu.be/dPz3iTjweY>

Using MECHA Only for Rotation

<https://youtu.be/rDNxe3lykf0>

Settings for Bracketed Photos – MECHA C1 and C2 Controllers

- *AF (Auto-Focus)* — Duration of the AF signal time; for example, 0.05 seconds. If the value is negative, the AF signal will be ON during the entire image sequence. In order to trigger the camera, for some Sony cameras, you have to select the MF option or set a non-zero AF value, even if the camera focus is set to manual.
- *W (Wake)* — Duration of the signal for camera wake-up. If the value is negative, the delay will be forced even when the camera is ON, before each sequence begins. This will also force a *B (Before)* delay in case of *B: not zero*. A small negative value, under 1 second – for example, *W:-0.9 s* or *W:-0.1 s* – will trigger the *Wake* signal, which is a focus signal, before every position instead of only at the beginning of a session. This is useful for moving out of the camera's view.
 - When *W* delay is negative, *B* delay is referenced to the MCU's clock rather than an added delay. For example, in time-lapse sessions, with *W:-0.001 s* and *B:5 s*, the result will be a shot at every 5 seconds. If movements are executed, the value of *B* needs to be large enough to cover the time taken by the move.
 - Also, when *W* delay is negative, a log file – */intervals.txt* – will be produced, with all the intervals, in milliseconds (ms) between shutter triggerings done by MECHA.
- *B (Before)* — The delay before each triggering sequence. If the value is negative, up to 2 seconds will be used for Mirror Lock Up.
- *M (Modifier of Exposure)* — The Exposure Modifier is a multiplier for the Duration of the shutter button signal. It can be entered as a list of multipliers (for example, 1,0.5,2 for normal, half, and double exposure time in case of 3

TRG) or as EV values (for example, -0.7EV for under, normal, over or 0.7EV for normal, under, over). In the latter case, it will automatically extend to the number of *TRG*.

If the modifier starts with B, such as B-2EV, or B1, or 1,0.5,2, “Bulb” mode will be assumed.

- *E* (Exposure) — Exposure options.
 - *Custom, E:0 sec, E:0.25 sec...* — Duration of the shutter button signal. For example: 3 or 0.5*3 for progressive half Exposure, or 2*3 for progressive double Exposure in a set. These can be entered as custom values. Values can also be entered as fractions (for example, 1/100).

E:SHT C.
E:SHT C1

- *E:SHT C., E:SHT C1* — Shutter release confirmation options.



Working principle

Many cameras will output a flash trigger signal for each shutter release. This signal can be fed back to MECHA via the AUX port as a shutter release confirmation. However, there are some cases where flash output is disabled, and hence no shutter release confirmation is available. For example:

- Some camera manufacturers have decided that flash should not be used in certain scene modes.
- Some cameras will output a flash signal at the PC Sync port but not at their flash shoe in some modes.
- Flash is disabled in electronic shutter mode for cameras with slow sensor readout. This includes the Silent Mode.
- Even if flash is available in electronic shutter mode, it may be disabled for certain shutter speeds.

It is recommended to use mechanical shutter mode for maximum compatibility with the shutter release confirmation feature.



What are the advantages of using this feature?

With this feature enabled, MECHA ensures that the specified number of trigger signals are sent before moving to the next position. This prevents missing shots that can ruin the final panorama. It also greatly simplifies the time delay settings. MECHA automatically uses the shortest delay time. This is critical when light is changing quickly.

- *E:SHT C.* — If the *E:SHT C.* option is specified in a preset, set your camera to simple shooting mode before launching the preset. Also, set your camera to take pictures keeping in mind that, for each trigger signal sent to your camera, MECHA will wait until one shutter confirmation is received through its AUX port via a PC Sync cable.
- *E:SHT C1* — Unlike the *E:SHT C.* option, if the *E:SHT C1* option is specified in a preset, set your camera to continuous shooting mode. MECHA will send only one trigger signal, regardless of the TRG value, and wait for a number of shutter confirmations equal to the TRG value before continuing with the next position in the preset. This is useful when you set your camera for bracketing in continuous shooting mode. As a result, the shutter button only needs to be pressed once, and the camera will automatically capture the entire bracketing set as quickly as possible. Please note that some cameras may revert to single shooting mode when the exposure times are long.



MECHA uses two types of shutter release confirmation. By default, it uses the new type, as the **Use New Shutter Confirmation** option is enabled on the */config* page. Depending on the camera used, the shutter release confirmation may not work with this option enabled. We recommend disabling it in this case. If this option is disabled, MECHA will use the old shutter confirmation type (*Fast Shutter Confirmation*).

For MECHA Dual Axis Combo, if your camera is connected to the vertical MECHA (or MECHA-V), and the confirmation is via the AUX Port of MECHA V, the **Shutter**

Confirmation via other MECHA needs to be enabled on the */config* page of horizontal MECHA (or MECHA-H).



<https://youtu.be/X25c13rsBYE>

Shutter Release Confirmation Basics – MECHA C1 and C2 Controllers

To use the shutter release confirmation feature, use the **Mecha 3.5mm to Male PC Sync Cable** (for shutter release confirmation, F9981) to connect the Aux Port of the MECHA C1 or C2 Controller to the PC Sync Port of your camera.

If your camera does not have a PC Sync Port, then you need a **Flash Shoe to PC Sync Adapter** (such as F9982, F9983, or F9984).

Shutter release confirmation and IR remote control are possible simultaneously by using the **IR Remote Commander and Receiver for MECHA** (F9988). In this case, connect the receiver to the Aux Port of the C1 or C2 Controller used, and connect the shutter release confirmation cable (F9981) to the female jack of the receiver.



Use the *E:SHT C1* or *E:SHT C.* option only if the shutter release confirmation test is successful (see code 32313< in the [Current Codes List](#)); otherwise, use the Button Confirmation instead: *E:BTN > C.* or *E:BTN > CT.*



1 — Mecha 3.5mm to Male PC Sync Cable




2 — Flash Shoe to PC Sync Adapter

3 — Receiver

4 — MECHA C1 Controller

5 — MECHA C2 Controller

E:BTN > C.
E:BTN > CT

- *E:BTN > C., E:BTN > CT* — Button confirmation options.
 - *E:BTN > C.* — MECHA will wait, after any triggering, for confirmation with the  button on the controller or NN IR Remote to continue.
 - *E:BTN > CT* — MECHA will only wait for *TRG* confirmations with the  button on the controller or NN IR Remote, then it will use the learned delay(s) to finish the preset.
- *A (After)* — The delay after each triggering sequence or individual triggering, in milliseconds. If the value is negative, there will be a delay after each shutter actuation.
- *Degrees of rotation* — The rotation angle between two consecutive positions in a sequence, specified for *[N x LEFT]* or *[N x RIGHT]* buttons. The rotation angle is updated automatically, simultaneously with the number of *Shots*. However, if the rotation angle is changed, the number of *Shots* does not change. Use this feature when you want to take a certain number of shots rather than an entire panorama. Specify this number in the next field (*x N*), and execute the sequence using the *[N x LEFT]* or *[N x RIGHT]* button. The value for the *Demo* option is 3600°.
- *x N* — The number of moves (*N*) for the *[N x LEFT]* or *[N x RIGHT]* button.
- *Wait/Rewind* — These options tell MECHA to *wait* after the last shot or to *rewind* to the initial position. *Rewind* is useful if there are cables attached or when shooting partial panoramas and time-lapse photography.
- *Repeat* — Delay in seconds until the shooting sequence will be repeated automatically. For example, 300 will delay the repeat of the sequence for 5 minutes. A number followed by an asterisk before the delay specifies how many times MECHA should repeat the shooting sequence. If it is omitted, the sequence is repeated only once. 4*300 means that the sequence will be repeated 4 times with a delay of 300 seconds (5 minutes). You can press the  button to bypass the delay. You can also set a very short delay – such as 1 – but not zero. Specify 0 (zero) or *No Repeat* if no repeat is needed. If the

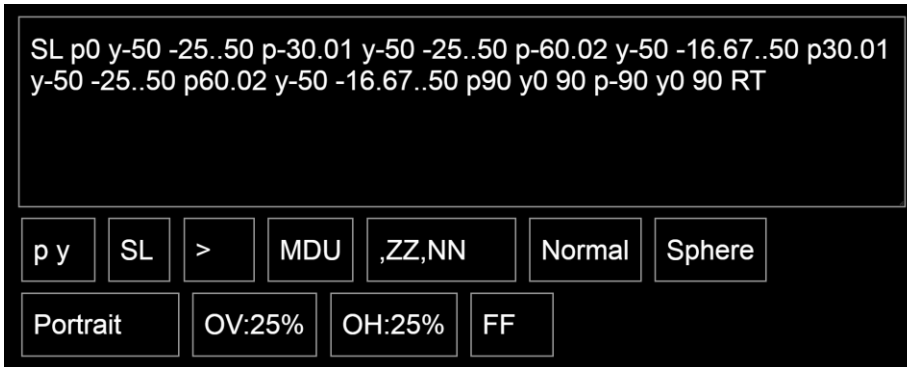
delay is negative, for example -300, the seconds are counted from the moment when the preset execution starts, not from the end. And if the absolute value of the delay is shorter than the preset execution time, the repeat will occur as soon as the preset execution ends.

- *Single / Dual / Scripted / Cloned / Mirrored* — Select *Single* for single-axis applications. However, you can select *Dual* even if there are no instructions for the second axis. *Scripted* is valid for both types of applications. See [MECHA's Simple Scripting \(MSS\)](#) for details about the *Scripted* option. *Cloned* and *Mirrored* are options that allow the execution of a certain preset by multiple MECHAs. See the chapter [Chain of Cloned MECHAs](#) for more details.
- *Speed* — Speed is denoted by Revolutions Per Minute (RPM). Select an option from the list or enter a value via the *Custom* option.



If the *Speed* value is too high, the device may stop or move too fast. In this case, be prepared to stop it by clicking/tapping the *[Stop]* button.

- *uStep* — Micro-stepping value, simple or combined; for example, different values for acceleration and constant-speed regions.
- *Load* — The options for *Load* are: *Custom*, *Light*, *Medium*, *Heavy*, and *Ring*. These are optimized motion profiles for a rated load. We encourage you to try them all to see which one is best for the camera and lens you are using or for what you want to do. You may prefer the *Heavy* option even if you use a light camera.
- *Sensor* — Depending on the option selected from the list, the movement will stop or cancel when the sensor is triggered, or there will be no action if the *No Sensor* option is selected. The Sensor options are only available for E2 and P1 rotators.



- *Script* field — The *Script* field becomes visible if you select the *Scripted* option from the *Single / Dual / Scripted* list. MECHA automatically generates a script if you provide a focal length instead of a number of shots. The focal length provided should be up to 100mm. When generating the script, MECHA takes into account the script settings (located below the Script field) and the corners of the panorama (specified using the two-axis slider). For a focal length of 28mm, MECHA generates the script shown in the image above. The script controls the movements and has priority over the *script settings*. The script updates automatically when the *script settings* are changed, but the *script settings* do not change if you edit the script manually.

Script Settings

- *py / TxN* — Script type. MECHA generates a script with pitch and yaw conventions (*py*, as in the image above) if you specify corners using the two-axis slider. You can also manually enter a *py* script in the Script field. The script type can be changed to *TxN*, which stands for tilt and number of positions for each tilt. A dialog box will appear asking you to remove the corners.



<https://youtu.be/1CtoUffncGE>

Tilt and Number of Positions vs. Pitch and Yaw – MECHA C1 and C2 Controllers

- *SL / SP / SR* — Starting position: Level, Parked, Raised. The upper rail should be in the selected position before launching the preset.

- $\langle ? \rangle / > / <$ — Direction of rotation: unspecified ($\langle ? \rangle$), to the right ($>$), to the left ($<$). In the User Interface, the direction of rotation is determined by the button used to launch the preset – *[RIGHT]* or *[LEFT]* – regardless of this setting. Instead, this setting is important when launching the preset from C2's OLED (P) *Preset Menu*.
- *MDU / MUD / UMD ...* — Row order, where *M* stands for Middle, *D* for Down, and *U* for Up. When one of these letters is missing, the corresponding rows will not be included in the script.
- *,ZZ,NN ...* — Zenith and nadir shots can be selected from the list or specified manually in the script.
- *Normal / Zigzag* — This setting represents the order of positions on a row, from left to right (*Normal*) or in a zigzag pattern (*Zigzag*).
- *Sphere / Grid* — Mapping type.
 - *Grid*: The same number of positions on every row.
 - *Sphere*: A larger number of positions on the middle row.
- *Portrait / Landscape* — Camera orientation.
- *OV* — Vertical overlap. Select the vertical overlap first, then select the horizontal overlap if it differs from the vertical overlap.
- *OH* — Horizontal overlap.
- *FF / 1.5x ...* — Crop factor. Values: 0.64x, 0.79x, FF (full frame), 1.3x, 1.5x, 1.6x, 1.7x, 2.0x, 2.7x, 3.9x, 4.5x, 4.8x, 5.6x, 6.0x.



- *[N x LEFT]* button — Shoots and rotates counterclockwise for *N* positions with the degree interval specified above, regardless of the number of shots specified in the *Shots* field.

For example, if you want to take three shots 45° apart to the left, set the degrees of rotation to 45°, and the number of positions to 3 (as shown in the

image below), and click the *[3 x LEFT]* button.



The screenshot shows the MECHA C2 Advanced Mode UI with the following settings:


- 1 TRG
- AF 0.01 sec
- W:0 sec
- B:0 sec
- M:1
- E:0.25 sec
- A:1 sec
- 45 °
- x 3
- Wait
- No Repeat
- Single
- 7 RPM
- 16+128 uStep
- Medium Load
- No Sensor
- 3 x LEFT
- SHOOT
- 3 x RIGHT

- *[Shoot]* button — Shoots the number of photos in a set for a single position. In our example, one photo (*1 TRG*) is taken. Use this feature when you want to take some photos in a certain position without any rotation.
- *[N x RIGHT]* button — The same as the *[N x LEFT]* button, but shooting and rotation are done clockwise.


The screenshot shows the bottom control buttons of the MECHA C2 UI:

- Cancel
- PAUSE
- STOP


- *[Cancel]* button — Executes a smooth stop and rewind to the initial position, where the preset started.
- *[PAUSE]* button — Pauses the current running preset. Click/tap again this button to continue.
 - The code **21<** toggles MECHA's pause mode, the same as clicking the *[Pause]* button on the UI or IR Remote.
 - While MECHA is in pause mode, the text "PAUSE" is shown on C2's display.
 - If MECHA is in pause mode and a preset is started, MECHA will pause before every position, resulting in step-by-step movement, and the text "STEP BY STEP" is shown on the C2's display.
 - When MECHA runs a preset and is paused, you can press , or  on IR Remote, or *[PAUSE/NEXT]* on UI, to continue to the next position.

- If, instead,  is pressed on C2 or on IR Remote, MECHA will continue to the next position and switch on/off the step-by-step mode.

The above allows both:

- 1. Starting a preset in step-by-step mode, then switching off the step-by-step mode when it is no longer needed, thus the preset will continue automatically.
- 2. If a preset is paused by remote/UI/script, then pressing  will advance and switch on/off the step-by-step mode.

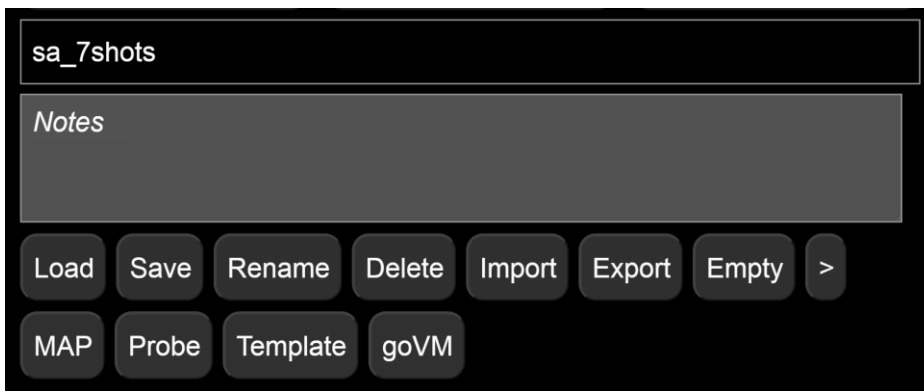
A possible application is a spherical panorama where certain areas need to be done step by step, and which areas depend on events in the field.

During a pause, by pressing  button on the IR Remote or *[SHOOT]* on the UI, MECHA will trigger the number of shots specified by *[TRG]* in presets. This can be used for extra shots at a particular position.



Beginning with firmware version (1)2361, in scripts you can specify a number of seconds from 1 to 254 before the pause, after which the preset will continue automatically.

- *[STOP]* — Emergency stop.



- *Presets list* — This list contains all presets, both created and downloaded from the server.

- The names of presets downloaded from the server start with (s), indicating they are not saved yet. You can load and save the presets you want to keep.
- The option *More from Server...* allows you to download presets from the server.
- *Notes* field — Use this field to make some notes about the current preset; they will also be saved when you save the preset.
- *[Load]* button — Loads the selected preset from the *Presets* list. In our example, the current preset is sa_7shots.
- *[Save]* button — Allows you to save the current preset with the same name (overwriting it) or with a different name.
- *[Rename]* button — Allows you to rename the selected preset.
- *[Delete]* button — Deletes the selected preset.
- *[Import]* button — Imports a preset and displays it in the *Presets* list. It can also import multiple presets at once if an all_presets(..).mps file is provided during import. Additionally, on the /row and /turn pages, shooting patterns can be imported from the following programs: (1) **PTGui**, if the project is exported as a PTGui 10 project (.pts), (2) **Hugin** (.pto, .txt), (3) **Autopano** (.xml file with Papywizard conventions).
- *[Export]* button — Exports the selected preset, or exports all presets if the *Presets* option is selected.
- *[Empty]* button — Empties the *Presets* list without deleting the presets.
- *[>]* — Button to set the rotation type, allowing you to switch between clockwise and counterclockwise rotations, regardless of the direction of rotation set in a preset. The *[MAP]*, *[Probe]*, and *[Template]* buttons will produce files according to the rotation type specified with this button.
- *[MAP]* button — Downloads the *map* PTGui/Hugin file for a full preview of the panorama with the current preset as the shooting pattern. Use this button after all the settings are set as desired.
MECHA will also offer to download a *map.zip* file containing three small *.png* images required for preview in PTGui/Hugin. The images are the same for any map, so you only need to download the archive once.

A high-resolution set is also available here, with *Mecha* as the zip password:
<https://www.nodalninja.com/MECHA-MAP/map-png.zip>

Download the archive in the same folder as the *map.pts* file, then copy the images and paste them next to the *map.pts* file. You can use your own images if you prefer. Double-click the downloaded *map.pts* file to open it with PTGui/Hugin and preview the panorama.

- *[Probe]* button — Downloads the *probe* PTGui/Hugin file for a partial preview of the panorama with the current preset as the shooting pattern. This allows you to study and refine the overlap. Save it in the same folder as the *map.pts* file. It uses the same set of images, so you don't need to download the image archive again. Open the *probe* PTGui/Hugin file and check if the image overlap is correct.

These checks are especially helpful when working with a large number of images to ensure that the preset settings are correct.

- *[Template]* button — Downloads the *template* PTGui/Hugin file for the current preset, which can be applied to a real set of images. This template also contains the focal length.









<https://youtu.be/5e0RxEIFB8>

MECHA's Map-Probe-Template Files for PTGui – Basics

- *[goVM]* button — Downloads a script (a *goVM.py* file) for the upcoming Virtual MECHA. Until Virtual MECHA is available, this file can also be used for support and demo purposes.



- *[Load 0]* button — Loads the default preset, which was saved using the *[Save 0]* button.
- *[Load 1]* button — Loads the preset assigned to the  button using the *[Save 1]* button.

- *[Load 2]* button — Loads the preset assigned to the  button using the *[Save 2]* button.
- *[Load 3]* button — Loads the preset assigned to the  button using the *[Save 3]* button.
- *[Save 0]* button — Saves the current preset as the default preset, which can be loaded using the *[Load 0]* button.
- *[Save 1]* button — Saves the current preset and assigns it to the  button, and can also be loaded using the *[Load 1]* button on the User Interface.
- *[Save 2]* button — Saves the current preset and assigns it to the  button, and can also be loaded using the *[Load 2]* button on the User Interface.
- *[Save 3]* button — Saves the current preset and assigns it to the  button, and can also be loaded using the *[Load 3]* button on the User Interface.



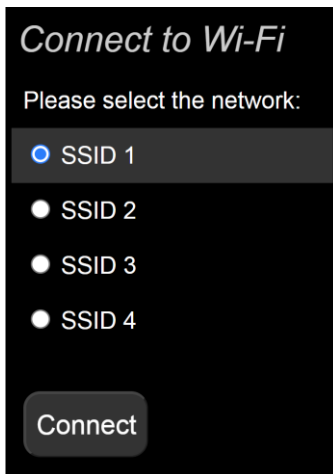
- *[Reboot]* button — Restarts MECHA, similar to restarting a computer.
- *Default page at start* — MECHA's home page, or start page, can be one of the following pages: *Row*, *Ring*, or *New* (like in our example). Select the desired option from the list.




- *Beep Volume* — A value from 0 to 250, which can be entered directly via *Custom* or selected from the list.
- *Power Saving Mode* — This setting allows you to configure MECHA to shut down automatically after a certain number of minutes of inactivity or keep it always on. You can also adjust this setting on the *Configuration* page. It takes priority over other options and is displayed on a gray background in the UI.
- *[Go to Ring]* button — Accesses the *Ring* page and alternates with *[Go to Row]*.
- *[Shut Down]* button — Shuts down MECHA in 20 seconds. Press *[Cancel]* or *[Stop]* to cancel.

• **Connect to Wi-Fi**

[Connect to Wi-Fi] button — Initiates the process of connecting to a Wi-Fi network to use MECHA in STA (Station) mode or for firmware updates. Available networks are displayed as shown in the image below.



If you have successfully connected to one of the networks in the list, it is displayed on a gray background. You can then connect to it using the stored password instead of typing it.

MECHA will show the connection status on the display when trying to connect to Wi-Fi in STA or AP+STA mode. The process can be stopped by pressing the  button if you know that the targeted Wi-Fi is out of range.



Wi-Fi Test

The `/wifitest` page, accessed from a device connected to MECHA, shows the Wi-Fi connection quality on a scale of 0 to 9, as shown in the image below.

The dots represent the quality as follows: *Lowest*, *Recent Low* (when available), and *High*. The scale can be reset by double-clicking it.

For better accuracy, it is recommended to open only this page in your browser.



- `[Wi-Fi Off]` button — Turns Wi-Fi off. The device requires a power cycle to turn Wi-Fi back on.
- `[More or Less...]` button — Toggles the display of additional settings.

Translate MECHA's UI Into Your Own Language

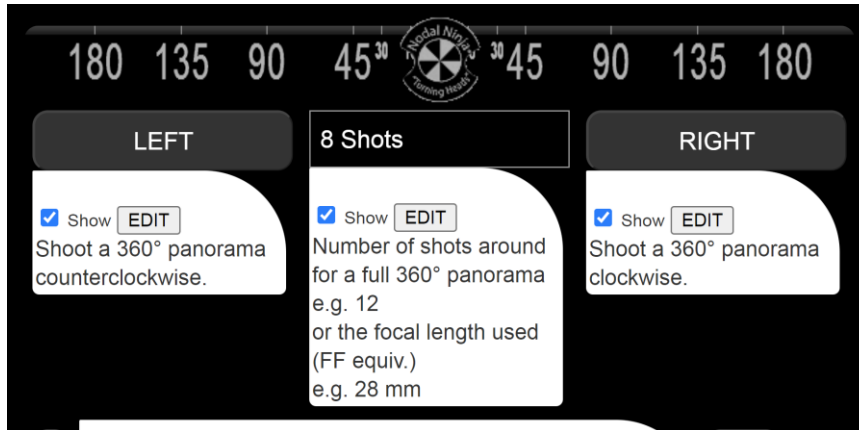
Although this feature is designed to allow users to translate the User Interface into their own language, it can also be used to add notes to the existing descriptions of the UI controls.

- To enter UI control edit mode:

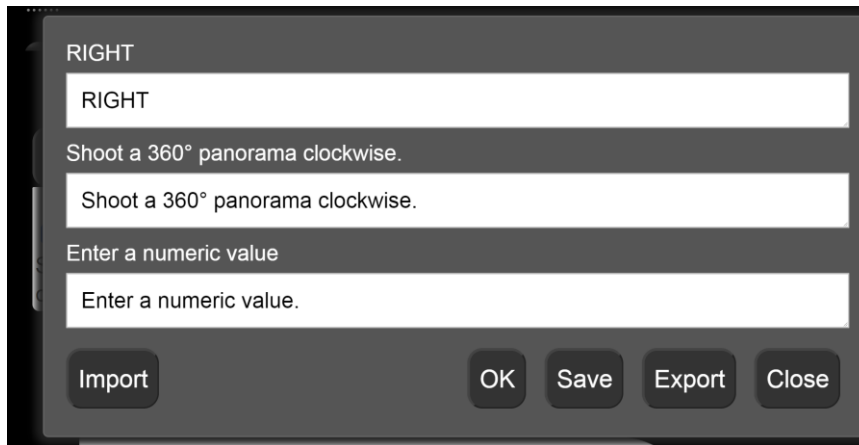
- Click the UI `[info]` button:



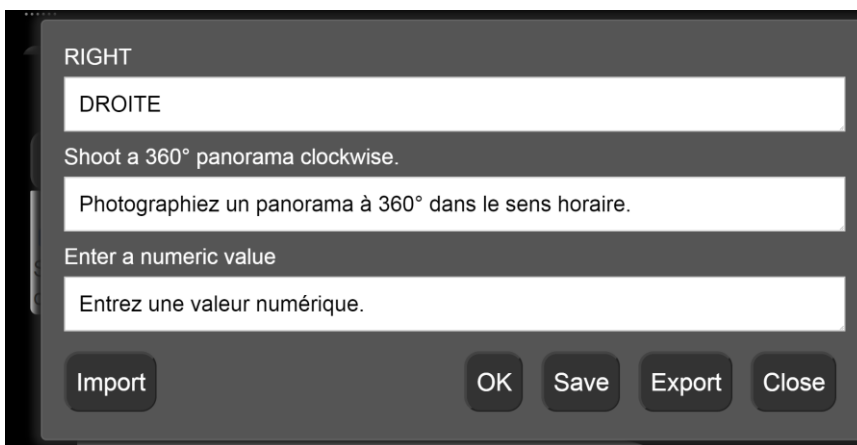
- Then click the `[EDIT]` button corresponding to the control whose description you want to edit:



- A window will be displayed with fields in which you can enter your own translation or notes.



If the UI control is a button type, enter a button caption in the first field. For example, the French description of the *[RIGHT]* button could be:



The translation window has its own controls:

- *[OK]* button — Allows you to preview the changes made without saving them.
- *[Save]* button — Saves all the changes made to the User Interface.
- *[Export]* button — Allows you to download the *lang.txt* file, which contains the descriptions of all the UI controls (for bulk editing in a text editor or for sharing with other users).
- *[Import]* button — Allows you to upload to MECHA a file named *lang.txt* to be used for translating the User Interface.
- *[Close]* — Use this button to close the translation window.

Troubleshooting

By default, the translated version of the User Interface is displayed. If, for some reasons, you need to switch to the original version, add **?en** to the page URL, for example:

```
192.168.8.1/row?en
```

The translated version of the User Interface (the *lang.txt* file) can be deleted by accessing this page:

```
192.168.8.1/delang
```

After deleting the *lang.txt* file, the original version of the User Interface will be displayed.

In STA mode, you need to replace the static IP address above (192.168.8.1) with the dynamic IP address corresponding to the computer or device you are using.



Configuration Page

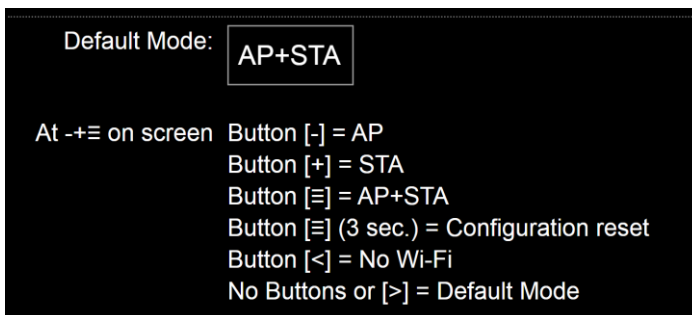
The *Configuration* page can be accessed at `192.168.8.1/config`, using the following username and password:

User:	admin
Password:	Mecha



At the top of the *Configuration* page, there are links to access the *Ring* page (for single-axis applications), the *Row* page (for dual-axis applications), and the *Turn* page (for turntable applications – work in progress). These pages are quite similar and, as a result, are not presented separately in this user guide. For single-axis applications, you can access either the *Ring* or *Row* page.

Default Mode

Default Mode — The possible values for *Default Mode* are: AP, STA, AP+STA, or No Wi-Fi. The *Default Mode* set here will be the current mode for MECHA after powering on. However, the *Default Mode* can be changed by pressing the menu button, , at the beginning of the starting sequence when  is shown on the display.



Wi-Fi Reset

Press and hold the menu button, , for 3 seconds at  on the display to reset the following settings to their default values:

- AP Mode SSID → MECHA-ID
- SSID password → 12345678
- *Configuration* page password → Mecha
- Firmware update hotspot password → 87654321
- UI Password → none
- Trusted IP → none
- Wi-Fi Power → 100
- Default Mode → AP
- STA Mode → no settings (auto)

This is very useful if you have forgotten your set passwords and cannot access, for example, the *Configuration* page or the User Interface.

Also, if a hotspot named M-XXXXXX (where XXXXXX is the MECHA ID) and password 12345678 is found, the firmware will be updated using that hotspot. If MECHA fails to boot, please activate the hotspot.

[*Set Wi-Fi Power*] button — Sets the value for Wi-Fi power. The maximum value for Wi-Fi power is 100. In our example (see the image below), it is set to 100.

AP Mode SSID:	MECHA-C2R1B
SSID Password:	12345678
MECHA-UPDATE Hot-Spot Password:	87654321
[admin] Password:	Mecha
UI Password:	max. 20 chars.
Trusted IP(s):	
Using: 192.168.2.187	

AP Mode SSID — The name of MECHA's network. This is how it is displayed in the list of available networks on your device.

SSID password — The default SSID password is **12345678**.

MECHA-UPDATE Hotspot Password — It is **87654321** by default.

[admin] Password — The default password for the *Configuration* page is **Mecha**.

UI Password — Allows you to prevent someone from changing the settings on the *Configuration* page. You may want to allow someone to access your interface but not change the settings.

Trusted IP(s) — The IPs added to this field will not be restricted in any way when accessing MECHA. Add the IPs of your personal devices that you use to connect to MECHA.

Using — The IP address of the current device connected to MECHA. In our example, it is 192.168.2.187.

STA Mode

STA Mode:	(no values for auto)
Static IP:	<input type="text"/>
Subnet:	<input type="text"/>
Gateway:	<input type="text"/>
DNS:	<input type="text"/>

Static IP — Remember that the IP address to access the MECHA's User Interface on your computer is dynamic and changes from time to time. Enter a dynamic, available IP address in the *Static IP* field to make it static.

You can ignore the *Subnet*, *Gateway*, and *DNS* fields if you do not know what information to provide.

Fixed Settings

Fixed Settings — Settings that override the corresponding settings on the *Row/Ring/Turn* page. For example, if the *fixed Motor Speed* is set to 7, the value provided via the preset will be ignored, and MECHA will use 7 RPM as the speed.

Fixed Settings: If you want a setting to be taken from presets or UI (default) leave its field empty. The values set here will have priority over those in UI (which will have gray background)	
AF:	<input type="text"/>
W:	<input type="text"/>
B:	<input type="text"/>
M:	<input type="text"/>
E:	<input type="text"/>
A:	<input type="text"/>

Motor Speed [RPM]:	
Micro-stepping: e.g. 16 or 16128	
Motion Profile:	
BEEP:	1
Power OFF after:	

Power OFF after — If this field is not empty, the value specified here tells MECHA to power off after a period of inactivity equal to the number of seconds specified.

Power OFF after:	1	sec. 1 = No Power OFF
------------------	---	-----------------------

Power OFF after field (second field) — Refers to the period of time immediately after powering on MECHA, when no presets are executed. Value 1 means *No Power OFF*.

Rotator Settings

If you use only one rotator, fill in the fields for Rotator 2 with the data for Rotator 1.

The rotator connected to the C2 Controller via the lower cable is Rotator 1 (normally, this is the lower rotator). The rotator connected to the C2 Controller via the upper cable is Rotator 2 (normally, this is the upper rotator).

Rotator 1:	P1
<input type="checkbox"/> Inverted	
Backlash 1:	0
Rotator 2:	E2
<input type="checkbox"/> Inverted	
Backlash 2:	20

Rotator 1 — Set the **lower** rotator in use by selecting an option from the list, or using the *C7₀ ROTATOR 1...* option in the *OLED (C) Config Menu*, or using the following codes: **13131<** for E1, **13132<** for E2, and **13121<** for P1. The *AUTO* option enables the automatic detection of the rotator type for the lower rotator.

Inverted — Check this checkbox if, for a particular reason, the rotator needs to have all its movements in the opposite sense of rotation (for example, when mounted under a turntable).

Backlash 1 — If the value needs to be entered manually instead of using the automatic procedure, for E1 and E2 rotators it is around 21, and for P1 rotator the value is 0 (zero). It is recommended to use the automatic procedure for better results if the conditions to detect the small movements are met. Please see the [code 12321<](#) (Backlash compensation calibration) for more details. Alternatively, you can use the *C7₂ BACKLASH 1 COMPENSATION* option in the *OLED (C) Config Menu*.

Rotator 2 — Set the **upper** rotator in use by selecting an option from the list, or using the *C7₁ ROTATOR 2...* option in the *OLED (C) Config Menu*, or using the following codes: **23131<** for E1, **23132<** for E2, and **23121<** for P1. The *AUTO* option enables the automatic detection of the rotator type for the upper rotator.

Inverted for upper rotator — Same as *Inverted for lower rotator*.

Backlash 2 (for upper rotator) — Same as *Backlash 1* for **lower** rotator. The backlash compensation calibration code is **123212<**. Alternatively, you can use the *C7₃ BACKLASH 2 COMPENSATION* option in the *OLED (C) Config Menu*.

☐ Less Noise for E rotator(s)

Less Noise for E rotator(s) — Check this checkbox to reduce the noise from the E rotators. By eliminating the accelerated part of the motion profile, the gear will produce less noise in some cases. The motion profile is constant at the speed set for the arrow buttons (*Arrow buttons Speed [RPM]*). We recommend setting various values for the speed of the arrow buttons and testing to determine the required value for an acceptable noise level. The corresponding code is **2121<**, and the option in the OLED Menu of C2 is **C8₆** (that is, the *(C) Config Menu*, page 8, option 6). Disabled by default.

☐ Set Low Current if using E2 rotator(s).

Set Low Current if using E2 rotator(s) — This affects rotator power, and you do not need to check this checkbox unless the support team recommends it. Disabled by default.

Buzzer PWM and Start Page

1 Set Buzzer PWM

Start Page: new

Buzzer PWM values — Range from 1 to 255 and do not necessarily refer to sound loudness. We recommend trying a few values to find your preferred setting.

Start Page — Can be *New*, *Row*, or *Ring*, and can also be set on these pages.

IR Settings and more

☐ Enable i2c on Aux Port.

Enable i2c on Aux Port — Upcoming feature.

☒ Use New Shutter Confirmation

Use New Shutter Confirmation — It will be used in both shutter confirmation and the test of shutter confirmation (see the *C6₇ Shutter CONF. TEST* option in the *(C) Config Menu*). If the test fails, please perform the test again with this option disabled.

Shutter Confirmation Time Out (sec.) : 30

Shutter Confirmation Time Out (sec) — This is the maximum time MECHA waits for the shutter confirmation to occur (30 seconds by default).

☐ Shutter Confirmation via other MECHA

Shutter Confirmation via other MECHA — If enabled, the shutter confirmation will work via other MECHA for C2+ as well if a camera and PC-Sync cable are connected to another C1/C2 mounted on a hot shoe.

☒ Enable Fast Mode.

Enable Fast Mode — Leave this checkbox checked.

☐ Enable RAW Interface.

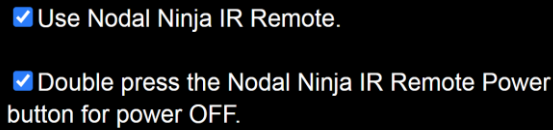
Enable RAW Interface — Check this checkbox to be able to access the RAW Interface (at <http://mecha-IP/i>, where *mecha-IP* is either the static IP address or the dynamic IP address, depending on how you connect to the MECHA's Wi-Fi network). It is disabled by default.

☒ Hide some controls in web UI when a motor is running.

Hide some controls in web UI when a motor is running — You will notice that some controls are automatically hidden so you can more easily find the important ones – such as *[STOP]* and *[PAUSE]* – while the motor is running. This feature is enabled by default.

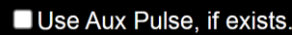
☐ Use cache for UI translation.

Use cache for UI translation — Enable this option to make the UI pages load faster. Disable it if the */row*, */ring*, or */turn* UI web pages do not load at all. It is disabled by default, which means slower loading of pages.



Use Nodal Ninja IR Remote — Check this checkbox to enable the use of the NN IR remote control. You must also connect the receiver to the MECHA's AUX port.

Double press the Nodal Ninja IR Remote Power button for power OFF — Check this checkbox to enable powering off MECHA by double-pressing the power button on the remote control.



Use Aux Pulse, if exists — Check this checkbox if your application requires the Aux Pulse file. The default setting is unchecked and can be ignored.



Custom Protocol on AUX Port — Allows the use of the auxiliary port for equipment that uses a specific protocol. With common remotes, a half-press is detected as 1A, and a full press is detected as 1A1S. These are the possibilities for a half-press:

- **045=1A** executes a preset whose name starts with 045 followed by a blank space.
- **-045=1A** executes a preset whose name starts with 045 followed by a blank space, but in the opposite sense of rotation.
- **HS=1A** – Home Set. A Home Set can also be done by pressing the power button.
- The following uses the inverted rotation for buttons if it is set:
 - **45.0=1A** rotates MECHA 45.0° from the Home position, absolute.
 - **-45.0=1A** rotates MECHA -45.0° from the Home position, absolute.
 - **^45.0=1A** rotates MECHA 45.0° from the previous position, incremental.
 - **^-45.0=1A** rotates MECHA -45.0° from the previous position, incremental.

- **H=1A** returns MECHA to the Home position set by HS or by the power button.



https://youtu.be/hYja_XtzRcA

Using Your Own Remote Control to Command MECHA – Part I





<https://youtu.be/5b6Ynstz77o>



Using Your Own Remote Control to Command MECHA – Part II

Reverse Direction of Rotation

Switch the 1 - 2 motor cables — Check this checkbox if, for some reasons, you want to connect the top cable of the controller to the lower rotator and the lower cable of the controller to the upper rotator.

- ☐ Switch the 1 - 2 motor cables.
- ☐ Switch the Up - Down rotation when done by MECHA buttons.
- ☐ Switch the Left - Right rotation when done by MECHA buttons.

Switch the Up-Down rotation when done by MECHA's buttons — Check this checkbox if you want to change the sense of up/down rotation when it is done manually using the ,  buttons. This is equivalent to code **2323<**.

Switch the Left-Right rotation when done by MECHA's buttons — Check this checkbox if you want to change the sense of left/right rotation when it is done manually using the ,  buttons. This is equivalent to code **2313<**.

Camera Settings

☒ Camera is in Portrait Orientation.

Camera is in Portrait Orientation — This checkbox is checked by default. Uncheck it if you want to specify that the camera is in landscape orientation. For example, if the number of shots around is *35mm* or *35mm2*, via *Custom*, the shooting pattern will be computed considering the camera orientation.

Preferred MSS pattern : **SL,MDU,ZZ,NN**

Preferred MSS pattern — This setting determines how MECHA automatically produces MSS scripts. By default it is **SL,MDU,ZZ,NN**.

Any MSS script consists of three parts: the first part refers to the starting position (**SL** – Start Level, in our case), and the third part indicates the number of images for zenith and nadir (**ZZ, NN** – 2 zeniths, 2 nadirs). MECHA will replace the middle part (**MDU**) with the computed script.

For example, if you want Start Parked instead of Start Level, a single zenith photo instead of two, and a pause before the first row, the *Preferred MSS Pattern* should be: **SP,PMDU,Z,NN**.

Typically, the following settings do not need to be changed. However, if these values are modified, regenerate the script on the *Row* page by entering the focal length in the *Shots* field via *Custom* (for example, *56mm*).

Default Focal Length :	50.00
Fisheye FOV:	0.00
Fisheye Max Width:	0
Fisheye Crop L,R,T,B:	
Fisheye Parameters a,b,c:	

- *Default Focal Length* — **50.00** (used unless otherwise specified). MECHA supports a focal length from 10 to 1500mm (FF equivalent), with the camera in Portrait or Landscape orientation.
- *Fisheye FOV* — **0.00**
- *Fisheye MAX Width* — **0**
- *Fisheye Crop L, R, T, B* —
- *Fisheye Parameters a, b, c* —

Sensor Height (portrait) :	36.00
Sensor Width (portrait) :	24.00
Overlap on Height :	0.25
Overlap on Width :	0.25

- *Sensor Height (portrait)* — **36.00**
- *Sensor Width (portrait)* — **24.00**
- *Overlap on Height* — **0.25**
- *Overlap on Width* — **0.25**

Arrow Buttons

Arrow buttons Speed [RPM]:	3.50
----------------------------	------

Arrow buttons Speed [RPM] — Rotational speed when a button is held down. If the *RPM* is zero, pressing MECHA's directional buttons will start the rotator slowly and accelerate it if the button is kept pressed. This is useful for precise alignment using the controller or IR remote buttons.

Arrow buttons Interval 1 [deg.]:	45.00
Arrow buttons Interval 1 Speed [RPM]:	3.50

Arrow buttons Interval 1 [deg] — Rotation angle for



Arrow buttons Interval 1 Speed [RPM] — Rotational speed corresponding to Interval 1.

Arrow buttons Interval 2 [deg]:	90.00
Arrow buttons Interval 2 Speed [RPM]:	3.50

Arrow buttons Interval 2 [deg] — Rotation angle for



Arrow buttons Interval 2 Speed [RPM] — Rotational speed corresponding to Interval 2.

Arrow buttons Interval 3 [deg]:	180.00
Arrow buttons Interval 3 Speed [RPM]:	3.50

Arrow buttons Interval 3 [deg] — Rotation angle for



Arrow buttons Interval 3 Speed [RPM] — Rotational speed corresponding to Interval 3.





Please see the [Simple Rotations](#) section for more details.

Interval 3 REAL Move ROT 1:	0.00
Interval 3 REAL Move ROT 2:	0.00

Interval 3 REAL Move ROT 1 — This is equivalent to the C7₄ i3 REAL MOVE 1 option in the (C) Config Menu.

Interval 3 REAL Move ROT 2 — This is equivalent to the C7₅ i3 REAL MOVE 2 option in the (C) Config Menu.

Leveling Amount [deg.]:	90.00
-------------------------	-------



Leveling Amount [deg] — The angle at which the upper rail is rotated after powering on if you press the  button when the display shows . Right after the rotation, this angle can be edited in the C2's menu, with the possibility to omit the confirmation of the change. This means that you can press the  button instead of pressing the  button as usual. The new value is only available during the current work session until MECHA is powered off.



Zenith Position [deg.]:	90.00
Nadir Position [deg.]:	-90.00

Zenith / Nadir Position [deg] — The default values are 90° and -90°. Other values may be useful for backlash reasons or to have a certain overlap. MECHA will use these values in scripts that contain Z and N.

Favorite Codes

FavCode 1	312
FavCode 2	21
FavCode 3	

The above settings allow you to assign two of your favorite codes to the  and  buttons, respectively, as follows:

- *FavCode 1* to the  button
- *FavCode 2* to the  button

These are shortcuts that allow a quick use of codes by long-pressing the corresponding button. See the [Current Codes List](#) at the end of this guide.

Battery Voltage



Battery min (V)	12.0
Battery MAX (V)	16.7

Battery min and *Battery MAX* — The minimum and maximum values for the battery voltage according to the technical specifications for the batteries you use.



For voltage values greater than zero, the battery level will be expressed as a percentage on the User Interface.

For voltage values lower than *Battery min*, you will see "**BATTERY**" shown on the controller display, after which **MECHA will enter *Pause mode*** if it is running a preset.



In *Pause mode*, you can use the  button to go to the **parked** position and the  button to go back to the previous position.

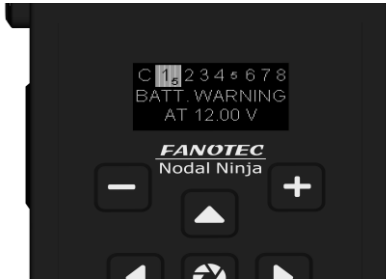


In C2 configurations, you cannot power the rotators directly via a power bank. If C2's batteries need to be changed during a shooting session, use the  button to go to the **parked** position, then use a power bank to power the controller. Change the batteries, then remove the power bank. To continue shooting where you left off, use the  button if necessary.

Set *Battery min* in the (C) Config Menu

Battery min can also be set in C2's (C) *Config Menu*. In this case, it is recommended to fully charge the battery before powering on MECHA, then

access this menu and adjust the value using the **−** and **+** buttons. Hold down the desired button to speed up the adjustment.



Why fully charge the battery before this adjustment?

This is because when you set *Battery min* as shown above, MECHA detects the current battery voltage and automatically sets it as *Battery MAX* to be able to compute the percentage.


Battery Voltage-Capacity Points optional, 10 voltage values for 5%,10%,20%, 30%...90%	13.52,13.76,14.1,14.3,14.44,14.56 ,14.84,15.2,15.64,16.08
<input checked="" type="checkbox"/> Loud Beep at Warning. Battery Extra Warning if Under Percent (%)	5
4-Cell Li-ion > 2500 mAh	4-Cell Li-ion ~ 2000 mAh

Battery Voltage-Capacity Points: optional, 10 voltage values for 5%, 10%, 20%, 30%...90% (empty by default) — This allows for fine-tuning the displayed battery capacity as a percentage. If left empty, the percentage will reflect the relationship between the voltage and the *Battery min* and *Battery MAX* values.


Loud Beep at Warning (checked by default) — If this checkbox is checked, MECHA will emit a loud beep when the battery percentage falls below the value specified in the *Battery Extra Warning if Under Percent* field.



The warning beep will be loud regardless of other beep settings.

When the **BATTERY** warning appears on C2's display, it can be canceled using the  button. A new warning will be displayed when the battery reaches 0%.



If the **0%** battery warning is canceled with the  button, there will be no more warnings, and the battery level will be shown as **voltage**.



If you continue to use MECHA despite these warnings, be aware that the battery will turn off automatically when it reaches a certain voltage.

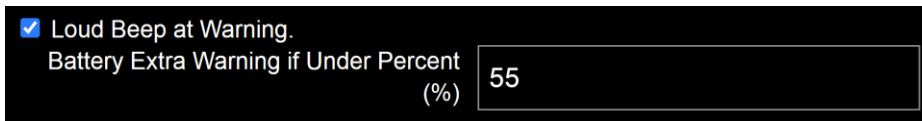
[4-Cell Li-ion > 2500 mAh], [4-Cell Li-ion ~ 2000 mAh] — Depending on the batteries used, click one of these buttons for common battery profiles to automatically fill in the fields mentioned above. Then you can edit the entered values if necessary. Click the *[Apply]* button to save the new settings.

How to test the **BATTERY** warning?

First, check the battery level on C2's display or find and select the *C1₅ BATTERY PERCENTAGE* option in the *(C) Config Menu*, page 1:



Then, enter any value greater than this in the field below:



Scroll to the bottom of the *Configuration* page and click the *[Apply]* button to save the new settings.

Now, the warning should be shown on C2's display:

BATTERY

Note that the warning will be displayed again when you click the *[Apply]* button as long as the above conditions are true.

More from Server, zLM, Firmware, OLED, BETA

☒ Show Factory (F) Presets in the Presets List.

☒ Enable "More from Server.." option for the Presets List when MECHA has connection to Internet.

☐ Enable the beta features.

☒ Use "zLM" - "zero Learning MECHA", if available for this MECHA
The availability is only after a request made via other ways.



☒ Check if there is any FW update available if MECHA has connection to Internet.



☒ Show FW number and the last part of IP on screen after boot.

The settings above have fairly self-explanatory descriptions: *Show Factory (F) Presets in the Presets list, Enable "More from Server"..., Enable the beta features, Use "zLM" – "zero Learning MECHA"..., Check if there is any FW update available..., Show FW number and the last part of IP on screen after boot.*

Use "zLM"... refers to a custom preset tailored to your specifications.

☒ Start with the Latest Preset Used selected on OLED Menu.



Start with the Latest Preset Used selected on OLED Menu (checked by default) — If enabled, MECHA C2 will start quickly and show the latest preset used, selected, and ready to be executed. Another preset can be selected instead by pressing the arrow buttons on the C2 Controller. Or one can exit from C2's (P) Preset Menu with the  button, or switch to the (C) Config Menu with the  button.

If not enabled, it is possible to go directly to the latest preset used by pressing the  button at  on the display.

Likewise, pressing one of the buttons , , or  will go to the regular start instead of the quicker access to the latest preset used.

See Show your own presets in C2's (P) Preset Menu for how to add the wanted presets to C2's (P) Preset Menu.

☐ Keep the same menu page on OLED at up-down buttons.

Keep the same menu page on OLED at up-down buttons (OFF by default) — If enabled, the  and  buttons will not change the page, thus will not cycle through all options from all pages.

☐ Allow DEGREES - REAL MOVE Switching.

☐ REAL MOVE.

Allow DEGREES - REAL MOVE Switching — If enabled, switching from C2₄ DEGREE MOVE to REAL MOVE is allowed via the (C) Config Menu.

REAL MOVE — The equivalent of the C2₄ REAL MOVE is ON option in the (C) Config Menu. If enabled, *REAL MOVE* will be ON.

☒ Simple Mode.

Simple Mode — Leave this option checked to benefit from the features of the simplified mode when working with the C2 Controller.



Show Hints on OLED — If enabled, the display will show contextual information to help you use C2's Menus, as shown in the second image above.

Technical Details – IP Addresses, FW

```

SDK: 2.2.2-dev(5ab15d1)
CPU @ 160 MHz; i2c? = OFF
RAM Free: 26136
Storage Free: 1740183
MAC: 98-F4-AB-CB-71-F4
Firmware: C2E_12202, C2M_12023
Rot1_00003:01143, MC1:255:255:255
Rot2_00002:01143, MC2:5:1:72

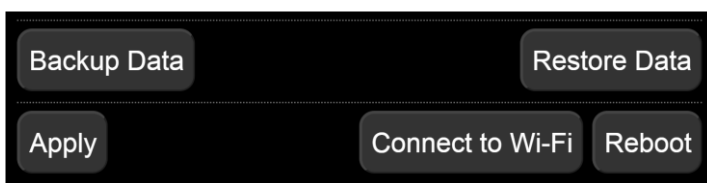
IP: 192.168.8.1, 192.168.2.104 SN:255.255.255.0 GW:192.168.2.1
DNS:8.8.8.8

LR: Software/System restart
  
```

Finally, several technical details are displayed, including the firmware version and the IP addresses used to access the User Interface:

- The first is the static address for access from smartphones: **192.168.8.1**
- The second, which is displayed only when MECHA is in STA mode, is the dynamic IP address for accessing the User Interface on your computer.

Backup and Restore Data



[Backup Data] button — Creates a downloadable archive containing all of MECHA's settings and files except the firmware.

[Restore Data] button — Uploads the archive downloaded using the *[Backup Data]* button.

[Connect to Wi-Fi] button — Initiates the process of connecting to a Wi-Fi network to use MECHA in STA (Station) mode or for firmware updates. See [User Interface – Connect to Wi-Fi](#) for more details.




[Reboot] button — Restarts MECHA, similar to restarting a computer.

[Apply] button — Applies and saves the current settings.

Other Updating Methods

If MECHA is not connected to a Wi-Fi network with internet access, it will prompt for an SSID name and password. This is similar to a guest asking if Wi-Fi is available in your home so they can check something on the internet. MECHA will use this Wi-Fi connection to download the new firmware and perform the update.

Firmware Update Using a Smartphone: Method 2

- Press the power button, , for about 3 to 5 seconds to power on MECHA and wait until  is shown on the display.
- Then press the  button to set MECHA in AP mode.

- Tap the *Settings* icon on your device. Under *Wireless and Networks*, make sure *Wi-Fi* is turned on, then tap *Wi-Fi*. Tap the network name that contains **MECHA** in its name to connect the smartphone to MECHA. The default password for MECHA's network is **12345678**.
- Now MECHA's User Interface (UI) can be accessed on the smartphone's browser at: **192.168.8.1** (which is a static IP address).



MECHA ACCESS POINT IP
<http://192.168.8.1/>

- This is the *New* page. At the top of the page, the current firmware version is displayed. Tap the *[Update]* button and follow the instructions to update the firmware:
 - Connect to Wi-Fi for internet access. Enter the Wi-Fi network name that you want to connect to. It can be your home or work Wi-Fi. The name and password are case-sensitive, like **MyWiFi** and **myPassword**! It's not about MECHA's passwords here, but the Wi-Fi name and password MECHA needs to connect to Wi-Fi.
- When the update is complete, a few beeps are heard, and the new firmware version is displayed at the top of the page. If it is not displayed in 1-2 minutes, refresh the page or reconnect the smartphone to MECHA if necessary.



Please do not turn off MECHA while updating the firmware!

Working with Presets

Programming a Preset Using Parameters

A programming method available starting with firmware version (1)2134.

This method of programming, or creating, a preset requires connecting to the MECHA's Wi-Fi network and passing parameters in a URL (see [How to Access the UI](#)). MECHA adds the new preset to the list of presets and also assigns it to some controller buttons (depending on the values passed), allowing you to launch the preset easily and quickly.




By creating a preset using parameters, the preset **Button 1**, **Button 2**, or **Button 3** will be overwritten if the value passed through the **b** parameter is **1**, **2**, or **3**.

Let's take a look at some examples first.

Being connected to the MECHA's SSID (MECHA's Wi-Fi) with your smartphone or computer, enter **one** of the following URLs in the browser address bar and tap *Access* or press the *Enter* key:

```
192.168.8.1/preset?b=1&s=12&p=2  
192.168.8.1/preset?b=1&f=30&p=2
```



The page will ask for credentials, which are: **admin**, **Mecha** (by default).

Then MECHA will create a preset and assign it to the  button, since **b=1** (overwriting the preset *Button 1*):

- 192.168.8.1/preset?**b=1**&**s=12**&**p=2**
will create a preset for 12 shots around (s=12).
- 192.168.8.1/preset?**b=1**&**f=30**&**p=2**
will create a 360° multi-row panorama for a 30mm lens (FF equivalent) (f=30).

In both cases, there will be a pause of 2 seconds (p=2) after each position.

Now check that the position of the upper rail is **level** (or as specified on the *Configuration* page of your MECHA, at *Preferred MSS Pattern*).

Then launch the preset by pressing either  or  (in *C1₀ ADVANCED MODE*).






Let's now explain all the parameters in more detail and see how to modify the URL to create your own preset.

The **parameters passed in the URL** are as follows.




b — button (required)


The **b** parameter tells MECHA either to assign the preset to a certain controller button (for values 1, 2, or 3), or to turn the value of the **b** parameter into a power code and add it to the beginning of the preset name (for any value other than 1, 2, or 3). This allows you to launch the preset in different ways (in addition to the usual method available on the *Row* page in the User Interface).

Assigning a Preset to a Controller Button Using URL Parameters

If the value of the **b** parameter is 1, 2, or 3, MECHA will assign the preset to either the , , or  button. You will launch the preset by pressing this button and either the  or  button to specify the direction of rotation.

There are no numbers on the buttons of the C2 Controller, but you may

remember that , , and  can also be used to enter the numbers 1, 2, and 3, respectively.

If a preset can be launched by using the controller buttons, we will specify only the  button in all the examples below for simplicity.

Examples:

192.168.8.1/preset?**b=1**&s=6  

192.168.8.1/preset?**b=2**&s=6  

192.168.8.1/preset?**b=3**&s=6  

Preset with Power Code Using URL Parameters

Any value of the *b* parameter except 1, 2, and 3, will be transformed into a power code and added to the beginning of the preset name.

- For values from **020** to **089**, the preset is also displayed in the C2's OLED (*P*) *Preset Menu* if the corresponding menu option is empty. Otherwise, the new preset can be found in the *Presets* list in the User Interface, and the existing preset in the C2's (*P*) *Preset Menu* will not be overwritten. In other words, the first preset created has priority over the other presets that have the same code at the beginning of their name.

Example:

192.168.8.1/preset?**b=020**&s=6

b=20 will also work, as MECHA automatically adds the digit zero before the number 20 to convert the parameter value into a power code (a code which starts with zero).

- Some power codes can be used to launch presets by using the controller buttons if the code starts with zero, as usual, and the next sequence of a maximum of six digits is a combination of 1, 2, or 3 so that two identical digits are not in consecutive positions.

To easily remember the above rule, you should know that MECHA has only three numerical buttons, and we do not press the same button twice in a row to avoid errors.

Example: 023, 0123, 02123, 0123123, etc.

192.168.8.1/preset?**b=0123**&s=6



Launch the preset by using the  button to enter the digit zero, wait 1 second, then enter the rest of the power code and specify the direction of rotation by pressing either the  or  button.

- Any power code can be used as a value for the **b** parameter. Example:

192.168.8.1/preset?**b=0123456**&s=6

Then use the URL below to launch the preset by passing the code in the URL, as follows:

192.168.8.1/do?**p=0123456**

Notice that the URL to launch the preset – **192.168.8.1/do?...** – is different from the URL to create the preset – **192.168.8.1/preset?...** .

Single-row Panorama Using URL Parameters

s — shots

The **f** parameter can be used instead of **s**.

The **s** parameter specifies the number of shots around for a **single-row panorama**. For example, this URL with two parameters will create a preset for 12 shots around:

```
192.168.8.1/preset?b=1&s=12
```



Now, simply replace the values in this example with your desired values. For **6 shots around**:

```
192.168.8.1/preset?b=1&s=6
```



Multi-row Panorama Using URL Parameters

f — focal length – values from 0 to 1000.

The **f** parameter is required for a multi-row panorama.

With this parameter, the panorama will be spherical. Otherwise, you need to specify the number of shots around (s), and it will be a single-row (cylindrical) panorama.

For example, this URL will create a preset for a **360° multi-row panorama** for a 30mm lens (FF equivalent):

```
192.168.8.1/preset?b=1&f=30
```



And this will create a preset for a **360° multi-row panorama** for a 50mm lens (FF equivalent):

```
192.168.8.1/preset?b=1&f=50
```



If both **s** and **f** are specified, **s will be ignored**.

Partial Panorama Using URL Parameters

h — horizontal angle (width) of panorama – values from 0 to 360.

v — vertical angle of panorama (height) – values from 0 to 180.

Starting with firmware version (1)2134, you can use the **h** and **v** parameters to specify the width and height of a partial panorama, in degrees.

For example, this URL tells MECHA to create a preset for a partial panorama **100°** horizontally and **75°** vertically, for an **80mm** lens:

```
192.168.8.1/preset?b=1&f=80&h=100&v=75
```



Bracketed Shots Using URL Parameters

t — number of camera trigger signals per position – by default, 1.

e — duration of the shutter button signal (exposure) – by default, 0.25s.

The default values can be omitted.

With newer firmware versions, use the trigger parameter – **t** – to specify the number of camera trigger signals per position and the exposure parameter – **e** – to specify the duration of the shutter button signal.

For example, this URL tells MECHA to create a preset for a 360° multi-row panorama, 85mm lens (f=85), three camera trigger signals per position (t=3), a shutter button signal duration of 1s (e=1), and a 2-second pause after each position (p=2):

```
192.168.8.1/preset?b=1&f=85&t=3&e=1&p=2
```



5 seconds for each position: (3*1)+2.

A negative value should be used (for example, $p=-2$) if the pause needs to be after each triggering:

192.168.8.1/preset?b=1&f=85&t=3&e=1&p=-2



9 seconds for each position: $(3*1)+(3*2)$.

The predefined values of the **e** parameter for *Fast Shutter Confirmation* and *Button Confirmation* are as follows:

- -0.11 → E:SHT C.
- -0.12 → E:SHT C1
- -0.13 → E:BTN > C.
- -0.14 → E:BTN > CT

p — pause – by default, 1s.

The default value can be omitted, as in some examples above.

The **p** parameter is the pause after each position.

It's more accurate to say "*the pause after each **position***" rather than "*the pause after each **shot***" when there are multiple shots (or trigger signals) per position.

p=2 means a pause of 2 seconds after each position:

192.168.8.1/preset?b=1&s=12&p=2



A negative value should be used (for example, **p=-1**) if the **pause** needs to be **after each triggering** (see the **t** parameter above).

<https://youtu.be/bfvnpnS1-AM>

Single-row, Multi-row, Partial Panorama Preset – MECHA's URL Parameters

Other Url Parameters

More parameters are now available for creating a preset via URL.

Parameters such as *sp*, *gr*, *zg*, *mdu*, *ov*, *ovw*, *bf*, and *pf* are also preset settings. We recommend reading the *User Interface* and *Creating a Preset in C2's Menu Mode* sections for more details.

sp — starting position – values: *SP*, *SL*, *SR* (parked, level, raised).

gr — grid – no value.

zg — zigzag – no value.

mdu — row order – values: *MDU*, *MUD*, *UMD*, *UDM*, *DMU*, *DUM*, *MD*, *MU*, *UM*, *UD*, *DM*, *DU*, *M*, *D*, *U*.

u — up limit – values from -90 to 90.

d — down limit – values from -90 to 90.

hf — horizontal field of lens – values from 0 to 180.

vf — vertical field of lens – values from 0 to 180.

mmp or **py** — script in pitch-yaw conventions – If present in the URL, this parameter tells MECHA to generate the script using pitch and yaw conventions (in case a script needs to be generated).

ov — vertical overlap – values from 0 to 99. In fact, this is the normal overlap, both horizontally and vertically. But if the *ovw* parameter is also present, then this is just the vertical overlap.

ovw or **oh** — horizontal overlap – values from 0 to 99. The *ovw* parameter has priority over the *ov* parameter.

bf — before – values: positive and negative as well.

pf — profile – values: *medium* (default), *ring*, *light*, *heavy*, *constant*.

Example of using *bf* and *pf*:

```
192.168.8.1/preset?b=1&s=12&p=2&bf=5&pf=heavy
```

lb — label – the value can be a simple text to identify the preset in the OLED (*P*) *Preset Menu* or in the *Presets* list in the User Interface. Without passing this parameter, MECHA will use the default label, which is *MECHAUTO*.

Example of using *lb* parameter:

```
192.168.8.1/preset?b=031&lb=my_preset&s=12&p=2&bf=5&pf=heavy
```

If parameters are passed in the following URL:

192.168.8.1/script (or *IP/script*, where IP is the dynamic IP address),
the generated script will be displayed on the screen of your device.

Example:

```
192.168.8.1/script?focal=35&gr&sp=SP&mdu=UMD&v=110&h=120&mmp&ov=50&ovw=35
```

The above URL will return the script below:

```
SP p50.71 y0 24..96 p25.36 y0 24..96 p0 y0 24..96 p-  
25.36 y0 24..96 p-50.71 y0 24..96 RT
```

How to Create Your Own Presets Using the UI

Besides the very simple method using buttons only (see [Panorama with Automatic Shooting Pattern](#)), and the URL with parameters method (see

Programming a Preset Using Parameters), the following describes the method using the UI.

Access the User Interface (UI) using a device or computer (see [How to Access the UI](#)) and tap/click the *[Row]* button to access the *Row* page.



An easy way to create a preset is to load one from the *Presets* list, modify it as needed, and then save it with a different name.

First, let's analyze some default presets.

Default Presets



Factory (F) presets cannot be overwritten.







- *FE 12mm NZ Level* — for 12mm fisheye lenses, 4 shots around, plus nadir and zenith, starting from the **level** position.
- *FE 16mm NZ Level* — for 16mm fisheye lenses, 6 shots around, plus nadir and zenith, starting from the **level** position.
- *FE 20mm ZN Level* — for 20mm fisheye lenses, 6 shots around, 2 rows – at -30° and +30° – plus zenith and nadir, starting from the **level** position.
- *FE 24mm ZN Level* — for 24mm fisheye lenses, 8 shots around, 2 rows – at -30° and +30° – plus zenith and nadir, starting from the **level** position.
- *TEST 1312 Parked* — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from the **parked** position.
- *TEST 1313 Level* — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from the **level** position.
- *TEST 1321 Raised* — 12 shots around, 3 rows – at 0° and +/-45° – plus zenith and nadir, starting from the **raised** position.
- *TEST 131* — 6 shots around (for single-axis applications).

- **TEST 132** — 12 shots around (for single-axis applications).

If the fisheye presets are not available in the *Presets* list, you may have a firmware version older than (1)2208 installed.

To hide all factory presets, uncheck the **Show Factory (F) Presets in the Presets List** option on the *Configuration* page.

Presets assigned to buttons

- *Button 1*, *Button 2*, and *Button 3* are default presets consisting of 4, 6, and 8 shots, respectively (for single-axis applications). These presets can also be executed with the following button combinations:
 - , ,  to the right.
 - , ,  to the left.

More from Server

More from Server — This option allows you to download more presets from the server. See the chapter [Downloading Presets from the Server](#) for details.

Note that MECHA, accessed at *192.168.8.1*, is in AP mode; therefore, *[More from Server..]* is not available.

MECHA controllers operate in two network modes: Access Point (AP) and Station (STA). AP mode allows the controller to create its own network and connect with up to five devices. STA mode allows it to connect to a Wi-Fi network (for example, one created by your wireless router), acting as a client.

Out of the box, MECHA operates in AP mode. Since it does not have a wireless modem, it does not have internet access. A device connected to it may also lose internet access. Please refer to the [MECHA Controller C1 Manual](#) for more details on STA mode.

Now let's examine the preset descriptions above and load the preset most similar to our desired outcome.

Loading a Preset

Suppose we want **six shots around, one horizontal row, plus zenith and nadir, starting from the parked position**. The most appropriate preset seems to be *TEST 1312 Parked*, so we select this preset and load it using the *[Load]* button.



To find out more about a preset, you can choose a higher **level** of complexity for the UI from the drop-down list next to the *[info]* button at the top of the page. Select *A3*, which is the most advanced **level**.

Now we have the full description of the selected preset and, in addition, clicking/tapping the *[info]* button will toggle descriptions for all the controls:



- **12 Shots** — 12 shots around for a full 360° panorama. Notice how the rotation angle changes according to the number of photos so that if we multiply them, the result is 360°. On the other hand, if we change the rotation angle, the number of images does not change.

We will get a similar result for a *33mm* focal length entered via *Custom* instead of *12 Shots*.

- **1 TRG** — One camera trigger signal. This is the number of camera trigger signals per position. Select zero if no camera trigger signal is needed. When using automatic exposure bracketing in continuous shooting or self-timer mode, MECHA treats it as one camera trigger signal.

LEFT		12 Shots		RIGHT	
NPP Shots			Live NPP		
1 TRG	AF 0.01 sec	W:0 sec	B:0 sec	M:1	
E:0.25 sec	A:1 sec	30 °	x 1	Wait	
No Repeat	Scripted	6 RPM	16+128 uStep		
Medium Load					
SP,0x12,-45x12,45x12,Z,N					
1 x LEFT		SHOOT		1 x RIGHT	
Cancel		PAUSE		STOP	
(F) TEST 1312 Parked					

- *AF 0.01 sec* — Auto-focus 0.01 seconds. If the value is negative, the AF signal will be ON during the entire image sequence. For some Sony cameras, in order to trigger the camera, you may need to select the MF option or set a non-zero AF value, even if the camera focus is set to manual.
- *W:0 sec* — No delay for camera wake-up. If the value is negative, the delay will be forced even when the camera is ON, before each sequence begins. This can be useful for moving out of the camera's view.
- *B:0 sec* — No delay before a set of images. If the delay before each bracketing sequence or set of images is negative, up to 2 seconds will be used for Mirror Lock-Up.
- *M:1* — Default modifier of exposure. The Exposure Modifier is a multiplier for the Duration of the shutter button signal. It can be entered as a list of multipliers (for example, 1,0.5,2 for normal, half, and double exposure time in case of 3 *TRG*) or as EV values (for example, -0.7EV for under, normal, over or 0.7EV for normal, under, over). In the latter case, it will automatically extend to the number of *TRG*.

If the modifier starts with B, like B-2EV, B1, or 1,0.5,2, the “Bulb” mode will be assumed.

- *E:0.25 sec* — Exposure 0.25 seconds. The duration of the shutter button signal, for example, 3 or 0.5*3 for progressive half Exposure or 2*3 for progressive double Exposure in a set. These can be entered as custom values. The values can be entered as 1/100.
- *A:1* — Delay of 1 second after each bracketing sequence or individual image. If the value is negative, there will be a delay after each shutter actuation.
- *30°* — The rotation angle between two consecutive positions in a sequence specified for *[N x LEFT]* or *[N x RIGHT]* buttons.
- *x1* — 1 move. The number of moves (N) for *[N x LEFT]* or *[N x RIGHT]* buttons.
- *Wait* — Wait after the last shot. The other option is *Rewind*, which means rewind to the initial position. Useful if there are cables attached, or when shooting partial panoramas and time-lapse photography.
- *No Repeat* — This is the delay in seconds until the shooting sequence will be repeated automatically. Set 0 (zero) or *No Repeat* if no repeat is needed.
- *SP,0x12,-45x12,45x12,Z,N* — The MSS script that describes our preset: starting position is **parked**, 3 rows of 12 positions, one zenith and one nadir (see [MECHA's Simple Scripting \(MSS\)](#) for more details).
- *6 RPM* — Speed denoted by Revolutions Per Minute.
- *16+128 uStep* — Micro-stepping value, simple or combined; for example, different values for acceleration and constant-speed regions.
- *Medium Load* — Means a profile for an average load. The other options are *Light*, *Heavy*, and *Ring*.

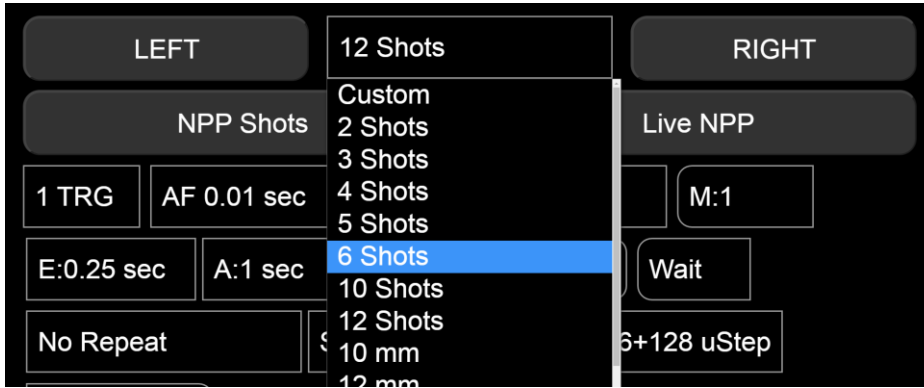


Most input lists, in both *Ring* and *Row* pages, can receive custom values. There is no error check nor range check for the custom values at the moment, so please use this feature with caution.

Modifying a Preset

To get a preset with *6 Shots* in a *single horizontal row*:

Instead of selecting *12 Shots*, select *6 Shots*:



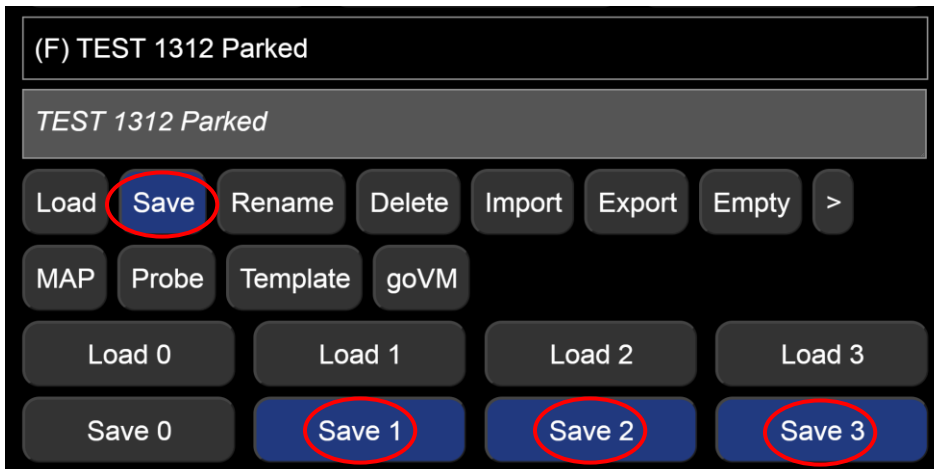
Remove the second row (-45x12,) and third row (45x12,) from the MSS script as follows:

```
SP, 0x12, Z, N
```

Follow the instructions below to save the preset.

Saving a Preset

To save a preset, do **one** of the following:



A. Tap/click the *[Save]* button to save the preset with a different name, or with the same name if it is a preset that can be overwritten.

The preset name can be preceded by a power code of up to seven digits. This feature also allows you to execute the preset using MECHA's buttons. For example, if the preset name is "**01 C2 6 shots**":


- Use  (wait 1 second)   to execute the preset to the right.
- Use  (wait 1 second)   to execute the preset to the left.


Preset Power Code


Create a **preset power code** as follows:

- The **first digit** must be **0** (zero) (remember that every power code starts with zero).
- The **next sequence of up to six digits** must be a combination of the digits **1, 2, or 3**, so that no two identical digits are in consecutive positions.

Examples: 01, 023, 0123, 02123, 0123123, etc.

B. Tap/click the *[Save 1]* button to overwrite the preset with the name *Button 1*, assigned to the  button.

C. Tap/click the *[Save 2]* button to overwrite the preset with the name *Button 2*, assigned to the  button.

D. Tap/click the *[Save 3]* button to overwrite the preset with the name *Button 3*, assigned to the  button.

Now the new preset is saved and displayed in the *Presets* list and ready to be used in the future.

<https://youtu.be/rZu4EI5AbIw>

Firmware Update Using a Hotspot – MECHA C2





The presets created in C2's Menu Mode (OLED menu) can be edited in the User Interface. If you make further changes to the presets via the OLED menu, the script will be produced again (automatically), unless you change the following settings: *T*; *E*: >, *M*: *AF/MF*, *W*: *B*: *A*: *Wait/Rewind* and motion-related *Profiles*, *Speed*, and *uStepping*.

The other settings, if changed, will affect the script and, as a result, the script will be produced again accordingly. Of course, the script can be further edited and checked in the User Interface. Also, check the PTGui/Hugin *map* file to make sure that the changes made are correct.

Show Your Own Presets in C2's (P) Preset Menu

In this section, we'll show you how to make a preset you created in the User Interface appear in the *(P) Preset Menu*.

Long-press the  button to enter menu mode. Press the  button to exit *Menu Mode*.

By default, on the first page of C2's *(P) Preset Menu* are shown some default presets, while pages 2-8 are blank and can be used in two ways:

- either to create presets directly in the *(P) Preset Menu*, as shown in [Creating a Preset in C2's Menu Mode](#)
- or to display some presets you have already created in the User Interface, as we will see in this section.

For example, the first option on page 2 might look like this:

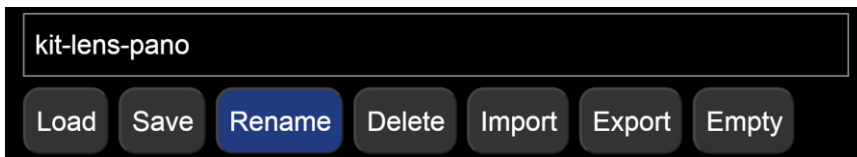


The next options on this page might be: *021 EMPTY, 022 EMPTY, ..., 029 EMPTY* (10 in total).

To be able to see a preset in exactly the above position – *020* – you have to rename that preset by adding the code *020* to the beginning of the preset name.

Access the User Interface using your smartphone or computer, select the preset from the *Presets* list, and click the *[Rename]* button.

In our example, the preset is *kit-lens-pano*:



In the popup window that appears, add **020** and a **space** at the beginning of the preset name, then click the *[Ok]* button. The result should be:






Now the first option on page 2 of C2's *(P) Preset Menu* is our preset:



Similarly for pages 3-8. For example, if the name of a preset is preceded by a code found in the range 030-039, then this preset is automatically listed on page 3, and so on.



In short, to see a preset created in the User Interface in C2's (P) *Preset Menu*, access the User Interface and rename the preset by adding a code from the range 020-089 and a space to the beginning of the preset name.

To execute the above preset, press the  button when the preset name is shown on the display, then press either the  or  button to specify the direction of rotation.

The code used in the preset name is a *preset power code* explained in the section Preset Power Code.


Although the power code used in the name of the presets shown in C2's (P) *Preset Menu* consists of only three digits, longer codes can be used in a preset name. These presets cannot be displayed in the menu but can be executed using the menu, as we will see below.






Using a Preset Name as a Base Name

When the name of a preset begins with a code in the range 020-089, then it can be used as a **base name**.

- Suppose we have a preset to shoot a common spherical panorama, and its name is **020 kit-lens-pano**. Since 020 is in the range 020-089, we can use *020 kit-lens-pano* as a base name. We also know how to execute this type of preset, as we have shown this before.
- If we create another preset and give it a similar name, adding a number in the range 1-3 after the code 020:

0203 kit-lens-pano, this preset can be executed as follows:

- Press the  button to select the preset *020 kit-lens-pano* (the power code is shown on the display).




- Press the  button to enter the number **3** (or press the  or  button to enter the number 1 or 2).
- Press either the  or  button to specify the direction of rotation.


As you can see, the preset is executed as usual; we only need to **specify what is different** from the base name – the number **3** in our case.

The second preset could be, for example, a preset to shoot 3 images in each position (3 *TRG*) or whatever you find useful.

Of course, instead of the number **3** used in our example, you can use a combination of digits, as shown in the chapter on presets (see [Preset Power Code](#)).

Directional preset name

If a preset name ends with one of the > or < signs, then the preset will be executed automatically when you press the  button. This is because the direction of rotation is specified in the preset name, and there is no need to use the  or  buttons for that purpose.

For example, the *020 kit-lens-pano>* preset will be executed to the right when the  button is pressed.

Although directional preset names may be preferable in some situations, please note that:

- Directional names cannot be used as a base name.
- The execution of the preset can be performed in one direction only, the one specified in the preset name.

MECHA's Simple Scripting (MSS)



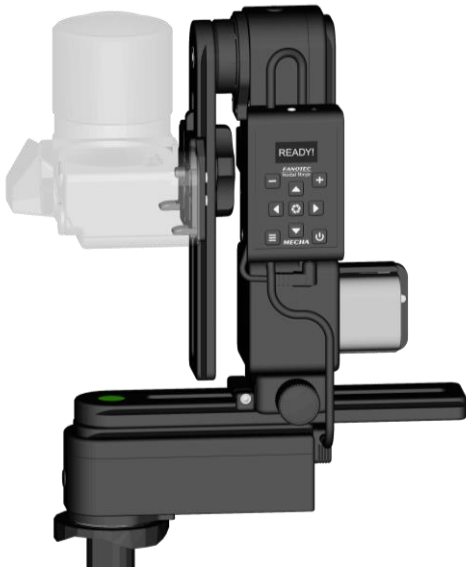
MSS scripts are row and column oriented and help you photograph a panorama with few clicks or button presses, without the need to understand the script. You only provide the focal length, and MECHA generates the script.

Starting with firmware version (1)2116, **MECHA's Simple Scripting (MSS)** reached a level of flexibility that allows easy scripting for common shooting patterns, for both single-axis and dual-axis applications.

An MSS script looks like the following. No need to fully understand it now, as MECHA will generate it for you in most cases.

Three-row Panorama + Nadir + Zenith (MSS)

Suppose we want to script a panorama starting from the **parked** position, made of 12 shots around, zenith, nadir, one row at 0°, one row at +45°, and finally, one at -45°. The MSS script, in this case, can be:



```
SP, Z, N, 0x12, 45x12, -45x12
```

In the **parked** position, the camera – mounted on the upper rail – is facing up.

If we want the starting and ending positions to be **level**, the script will be:

```
SL, Z, N, 0x12, 45x12, -45x12
```


And if we want the starting and ending positions to be **raised**, the script will be:

```
SR, Z, N, 0x12, 45x12, -45x12
```

If we want a pause before a row, we can add **P** in the script before that row. For example, this will set a pause just before the row at 0°:

```
SP, Z, N, P0x12, 45x12, -45x12
```

In the example above, the pause is infinite, and to continue, you need to press



 (the right button of MECHA) or the equivalent UI button, *[RIGHT]*.

Now let's have a closer look at scripting using the MSS Language.

For dual-axis applications, MECHA needs to know its starting position. This can be (1) **parked**, (2) **level**, or (3) **raised**. These conventions are also used in naming the presets available from the Server.




The naming conventions for starting and ending positions for dual-axis presets available via **More from Server...**

Adjust the position by using the  and  buttons to match the preset before starting the preset.

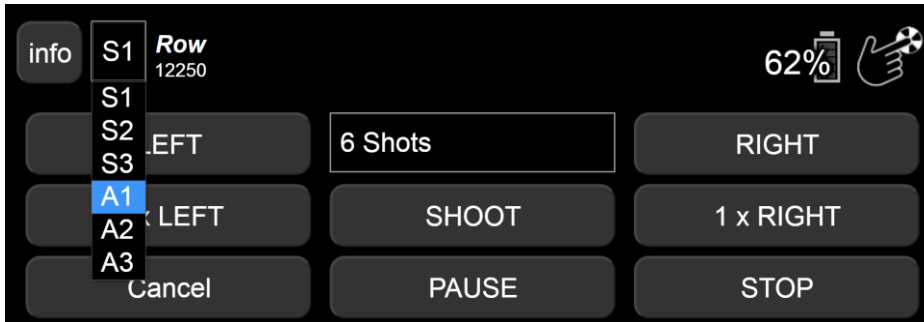
Shooting Panorama Made Easy for Dual Axis

Shooting a panorama is made easy by following these steps.

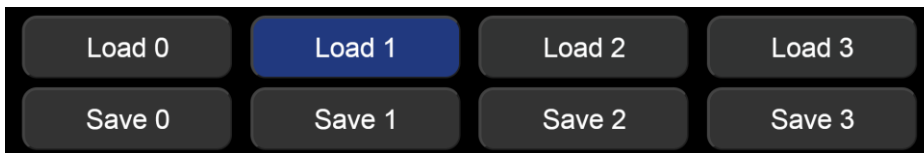
1. Use the  and  buttons to position the upper rail in the **level** position (see the section [Parked, Level, Raised Positions](#)).

Why **level**? Because this is the default position in the *Preferred MSS pattern* on the *Configuration* page. If you have changed this setting, then you need to position the upper rail according to your setting.

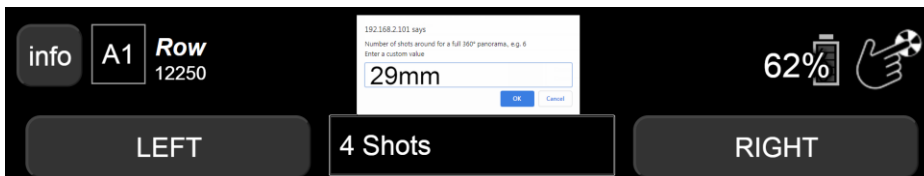
2. Connect to the MECHA's User Interface (see the chapter [How to Access the UI](#)).
3. On the *Row* page, select the *A1* (or *A2*, *A3*) level of complexity for the User Interface. In *A1-A3 (Advanced)* modes, you will see more controls than in *S1-S3 (Simple)* modes.



4. We recommend that you load a simple preset, for example, the default *Button 2* preset. To load this preset, use the *[Load 2]* button. Now, the current settings are the loaded preset settings.



5. Click/Tap the *Shots* field, choose the *Custom* option, and enter the desired focal length, for example, **29mm**. Confirm by clicking/tapping the *OK* button.




When you click/tap the *OK* button, MECHA creates a script for you to shoot a full panorama according to the focal length provided:

```
SL,0x11,-43.27x10, 43.27x10,ZZ,NN
```

The settings provided by the script have priority over the other settings.





6. To start shooting, press either the *[LEFT]* or *[RIGHT]* button.



7. To further simplify this process, we recommend that you save the current settings as a preset. For example, click/tap the *[Save 2]* button to overwrite the default *Button 2* preset, which is assigned to the  button by default (see [Saving a Preset](#) for more details).



Next time you need to shoot this type of panorama:

- Either load the preset by using the *[Load 2]* button and execute it with the *[LEFT]* or *[RIGHT]* button.
- Or execute the preset directly by using the   or   button combinations (*C1₀ ADVANCED MODE* only).

Next, we will present an example of an MSS script similar to the one above but with a larger image overlap, resulting in 12 photos per row.

MSS Script Explained

Considering the quite popular shooting pattern made with kit lenses around 29mm (FF equivalent), which consists of:

1. One row of 12 positions at a tilt of 0° (horizontally)
2. Another row of 12 positions at a tilt of +45°
3. Another row of 12 positions at a tilt of -45°
4. A single position at a tilt of -90°, known as nadir

5. A single position at a tilt of 90°, known as zenith









And assuming the **Start Level** position, as in the image above, this pattern can be programmed with the following **MSS**:

```
SL, 0x12, 45x12, -45x12, N, Z
```

Broken down, you will recognize the description above:

- **SL: Start Level**
- **0x12:** At a tilt of **0°**, one row of **12** positions
- **45x12:** At a tilt of **45°**, one row of **12** positions
- **-45x12:** At a tilt of **-45°**, one row of **12** positions
- **N:** The **Nadir** position
- **Z:** The **Zenith** position

Assuming that the angles of rotation are 45°, 90°, and 180° (see *Arrow buttons Interval 1/2/3* on the *Configuration* page):

- To go from **parked** to **level** and back, you can use  , then  .
- And to go from **parked** to **raised** in one go, use  , then use   to go back to the **parked** position.

NOTE. On the *Configuration* page, there is also a checkbox that establishes whether left is left or left is right regarding the movements when the buttons are pressed (see *Switch the Left-Right rotation when done by MECHA buttons*). You might want to change its status if you prefer a particular behavior over the other.

There are also two codes – **2313<** and **2323<** – for changing the direction of rotation if it is done by using the left/right and up/down buttons, respectively, without the need to access the *Configuration* page.

If you notice that instead of a 90° rotation, MECHA seems to rotate more or less, the cause could be a wrong setting regarding the type of rotators you use. The rotators can be set either on the *Configuration* page, or using special codes, or in C2's (C) *Config Menu*.

Considering the script:

```
SL, 0x12, 45x12, -45x12, N, Z
```

Let's see how it can be modified in different situations.

What Needs to be Changed sometimes in Real Situations

Instead of a single zenith, **more zeniths** may be needed, say, for flare reasons, in which case **Z** can be replaced with **Zx2**, for example, which will produce **2** zeniths **180°** apart ($360^\circ/2$):

```
SL, 0x12, 45x12, -45x12, N, Zx2
```

For **two** zeniths **90°** apart, the **ZZ** convention can be used, or **^90**, which tells MECHA to use a **90°** interval between zeniths instead of the computed $360^\circ/2$.

```
SL, 0x12, 45x12, -45x12, N, ZZ
SL, 0x12, 45x12, -45x12, N, Zx2^90
```

The same way, for **two** zeniths **120°** apart:

```
SL, 0x12, 45x12, -45x12, N, Zx2^120
```

Now, for zeniths at a tilt of **80°** instead of **90°**, which might help in automatic control points because the zenith is just like any row but at a tilt of **90°**, **90x1** will do the same as **Z**, thus **80x1** is what you need for a zenith at a tilt of **80°** instead.

For **two** zeniths at a tilt of **80°** and **180°** apart, use **80x2**, and for **two** zeniths **90°** apart, we can use **80x2^90**. Thus, the script will be:

```
SL, 0x12, 45x12, -45x12, N, 80x2^90
```

Suppose that the rows at a tilt of $+45^\circ$ and -45° must have **10** positions instead of 12, then the script can be changed as follows:

```
SL, 0x12, 45x10, -45x10, N, 80x2^90
```

The above applies to nadirs as well. In which case, the **N, NN, -90x1, -80x1, -80x2^90** can be used.

The nadir is like a row at a tilt of **-90°**.

Focus and Extra Shot Positions



<https://youtu.be/AohURKO5Jbg>

How to Change Focus and Take Extra Shots when Shooting Panoramic Photos by Using MECHA

When making a panoramic photo, the photographer usually sets the focus to the hyperfocal distance, which will allow for most features to be in acceptable focus, and leaves it unchanged for the entire shooting session.

However, when you know that there are objects closer to the camera in a certain area, you can set one or more positions where you want to change the focus, either automatically or manually, to get a better result when using MECHA.


Below is a script automatically created by MECHA for a 35mm focal length lens for a full spherical panorama:

```
SL, 0x13, -37.61x12, -75.21x8, 37.61x12, 75.21x8, ZZ,  
NN
```

For example, set a focus position after the first row is completed by adding **F** in the MECHA's script followed by pitch (or tilt) and yaw, separated by a caret symbol:

```
SL, 0x13, F-15^90, -37.61x12, -75.21x8, 37.61x12,
75.21x8, ZZ, NN
```

F-15^90 means a Focus position at **-15°** tilt and **90°** yaw.

MECHA will go to the focus position and wait for you to press either the  or *[PAUSE]* button to continue. Next, it sends the focus signal to your camera, then continues shooting.

Now let's see how to tell MECHA you want it to take extra shots when executing a preset.

Add **V** in the MECHA's script followed by pitch (or tilt) and yaw, separated by a caret symbol, where **V** stands for "**Via**" and suggests going through this position when the preset is executed.

```
SL, 0x13, F-15^90, -37.61x12, V-30^90, -75.21x8,
V30^-90, 37.61x12, 75.21x8, ZZ, NN
```


In this script, **V-30^90** means an extra shot position at **-30°** tilt and **90°** yaw after the second row.

And **V30^-90** means an extra shot position at **30°** tilt and **-90°** yaw after the third row.

MECHA will go to the **V** position and send one or more trigger signals, depending on the value set for *TRG*, just like for any other position in the preset. This means one or more shots in the **V** position, then continuing shooting.

Everything is automatic in case of extra shots and does not require any action on your part unless you set a pause before extra shots by adding **P** before **V**:

```
SL, 0x13, F-15^90, -37.61x12, V-30^90, -75.21x8,
PV30^-90, 37.61x12, 75.21x8, ZZ, NN
```


MECHA will go to the **V** position and wait for you to press either the  or *[PAUSE]* button to continue. Next, it sends the trigger signal to your camera to take the extra shot, then continues shooting.


Using Pause in MSS Script

Let's take a pause. Sometimes, we also need a pause, such as before a horizontal row or before nadir, to ensure we are out of the camera's field of view.

The pause can be added using **P**. So,

0x12 will mean: at a tilt of 0°, a row of 12 positions, while

P0x12 will mean the same but with a pause before it. MECHA will wait for the  button to be pressed, or for the UI *[PAUSE]* button to be pressed, or for the

 (pause) button on the **NN IR Remote** to be pressed, to continue (see image).



This pause can be used to adjust camera settings like exposure, aperture, white balance, focus, and more.

```
SL, P0x12, 45x10, -45x10, N, ZZ
```

If you want a pause before each row, for example, for focusing:

```
SL, P0x12, P45x10, P-45x10, N, ZZ
```

Or even before nadir and zenith:

```
SL, P0x12, P45x10, P-45x10, PN, PZZ
```

To customize it further, let's say we want an extra image at the beginning, a kind of clapboard you may want to use for white balance or even focus. It will be a type of image that needs to be taken again, without the extra elements, and the second one will be used in the panorama.

As the horizontal row is scripted by 0x12, for the extra shot we can add another horizontal row but made from only one position, like 0x1 with or without a pause. For example, if starting from **level**, we may not need a pause as we can launch the preset after clapboard preparations are done, and we will have the pause only before the actual row of 12 to start, giving time to remove, say, the gray card.

```
SL, 0x1, P0x12, 45x10, -45x10, N, ZZ
```

If MECHA is in the **parked** position, we need a pause to adjust the camera settings right after MECHA arrives in the horizontal orientation for the first horizontal row.

```
SP, P0x1, P0x12, 45x10, -45x10, N, ZZ
```

A **pause length** can also be specified by adding a number (integer) before the pause symbol. MECHA will advance to the next position or row after a number of seconds equal to the pause length if the user takes no action.

For example, in the script below we have a pause of 1 second before the first row, 2 seconds before the second, 3 seconds before the third, 4 seconds before the zenith shot, and 5 seconds before the nadir shot.

```
SL, 1p0x12, 2p-45x12, 3p45x12, 4pZ, 5pN
```

Let's Take a More Dense Approach with More Photos toward Gigapixel Imagery

Suppose we want a shooting sequence made out of rows at a tilt of 15° instead of 45°, as we had before:

```
SL, 0x36, 15x32, 30x28, 45x24, 60x20, -15x32, -30x28, -45x24, -60x20
```

- **SL:** Start Level
- **0x36:** First row at a tilt of 0° (horizontally) made out of 36 positions
- **15x32:** One row at a tilt of 15° with 32 positions
- **30x28:** One row at a tilt of 30° with 28 positions
- **45x24:** One row at a tilt of 45° with 24 positions
- **60x20:** One row at a tilt of 60° with 20 positions

The same for the negative tilts:

- **-15x32:** One row at a tilt of -15° with 32 positions
- **-30x28:** One row at a tilt of -30° with 28 positions
- **-45x24:** One row at a tilt of -45° with 24 positions
- **-60x20:** One row at a tilt of -60° with 20 positions

Because there are many shots to be taken, it will take a while.

Now, suppose we want only a vertical slice of it, **45 degrees wide**, as a kind of preview. This also allows us to test overlap and see if the full 360° around can be used in production or just as a partial panorama 45° wide instead of 360°, using the same camera-lens combo.

To achieve this, we need to add **(45)**, which tells MECHA that only a bit over 45 degrees should be taken.

The resulting MSS script will be:

```
SL, 0x36, 15x32, 30x28, 45x24, 60x20, -15x32, -30x28,
-45x24, -60x20 (45)
```

As in the examples above, it can have pauses before rows, or an extra one-position row for a clapboard, and so on.

We can also add one nadir and one zenith with a pause, and even use that pause to replace the lens with a fisheye lens or change the focal length to its shortest (widest angle) extent.

```
SL, 0x36, 15x32, 30x28, 45x24, 60x20, -15x32, -30x28,
-45x24, -60x20, PN, Z (45)
```

If the preview slice looks good, we can remove the (45), and make some changes regarding the number of shots per position (HDR), ending up with the full 360° around and 180° tall panorama:

```
SL, 0x36, 15x32, 30x28, 45x24, 60x20, -15x32, -30x28,
-45x24, -60x20, PN, Z
```

Rewind After Each Row

The *RW* term in the MSS script indicates rewind after each row, useful in gigapixel sessions when cables to a power bank are used.

For example, for 50mm (FF equivalent):

```
SL, 0x18, -28.30x17, -56.60x12, 28.30x17, 56.60x12,
ZZ, NN, RW
```

Shooting in a Horizontal Zigzag Pattern

The *HZ* term in the MSS script indicates shooting in a Horizontal Zigzag pattern.

MECHA will change the sense of rotation after each row.

For example, for 50mm (FF equivalent):

```
SL, 0x18, -28.03x18, -56.06x14, 28.03x18, 56.06x14,  
ZZ, NN, HZ
```

Example of a partial panorama with explicit intervals for the lower rotator (24°) and upper rotator (36°) in a Horizontal Zigzag pattern, 4 rows, 8 columns:

```
SL, 54x8^24, 18x8^24, -18x8^24, -54x8^24, HZ
```



<https://youtu.be/WjChIxHm5UE>


Shooting in a Zigzag Pattern – MECHA C1 and C2 Controllers




Script for Two Focal Lengths – MECHA Dual Axis


Script for shooting a spherical panorama using 50mm and 24mm lenses or focal lengths:

```
SL, 12x19, -12x19, P-50x10, 50x10, ZZ, NN
```

Select the *Scripted* option from the *Mode* list on the *Row* page and enter the above script in the displayed text box.

For example, use the *[Save 1]* button to assign the preset to the  button.

Since the preset is assigned to the  button, you can start shooting using the   buttons.

During Pause (P), change the lens or focal length, then press the  button to continue.

Please watch the video below for more details.



<https://youtu.be/fKb7Ma3Rddg>

Script for 2 Focal Lengths – MECHA Dual Axis

Absolute Positions in Pitch and Yaw Conventions

As you have likely seen, in an MSS script, you can specify the starting position, the number of positions per row, zenith and nadir positions, pauses, and more. A similar result can be achieved by using absolute positions in pitch and yaw conventions, where **p** stands for pitch and **y** for yaw.

Let's start with a simple example in discrete format:

```
SL p0 y0 p0 y15 p0 y30 p0 y45
```

Which means, from the starting level position (**SL**), at 0° pitch (**p0**), we have positions at 0° yaw (**y0**), at 15° yaw (**y15**), at 30° yaw (**y30**), and at 45° yaw (**y45**).

The above script can be written in a more compact form, like this:

```
SL p0 y0 15 30 45
```

The pitch can take values from -90° (downward) to 90° (upward), for example:

```
SL y0 p0 15 30 45
```

Meaning that at 0° yaw, we have the following positions: at 0° pitch, at 15° pitch, at 30° pitch, and at 45° pitch.

The yaw can take values from 0° to 360°.

The two scripts above can be compactly written as:

```
SL p0 y0 15..45
```

and

```
SL y0 p0 15..45
```

respectively. MECHA will replace the two dots (..) with computed values. In the two examples above, there is only one value: 30.

These forms are also accepted:

```
SL y0 (p0 10 20 30 40 50) y10 () y20 () y30 () y40 ()
y50 ()
```

where each occurrence of the () will be replaced with (p0 10 20 30 40 50) by MECHA.

The above script in compact form:

```
SL y0 (p0 10..50) y10 () y20 () y30 () y40 () y50 ()
```

or even more compactly as:

```
SL y0 (p0 10..50) 10..50
```

The following two scripts are equivalent:

```
SL, 0x13, -37.61x12, -75.21x8, 37.61x12, 75.21x8, ZZ,
NN
SL p0 y0 27.69..332.31 p-37.61 y0 30..330 p-75.21 y0
45..315 p37.61 y0 30..330 p75.21 y0 45..315 p90 y0 90
p-90 y0 90 RT
```

In the second script, **RT** means return to the starting position on the shortest path.

RW can be used in the same way as RT when cables to a power bank are used. **RW** means rewind or return to the starting position on the same path.

WO stands for *without optimization* and can be used when no optimization is needed for the shortest path. Thus, **RTWO**, **RWWO**, **WORW**... are valid as well.

We recommend that you test any script that contains RT, RW, WO... type specifications (without cables), to be sure that it works as expected.


A script can be even more complex*, like this:

```
SL y0 (p-75 -50..75) y20 [p35 0..-35] y40 {p-60 -
30..60} 60..350
```

When the script has the above complex form, the simplest and most recommended order of parentheses is this: () [] {}, and note that this order matters.



* If the script is very complicated and long, it might fill up the RAM. Please test any script before using it by downloading the MAP from the web User Interface and check if it looks OK in PTGui/Hugin or other stitching software that can open a .pts file.

Add **:** (colon) before y where a pause is needed, in discrete format scripts. **p** stands for *pitch* in pitch and yaw conventions, which is why we cannot use it to specify a pause. After the pause, continue shooting as usual, for example by pressing the  button.

```
SL p0 y0 p0 y15 p0 :y30 p0 y45
```

A **pause length** can also be specified by adding a number (integer) before the pause symbol. MECHA will advance to the next position or row after a number of seconds equal to the pause length if the user takes no action.

For example, in the script below we have a pause of 1s before the first row, 2s before the second, 3s before the third, 4s before the zenith shot, and 5s before the nadir shot.

```
SL 1:p0 y0 30..330 2:p-45 y0 30..330 3:p45 y0 30..330
4:p90 y0 5:p-90 y0 RT
```

Downloading Presets from the Server

To download presets from the server, ensure MECHA is connected to the internet. Then, select *More from server* from the *Presets* list on the *Row* page. If *More from server* isn't displayed in the list, MECHA isn't connected to the internet. In this case, tap/click the *[Connect to Wi-Fi]* button at the bottom of the page and refresh the page after connecting. For more details, see [User Interface – Connect to Wi-Fi](#).

Step by step:







- On the *Row* page, select *More from server* from the *Presets* list.
- Provide a keyword if you want to retrieve only certain presets, then click/tap the *[OK]* button. The names of the found presets will be added to the *Presets* list.
- The preset name describes its function. Over time, you'll learn which keywords to use. For example, the sequence *_P_* in a preset name indicates that the preset includes a pause.
- *(S)* in a preset name means the preset is not yet saved on MECHA.
- Save useful presets as described in the [How to Create Your Own Presets by Using the UI](#) section:
 - Select a preset from the *Presets* list.
 - Tap/click the *[Load]* button to load it (if the button is visible).
 - Modify the preset if needed.
 - Save the preset with the same name or a different name.

Pause in the Execution of a Preset that Has a *py* Script

If the script type is *py*, the pause can be used to go back and forth to any position in the preset, with or without taking shots, take extra shots, as well as pan to any arbitrary pitch and yaw for taking extra shots. Then, the preset execution can be resumed.

This is a Beta Feature in firmware version (1)2412, which needs to be enabled either on the */config* page (*Enable the beta features*) or in C2's (C) *Config Menu* (C6, *BETA Feat...*).

When creating a preset, MECHA automatically generates a script in some cases, depending on the preset settings. It is editable and can also be created manually from scratch. The script type can be either *py* (pitch and yaw conventions) or *TxN* (tilt and number of positions for each tilt).

 The execution of a preset can be paused with the , , or  button of the controller, or with the  or  button of the NN IR Remote, but also with the *[PAUSE]* button in the User Interface, regardless of the script type.

The script type is *py* for the following presets:

- Any preset newly created with the *OLED Menu* for focal lengths up to 100mm.
- Any old preset with corners set with the *OLED Menu* or the User Interface.
- Any preset created with the *OLED Menu* using the *sh* setting, that is, positions on up to three rows.
- Any preset created automatically on the User Interface for focal lengths up to 100mm, then selecting the script type *py* instead of *TxN*. By setting corners for a partial panorama, the User Interface will automatically switch to the *py* format.
- Any preset with the script entered manually, as long as it is in *py* format.

Let us look at a preset consisting of 36 positions, paused at position 3:



While the preset execution is paused, the controller buttons can be used as follows (the virtual controller at *MECHA-IP/c2* and the NN IR Remote can also be used):

— To change the position without moving to the set position.

For example, by pressing twice, the position is changed to 5:



— To move to the position set with or without shooting.


The current position is 5 in our example, so there will be a 60° rotation (as we have 12 positions per row).

— To move to the position set with or (if needed) and shoot.


Continuing with our example, only the photo will be taken. There is no need to move to the set position, as the button has already done that.




— To move to a temporary ZENITH position.


The upper rail will rotate downwards so that the camera is oriented upwards, as for a zenith shot. Use the  button for shots if needed.




 — To move to a temporary HORIZON position.

The upper rail will rotate either up or down so that it reaches a horizontal position. Use the  button for shots if needed.





 ZENITH and HORIZON are similar to Parked and Level, except that Parked and Level are unique, precise positions, while ZENITH and HORIZON are just ordinary, temporary, vertical, and horizontal positions.

 — To allow arbitrary panning with the arrow buttons, for other extra shots if needed.

The OLED display will show MENU, as in the image below.



On the virtual controller (*MECHA-IP/c2*), click the  button twice, or long-click on this button until MENU is displayed.

Use the same button () to go back to your paused preset.



— To resume the execution of the preset.

This means moving to the set position (8 in our example), shooting, and continuing the preset.



— To cancel the execution of the preset.

Preset pauses can be automated by adding the ":" sign before **p** or **y** in the script. For example, in the following script there is a pause before the first shot in the row at -50° pitch:

```
SL p0 y-40 -13.33..40 :p-50 y-40 -13.33..40 p50 y-40 -  
13.33..40 RT
```



<https://youtu.be/72NdLU4pBlw>

Panorama Extra Photos with MECHA

Launching a Preset by Scanning a QR Code

A complete list of preset QR codes can be found on this web page:

MECHA QR Codes

<https://www.fanotec.com/mecha-qr-codes>

- To be able to launch a preset by scanning a QR code, your phone must first be connected to the MECHA's SSID (see [Access the User Interface \(UI\) on a Smartphone](#)).
- Click to enlarge the QR code you want to launch, then scan it.

For example, to launch preset **20**, which is an option in C2's *(P) Preset Menu*, scan the QR code corresponding to **020**:



<https://youtu.be/UDqwkyolyg>

Launching a MECHA Preset by Scanning a QR Code

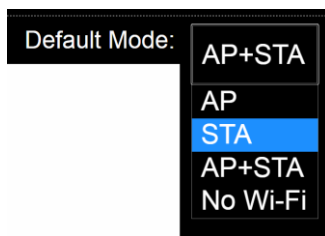
How to Set Up Both MECHA and Smartphone for Internet Access

In this chapter, we will explain how to set up both MECHA and your smartphone for internet access. You'll also learn how to enable updates and use your device for usual internet browsing simultaneously.

First, set up a hotspot on your smartphone in the 2.4 GHz band and name it **MECHA-PHONE**. Please refer to your smartphone's documentation for instructions on setting up a hotspot.

Assume the hotspot is currently disabled. This hotspot will assign IP addresses in the range of 192.168.43.xxx to its connected devices.

1. Power on MECHA.
2. Connect to MECHA's *Configuration* page (*/config*) with your smartphone, then set it to STA mode choosing the STA option from the Default Mode select list.



Scroll to the *STA Mode* and enter the following values:

- Static IP: 192.168.43.101
- Subnet: 255.255.255.0
- Gateway: 192.168.43.1
- DNS: 8.8.8.8 (or leave the field blank)

 A screenshot of a web form titled 'STA Mode: (no values for auto)'. It contains four input fields: 'Static IP:' with the value '192.168.43.10', 'Subnet:' with the value '255.255.255.0', 'Gateway:' with the value '192.168.43.1', and 'DNS:' which is currently empty.

3. Scroll to the bottom of the page and tap the *[Apply]* button.
4. Tap the *[Connect to Wi-Fi]* button at the bottom of the page, then enter (or select) **MECHA-PHONE** and the required password. Please see [User Interface – Connect to Wi-Fi](#) for more details.
5. Start the MECHA-PHONE hotspot.

MECHA should connect to **MECHA-PHONE** after a short while.

As a result:

- MECHA is connected to a Wi-Fi network with internet access, provided 3G, 4G, or other cellular data is available on your smartphone.
- This enables downloads of presets from the server, updates, and the use of your phone for internet browsing as usual.
- MECHA will always be accessible at 192.168.43.101

To ensure continuous connectivity, simply turn on the **MECHA-PHONE** hotspot when powering on MECHA and keep it enabled while using MECHA. For example, disable any automatic turn-off feature for the hotspot on your smartphone.

Now your device is connected to the internet and to MECHA, allowing you to download presets from the server.

Panorama Using MECHA's Buttons


Panorama with Automatic Shooting Pattern Using Only the MECHA's Buttons








This method requires the firmware version (1)2118 or newer and works for rectilinear lenses from 10 to 200mm (FF equivalent).

The shooting pattern will be computed by MECHA based on a few button presses, without using the User Interface, as follows:

- First, position the upper rail in the **level** position using the left/right buttons.



- Place a **sheet of paper in front of MECHA** so that it fills the frame. The frame can be viewed through the viewfinder or through live view. Instead of a sheet of paper, any well-defined feature or image on a screen, or other means, can be used. A gray sheet of paper will work best for exposure purposes.
- The camera and lens must be set the same as for shooting the actual panorama.
- Enter the code **31<**. After entering the code, MECHA waits for two quick presses of its power button, , as follows:
 - The **first** press is to trigger the camera.
 - The **second** press is after the camera has been triggered.

- After that, MECHA will rotate slowly to the right and wait for another **press of its power button**, , right after the sheet of paper is out of the camera's frame.
- Then MECHA will go back to the initial position and start to slowly tilt down. Again, it waits for **another press of its power button**, , when the sheet of paper is out of the camera's frame.
- Then MECHA will go back to the initial position, and
- the characters  are shown on the display. MECHA waits (15 seconds) for one of the , , or  buttons to be pressed to assign the computed preset to that particular button. To cancel the assignment, press the power button, , instead.

If MECHA is unable to compute a pattern using the feedback received when its power button is pressed (mostly because of too small intervals), the display will show “!!!”, which indicates that there is no change.

To execute the panorama computed by MECHA, make sure the upper rail is in the **level** position and press the button to which you have assigned the panorama. Then press either the left or right button.

MECHA's Current Codes

The controller buttons allow you to quickly perform some operations and can be an alternative to the User Interface in most cases.

See below the equivalence between buttons and characters:



For example, to enter the code **1<**, use the buttons. This code executes the preset *Button 1* to the left.



To be able to enter codes, make sure C2 operates in *Advanced Mode* (see the (C) *Config Menu*, C1o *SIMPLE / ADVANCED MODE* option).

All codes end with either the > or < sign, which usually tells MECHA to execute the preset to the right or to the left.

See all standard current codes below.



Please note that the power button, , can always be used as an emergency stop if necessary, except for the speed calibration procedure.

Current Codes List

1< or 1>

Executes the preset *Button 1* to the left or right.

By default, this preset consists of four shots around or is the preset saved with the *[Save1]* UI button.

2< or 2>

Executes the preset *Button 2* to the left or right.

By default, this preset consists of six shots around or is the preset saved with the *[Save2]* UI button.

3< or 3>

Executes the preset *Button 3* to the left or right.

By default, this preset consists of eight shots around or is the preset saved with the *[Save3]* UI button.

131< or 131>

Executes a panorama of six shots around to the left or right.

132< or 132>

Executes a panorama of 12 shots around to the left or right.

1312< or 1312>

Executes a panorama of 12 shots around, arranged in 3 rows – at 0° and +/- 45° – plus zenith and nadir, to the left or right. The lower rotator must be **parked** (oriented upward) as for the zenith photo.

1313< or 1313>

The same as 1312, but with the upper rotator in the **level** position. First time, please test the codes without a camera mounted on the panoramic head.

1321< or 1321>

The same as 1312, but with the upper rotator in the **raised** position. First time, please test the codes without a camera mounted on the panoramic head.

121< → C1₂ MECHA ID

Shows the MECHA's ID, like "123ABC".

123< → C1₃ MAC ADDRESS

Shows the **entire** MAC address, like "123ABC123ABC".

323< → C1₄ IP ADDRESS



Shows the **full** IP address, like "192.168.0.100".

321<

Shows the **last** part of the IP address, starting with a dot, like ".100".

If "AAA" is shown, MECHA is in AP mode, and the IP address is 192.168.8.1

If "!!!" is shown, it means the Wi-Fi is OFF.

If either ".0" or "0.0.0.0" is shown, MECHA is not in AP mode, nor does it have an IP assigned. In this case, a restart, then pressing the  button for 3 seconds when  is shown on the display will enable AP mode and allow access to the web interface at 192.168.8.1

13< → C1₅ BATTERY PERCENTAGE


Shows the Battery percentage/voltage.

131313< → C8₁ REBOOT

Reboots MECHA without power cycling it.

This is useful when you want MECHA to reboot (say, to enable Wi-Fi or change the AP-STA mode) without disengaging the motors. Thus, the camera will not move due to gravity or other causes.

21< → C2₀ STEP by STEP

Switches MECHA **to** or **off** pause mode, the same as clicking the [PAUSE] button on the UI, or using the  button on IR Remote.


2121< → C8₆ LESS NOISE E is ENABLED/DISABLED

Code to enable/disable noise reduction for E rotators.

23< → C2₁ MOTOR 1 is ENABLED/DISABLED

Enables/Disables motor 1.



Before disabling the upper motor (MOTOR 2), we recommend positioning MECHA in the **parked** position using the  button, for example, to avoid a sudden change of position in case of heavy cameras. Please see [Simple Rotations](#) and [Parked, Level and Raised Positions](#) at the beginning of this guide.

2313< → C2₂ MOTOR 2 is ENABLED/DISABLED

Enables/Disables motor 2.

2312< → C2₃ DISABLE/ENABLE MOTOR 1&2

Disables/Enables both motors.

The UI *[Reboot]* command will be ignored if the motors are disabled.


While the motors are disabled, the power icon blinks in the UI, and C2's display shows **1 DS, 2 DS** instead of 1 R, 2 R (where R represents the rotators used).

Also, while one motor is disabled, if you press the directional buttons corresponding to the second motor, the second motor will also be disabled. When enabling the motors, regardless of which motor you enable, both will be enabled.


Disabling the motors is useful to prevent MECHA from turning accidentally in some cases, for kids' protection, or to simulate MECHA's functioning for learning purposes, and when you want to be able to rotate the rotators by hand. There are other applications not listed here.




31<

Code for automatic shooting pattern computed by MECHA, without using the UI. After entering the code **31<**, MECHA waits for two quick presses of


the  button: first to trigger the camera and second after the camera is triggered.

Please see [Panorama with Automatic Shooting Pattern...](#) for details.

After that, MECHA will rotate slowly to the right and wait for another press of the  button, right after the sheet of paper is out of the camera's frame.

Then MECHA will return to its initial position and wait for one of the , , or  buttons to be pressed to assign the computed preset to that particular button.

To cancel the assignment, press the  button instead.

For single-axis applications, after the first row, MECHA will enter pause mode. The vertical axis should be tilted manually to continue to a full spherical panorama. If only a cylindrical panorama is needed or no manual tilt is possible, press the  button.


32<

Similar to the code **31<**, but fisheye lenses can also be used.

Also, **32<** uses a small feature centered in the frame as a reference point, for example, below the central focus point.

12321< → C7₂ BACKLASH 1 COMPENSATION

Backlash compensation calibration for the lower rotator.



After entering the code, MECHA will turn slowly to the right. After that, press the  button when you see or feel that MECHA starts moving very slightly to the left.

You can use the viewfinder, live view with zoom, or other attached devices, like a laser pointer, etc., or simply feel by hand when that small movement begins.

At the end, the display will show something like ":24", where 24 is the new calibration factor (it should be around this value).

You can enter the code again if you want a better result or have more

precise ways to determine the small movement.

You can cancel the procedure by pressing any other button when the power symbol, , flashes on the display, or press the  button right after it starts flashing to have no compensation at all. Otherwise, it will time out in 5 minutes if no buttons are pressed.

123212< → C7₃ BACKLASH 2 COMPENSATION

Backlash compensation calibration for the upper rotator, similar to the code above.



TIP: If you have an R1 with a camera in portrait mode, with the grip up and no live view, and you have to look through the viewfinder to see when the small movement begins, you can look with your left eye, and there is no need to close the right eye.

If the grip is mounted to the bottom of the camera, you can look with your right eye, and there is no need to close the left one.

This will make the process more bearable.

123123<

Speed calibration for the lower rotator.

The procedure takes **1 hour** and is silent; the motor is not moving.

Please wait until MECHA turns OFF automatically, and don't use the web interface during this time.

This is a one-time procedure, which you can omit if you wish, as the default factory calibration is good.

It cannot be canceled once started.

1231232<

Speed calibration for the upper rotator, similar to the code above.



Both **backlash compensation** and **speed calibration** codes can be used only if they are absolutely necessary for your application. Both procedures save the results automatically.

The **speed calibration** makes the RPM value set in the interface as close as possible to the same calculated RPM value.

Backlash compensation is to compensate for the backlash of the gear assembly, to have a better precision for left-right movements, like rewinding to the initial position for cable protection (in case of C1), or in case of partial panoramas and time-lapse.

The procedure can be repeated after a longer period of time, after gear wear. If you hear or see a slight right-left movement when starting the unit, compensation is set. Otherwise, the compensation is 0, or is not set.

3212< → C8₂ FIRMWARE VERSION

Shows the firmware version on the display. The code **32123<** can be used to update the firmware, provided MECHA has internet access or is connected to a Wi-Fi network with internet access that it was previously connected to.

32123<

Updates the firmware if possible. To update the firmware using the code **32123<**, MECHA must be in *STA* or *AP+STA* mode and connected to a Wi-Fi network with internet access before entering the code. Depending on the *Default Mode* setting, it may be necessary to temporarily enable *STA* or *AP+STA* mode at startup via buttons, then enter the code **32123<**. MECHA will display "*No update found*" on the display if the update cannot be done at that time, or "*!!!!*" if there is no internet connection.


312123< → C8₃ UPDATE USING H-SPOT

Update the firmware using a hotspot named **MECHA-UPDATE** with the password **87654321** (default). The hotspot must be created and active before entering the code.

312< → C8₀ UPDATE

Re-updates the current firmware.

3231<

Code for testing the IR Remote. After the code is entered, MECHA will not execute the commands received from the IR Commander's buttons. Instead, it will only beep and show on its display the code of the button pressed (after the button is released) and over the battery symbol in the UI. To end the test, press the power button, .



3232< → C6₀ USE NN IR or SW is ON/OFF

Allows you to enable/disable the use of Nodal Ninja IR Remote.



3123<

This code will temporarily switch MECHA from **AP** to **STA** mode and connect it to the last Wi-Fi network if the last Wi-Fi network is detected by MECHA.

2313< → C3₀ CHANGE SENSE LEFT-RIGHT

Changes the sense of left/right rotation when it is done manually using the  and  buttons.

2323< → C3₁ CHANGE SENSE UP-DOWN

Changes the sense of up/down rotation when it is done manually using the  and  buttons.

The following codes should match with the current rotators connected to the controller.

13131< → C7₀ ROTATOR 1 is E1

Sets E1 as the lower rotator.

13132< → C7₀ ROTATOR 1 is E2

Sets E2 as the lower rotator.

13121< → C7₀ ROTATOR 1 is P1

Sets P1 as the lower rotator.

23131< → C7₁ ROTATOR 2 is E1

Sets E1 as the upper rotator.

23132< → C7₁ ROTATOR 2 is E2

Sets E2 as the upper rotator.

23121< → C7₁ ROTATOR 2 is P1

Sets P1 as the upper rotator.

231231< → C8₄ RESET CONFIG. TO DEFAULT!

Resets the configuration settings to their default values, for example: SSID password → **12345678**, Password for *Configuration* page → **Mecha**, Hotspot password for firmware update → **87654321**, Default Mode → **AP**. This code needs to be entered twice, as follows:

1) Enter **231231<** and wait until the display shows *"please execute again, then press power"*.

2) Then, enter **231231<** again.


When the power symbol starts flashing on the display, press the  button (short press).

231231231< → C8₅ FACTORY RESET!

This code will restore your MECHA to its original factory settings and needs to be entered twice, as follows:

1) Enter **231231231**< and wait until the display shows "*please execute again, then press power*".

2) Then, enter **231231231**< again.

When the power symbol starts flashing on the display, press the  button (short press).

Appendix

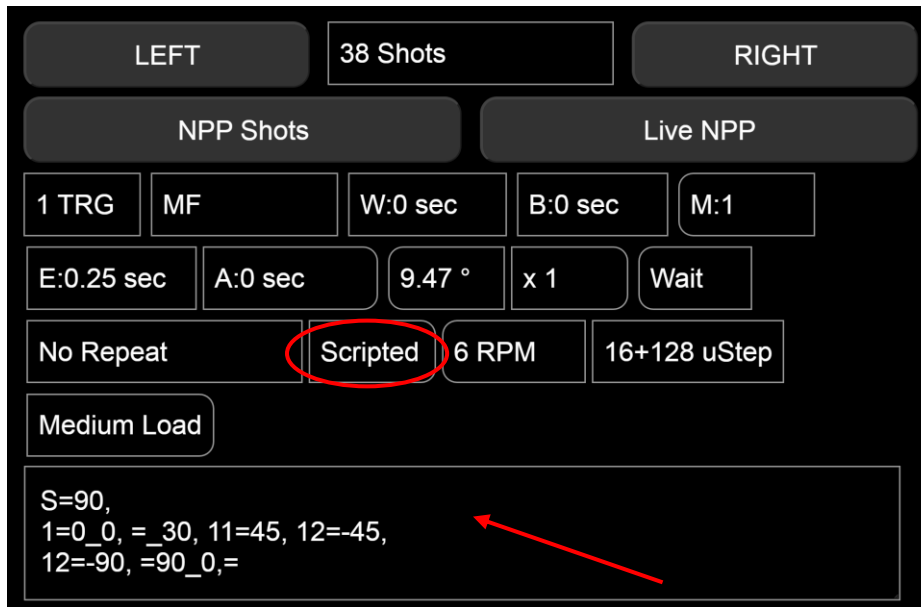
MECHA's S (Shots) Language

The S Language requires firmware (1)2054 or newer.

In this chapter, we will explain how to create a script for your desired shooting pattern.

The S language is Shots-oriented, and it can be used for both single-axis and dual-axis applications.

Access the *Row* page using the User Interface and select *Scripted*. As a result, a blank text area is displayed where you will write the script.



LEFT 38 Shots RIGHT

NPP Shots Live NPP

1 TRG MF W:0 sec B:0 sec M:1

E:0.25 sec A:0 sec 9.47 ° x 1 Wait

No Repeat **Scripted** 6 RPM 16+128 uStep

Medium Load

S=90,
1=0_0, =_30, 11=45, 12=-45,
12=-90, =90_0,=

The script starts with the initial position of MECHA, as follows:

`S={position in degrees}`



Please note that MECHA's position usually refers to the position/orientation of the rail/device controlled by MECHA.

For dual-axis applications, we commonly have three possible starting positions: (1) **level**, (2) **parked**, and (3) **raised**. To transition between these positions, please see the [Simple Rotations](#) and [Parked, Level and Raised Positions](#) sections at the beginning of this guide.

For example, use the   or   buttons to transition from raised to parked and back.



The naming conventions for starting and ending positions for dual-axis presets available via **More from Server...**

Adjust the position by using the  and  buttons to match the preset before starting the preset.

There are a couple of conventions in the S language, and the most important are as follows:

-	<i>Underscore</i> refers to the lower rotator.
=	<i>Equal sign</i> refers to the upper rotator.
::	<i>Double colon</i> is equivalent to the <i>equal sign</i> .
()	<i>Round brackets</i> indicate a loop.

^

Caret means “relative to the previous position”, and can be used for the upper rotator, as the positions for the lower rotator are always relative to the previous position.

Three-row Panorama + Nadir + Zenith – EXAMPLE 1 (SL)

The MSS example Three-row Panorama + Nadir + Zenith (MSS) can be translated in S Language as follows:

```
S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90, =90_0, =
```

The S Language also accepts precise values for the pause, of integer and float type. For example, **2.5:** means 2.5 seconds. To cancel a pause, you need to set another pause of zero seconds: **0:**

```
S=90, 1=2.5:0_0, =0:_30, 11=45, 12=-45, 12=-90, =90_0, =
```

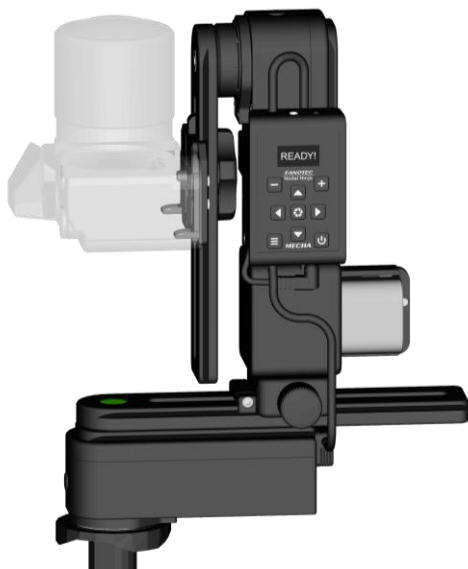
Three-row Panorama + Nadir + Zenith – EXAMPLE 2 (SL)

In the *Script* text area, **::** will be automatically replaced with = (equal sign) to allow easier input from phones.

This example is similar to the previous one. Suppose we want to script a panorama starting from the **parked** position, made of 12 photos arranged in three rows at 0° and at +/- 45°, plus zenith and nadir. In this case, we want **zenith and nadir shots taken last**.

This scripting method is more complex but allows for greater flexibility in shooting patterns.

In the **parked** position, the camera – mounted on the upper rail – faces upward, as shown in the image below. MECHA must rotate the upper rail 90° to photograph the first row, as required in our example. Therefore, we specify the **parked starting position** for the upper rotator as follows: **S=90**.



If the start position is **raised**, **S=-90**. For the **level** position, **S=0**, or **S=** (**S=0** is equivalent to **S=**).

Level	Parked	Raised	Other
S=0	S=90	S=-90	S=-45

After the starting position, we have to specify the details for the **first position** as follows:

{Number of position until the changes occur}
={upper rotator position}_{lower rotator position}

1=0_0

1	Next 1st position for the change to occur
=0	Upper rotator at a tilt or pitch of 0° (thus it does not move)
_0	Lower rotator at a yaw of 0° relative to the previous (thus it does not move)

Assuming the **parked** position, our script becomes:

```
S=90, 1=0_0,
```

Then we have to think about how we want the rotators to move so that we have 12 photos around, 30° apart.

For the next position, the lower rotator rotation will be 30°, while for the upper rotator, the position does not change.

We can write that as **1=0_30**, but S language also allows this compact form instead: **=_30**, by omitting the number 1, and writing the equal sign followed by nothing, meaning no changes for the upper rotator.

So, the script becomes:

```
S=90, 1=0_0,   =_30,
```

The movement for the next 10 positions or photos (as we have only one photo at every position) will continue by changing only the rotation of the lower rotator. Then, at the 11th photo, something changes: the upper rotator should rotate the upper rail up 45°, so we have to add **11=45**, to our script:

```
S=90, 1=0_0,   =_30, 11=45,
```

Then, for the next 11 positions, things will continue in the same manner. At the 12th photo, the upper rotator should rotate down 45° (-45)°. So, we have to add **12=-45**, to our script, and it becomes:

```
S=90, 1=0_0,   =_30, 11=45, 12=-45,
```

As in the previous row, things go the same for another 11 photos. At the 12th photo, the upper rotator has to rotate at -90° , which is the position for nadir. So, we have to add **12=-90**, and the script becomes:

```
S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90,
```

Finally, we only need a position for the zenith photo at 0° from the nadir for the lower rotator. So, we have to add **=90_0**; **_0** is to tell that the previous position and the next position are 0° apart.

Now the script is:

```
S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90, =90_0,
```

To complete the script, now we can add an equal sign **=**, which in other cases can be omitted. Our final script is:

```
S=90, 1=0_0, =_30, 11=45, 12=-45, 12=-90, =90_0, =
```

which you can see in the above image as well.

Just a side note: The script allows having some pieces of the code in a loop, and much less code to enter, especially in the case of gigapixel panoramas. This feature will be exemplified later.

Before launching the panorama, enter 38 in the *number of shots* field via the *Custom* option, then click/tap either the *[RIGHT]* or *[LEFT]* button.

We will explain in another example how to tell MECHA to wait or take extra shots in a particular orientation, and so on.

Panorama Using Loop in Script – EXAMPLE 3 (SL)

```
S=90, 1=0_0, =10(^3_30, ^=3), =10(^-3_30, ^=-3),
```

S=90, — Start from **parked** position.

1=0_0, — The first position is at **=0_0**

=10(^3_30, — From the next position, we will start a loop (round brackets) **10** times that sets horizontal rotations of **30°** from the previous position,
=^3), — and the upper rotator tilts **3°** from the previous position (specified by the ^ sign).

In the loop, we have only the tilting of **3°** for the upper rotator, and no changes for the horizontal interval.

The above loop repeats with **-3°** instead of **3°** for the upper rotator:

=10(^-3_30, ^=^-3),

Panorama with Extra Shots and Pause – EXAMPLE 4 (SL)

A script for 28mm on a full-frame camera:

- 2 images 90° apart for both zenith and nadir.
- 2 rows of 10 shots at 45° above & below horizontal.
- 12 shots around for the horizontal. 36 shots in total.
- Start in **parked** position (zenith), and end in **raised** position (nadir).

```
S=90, 1=0_0, =_30, 11=-45, =_36, 9=45, 10=90, =_90,
=-90_0, =_-90, =
```

S=90, — The starting position is parked.

1=0_0, — The first shot is at 0,0 (no rotation).

=_30, — The next shot is at the same tilt but 30° apart and will keep going so.

11=-45, — Then, at the 11th shot from the previous change, the tilt becomes -45°.

=_36, — The next shot is at the same tilt but 36° apart and will keep going so.

9=45, — Then, at the 9th shot from the previous change, the tilt becomes 45°.

-10=90, — Then, at the 10th shot from the previous change, the tilt becomes 90° for zenith.

=_90, — The next shot is at the same tilt but 90° apart (the second zenith shot).

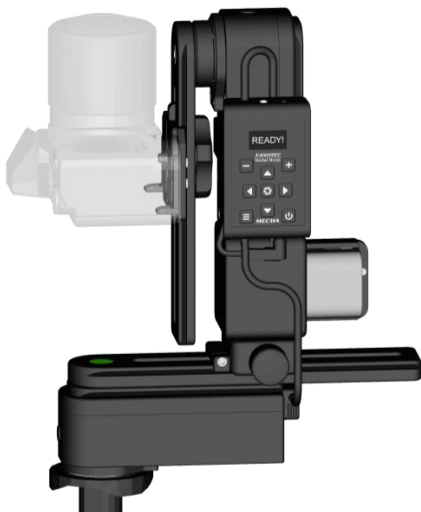
=-90_0, — Then, at the next shot, the tilt becomes -90° for nadir.

=_-90, — The next shot is at the same tilt but 90° apart (the second nadir shot).

= — End.


To end in the parked position, as it started, to repeat it again and again:

```
S=90, 1=0_0, =_30, 11=-45, =_36, 9=45, 10=90, =_90,
=-90_0, =_-90, =90
```



When the camera is facing up, and its buttons and display are not accessible, you can add P to the first shot:

1=P0_0,

MECHA will pause before the first shot and will continue only after you click the *[PAUSE]* button on UI or press the  button on the controller.

C2 – C1 Differences and Similarities

- C2 can be connected to two rotators, allowing it to control them simultaneously.

- C1 can only control one rotator at a time.



For dual-axis applications, you need either one C2 Controller and two rotators or two C1 Controllers and two rotators.





- The C2 Controller connects to the rotators with its built-in cable.
 - The C1 Controller connects wirelessly to another C1, allowing two C1 Controllers to be assembled in a DAC (Dual Axis Combo) configuration to control two axes.
- The C2's battery is external and can be quickly replaced when needed.
 - C1 has a built-in battery that lasts for one day after a full charge and can be charged from a power bank or outlet adapter even while it is in use.

Both systems allow MECHA to operate non-stop.







- **READY!** C2 has a 0.96-inch OLED display showing various data, including presets for shooting panoramas, code names, and warnings.




Codes are special, predefined numerical combinations used to get information from MECHA or ask it to perform various operations.


- C1 has no display but has five LEDs with a similar functionality.
- C2 has nine buttons; C1 has six.
 -  The minus button of C2 is the equivalent to the  button of C1. It comes pre-programmed with 4 shots around. It can also be used to enter the number 1 or, when long-pressed, execute *favorite code 1*. Other special functions include adjusting values in preset editing mode, deleting presets created in C2's menu.

-  The plus button of C2 is equivalent to the  button of C1. It comes pre-programmed with 6 shots around. It can also be used to enter the number 2 or, when long-pressed, execute *favorite code 2*. Other special functions include adjusting values in preset editing mode, creating presets, and accessing edit mode.
-  The menu button of C2 is equivalent to the  button of C1. It comes pre-programmed with 8 shots around. It can also be used to enter the number 3. Other special functions include long-pressing to show C2's menus and switching between menus.


NOTE. When we refer the MECHA's buttons or simply "the buttons", we are actually referring to the controller buttons.

Number-button equivalence			
numbers	1	2	3
C2 buttons			
C1 buttons			

-  On both C1 and C2, the left and right buttons are used to rotate the system manually left and right, respectively. They also specify direction when launching a preset using the controller buttons and act as terminators for codes (similar to the Enter key). They function as navigation buttons as well.
-  On C2, the up and down buttons control the up and down movement of the upper rotator when two rotators are used. They also serve as navigation buttons.
 - On the Dual Axis Combo, the left and right buttons of the upper C1, , act as up and down buttons and control the upper rotator.

-  The center button of C2 has a camera trigger function and confirms the execution of a code or preset selected from the menu or confirms the adjustment of values when editing a preset.

A code can be entered using C2's buttons and can also be selected from the *C2 (C) Config Menu*.

- There is no C1 equivalent for the above button.
-  On both C1 and C2, the power button is used to power on/off MECHA, confirm or cancel operations, and enter the number 0 (zero) when entering power codes.

Power codes are codes that start with zero.

- Both C1 and C2 support IR or wired remote control.
- Both C1 and C2 can be controlled using the User Interface and their own buttons.
- Both C1 and C2 use Wi-Fi for connection, allowing them to be accessed directly by phone, via a Wi-Fi network, or even via the internet with a connected device.
- For complex tasks or assigning complex tasks to a single button, the User Interface can be used on both C1 and C2.




<https://youtu.be/gB35eNUIEEE>

Comparison between the MECHA C1 and C2 Controllers

MECHA C2 OLED Images

(C) Config Menu

C 1 ₀ 2 3 4 5 6 7 8 SIMPLE MODE is ON	C 1 ₁ 2 3 4 5 6 7 8 USER'S GUIDE QR Code	
C 1 ₂ 2 3 4 5 6 7 8 MECHA ID	C 1 ₃ 2 3 4 5 6 7 8 MAC ADDRESS	C 1 ₄ 2 3 4 5 6 7 8 IP ADDRESS
C 1 ₅ 2 3 4 5 6 7 8 BATTERY PERCENTAGE	C 1 ₆ 2 3 4 5 6 7 8 BATT. WARNING AT 12.00 V	C 1 ₇ 2 3 4 5 6 7 8 ALWAYS ON NO POWER OFF
C 1 ₈ 2 3 4 5 6 7 8 FCC ID	C 1 ₉ 2 3 4 5 6 7 8 + ASSISTANT is OFF	C 1 2 ₀ 3 4 5 6 7 8 STEP by STEP is OFF
C 1 2 ₁ 3 4 5 6 7 8 MOTOR 1 is ENABLED	C 1 2 ₂ 3 4 5 6 7 8 MOTOR 2 is ENABLED	C 1 2 ₃ 3 4 5 6 7 8 DISABLE MOTOR 1 & 2
C 1 2 ₄ 3 4 5 6 7 8 DEGREES MOVE is ON	C 1 2 3 ₀ 4 5 6 7 8 CHANGE SENSE LEFT-RIGHT	C 1 2 3 ₁ 4 5 6 7 8 CHANGE SENSE UP-DOWN
C 1 2 3 ₂ 4 5 6 7 8 ARROWS speed 4.0 RPM	C 1 2 3 ₃ 4 5 6 7 8 INTERVAL 1 [-] 45.0 deg.	C 1 2 3 ₄ 4 5 6 7 8 Interval 1 speed 3.5 RPM

C 1 2 <u>3₅</u> 4 5 6 7 8 INTERVAL 2 [+] 90.0 deg.	C 1 2 <u>3₆</u> 4 5 6 7 8 Interval 2 speed 3.5 RPM	C 1 2 <u>3₇</u> 4 5 6 7 8 INTERVAL 3 [=] 180.0 deg.
C 1 2 <u>3₈</u> 4 5 6 7 8 Interval 3 speed 3.5 RPM	C 1 2 <u>3₉</u> 4 5 6 7 8 LEVEL AMOUNT 90.0 deg.	C 1 2 3 <u>4₀</u> 5 6 7 8 SHOW HINTS is OFF
C 1 2 3 <u>4₁</u> 5 6 7 8 Default Wi-Fi is AP + STA	C 1 2 3 <u>4₂</u> 5 6 7 8 CONNECT TO Wi-Fi	C 1 2 3 <u>4₃</u> 5 6 7 8 Wi-Fi TEST <u>0 1 2 3 4 5 6 7 8 9</u>
C 1 2 3 <u>4₄</u> 5 6 7 8 KEEP PAGE is OFF	C 1 2 3 4 5 <u>6₀</u> 7 8 USE NN IR or SW is ON	C 1 2 3 4 5 <u>6₁</u> 7 8 IR REMOTE TEST
C 1 2 3 4 5 <u>6₂</u> 7 8 at SHOOT, OLED is ON	C 1 2 3 4 5 <u>6₃</u> 7 8 OLED TEST	C 1 2 3 4 5 <u>6₄</u> 7 8 OLED Brightness 1
C 1 2 3 4 5 <u>6₅</u> 7 8 OLED Offset X 0	C 1 2 3 4 5 <u>6₆</u> 7 8 OLED Offset Y 0	C 1 2 3 4 5 <u>6₇</u> 7 8 Shutter CONF. TEST
C 1 2 3 4 5 <u>6₈</u> 7 8 RAW Interface is ENABLED	C 1 2 3 4 5 <u>6₉</u> 7 8 BETA feat. is ENABLED	C 1 2 3 4 5 6 <u>7₀</u> 8 ROTATOR 1 is AUTO
C 1 2 3 4 5 6 <u>7₁</u> 8 ROTATOR 2 is AUTO	C 1 2 3 4 5 6 <u>7₂</u> 8 BACKLASH 1 COMPENSATION	C 1 2 3 4 5 6 <u>7₃</u> 8 BACKLASH 2 COMPENSATION
C 1 2 3 4 5 6 <u>7₄</u> 8 i3 REAL MOVE 1 0.0	C 1 2 3 4 5 6 <u>7₅</u> 8 i3 REAL MOVE 2 0.0	C 1 2 3 4 5 6 <u>7₆</u> 8 ZENITH POS. 90.0 deg.

C 1 2 3 4 5 6 7 8 NADIR POS. -90.0 deg.	C 1 2 3 4 5 6 7 8 ROT. 2 SENSOR is ENABLED	C 1 2 3 4 5 6 7 8 ROT. 2 is Up ROT. 1 is Down
C 1 2 3 4 5 6 7 8 UPDATE	C 1 2 3 4 5 6 7 8 REBOOT	C 1 2 3 4 5 6 7 8 FIRMWARE VERSION
C 1 2 3 4 5 6 7 8 UPDATE USING H-SPOT	C 1 2 3 4 5 6 7 8 RESET CONFIG. TO DEFAULT !	C 1 2 3 4 5 6 7 8 FACTORY RESET !
C 1 2 3 4 5 6 7 8 LESS NOISE E is ENABLED	C 1 2 3 4 5 6 7 8 QUIET - LOUD BEEP	

(P) Preset Menu

P 1 2 3 4 5 6 7 8 SIMPLE ROTATIONS	P 1 2 3 4 5 6 7 8 PANORAMA TEST SINGLE 6	P 1 2 3 4 5 6 7 8 PANORAMA TEST PARKED
P 1 2 3 4 5 6 7 8 PANORAMA TEST LEVEL	P 1 2 3 4 5 6 7 8 PANORAMA TEST RAISED	P 1 2 3 4 5 6 7 8 KIT LENS 18(29) LEVEL
P 1 2 3 4 5 6 7 8 + FE 12mm NZ Level		

Raw Interface



<https://youtu.be/Fxqge2pDsCI>

MECHA's Raw Interface – C2 Controller

MECHA can be controlled mainly from the User Interface or by using the controller buttons. There is also a Raw Interface, which allows third-party applications and any user to control MECHA through a series of parameters and commands presented below.

Connect to MECHA's Wi-Fi network using your phone or computer. Then, access the `/config` page and check the **Enable RAW Interface** checkbox (disabled by default). Click the `[Apply]` button.

Access the Raw Interface at one of the addresses below. On page `/i`, the MECHA status is outputted in XML format, and on page `/ij`, in JSON format.

```
http://mecha-IP/i    or    http://mecha-IP/ij
/replace mecha-IP with the static or dynamic IP address as
appropriate
```



In this chapter, we will access the `/i` page by using **MECHA's static IP address (192.168.8.1)**. Please use the dynamic IP address if you are connecting to MECHA's network using a computer.

```
http://192.168.8.1/i
```

For a Dual Axis MECHA C2-E1-E1, the page above displays data similar to the example below in **XML format**:


```

<xml>
<m0> 2</m0> /controller type
<m1> MECHA-664B83</m1> /MECHA ID
<m2> 12349</m2> /firmware version
<m3> 88%</m3> /battery level
<m4> 0</m4> /m4 becomes 1 when the power button is pressed
during the execution of commands
<r1> 7536</r1> /number of full steps per revolution for
rotator 1 (lower rotator)
<r2> 7536</r2> /number of full steps per revolution for
rotator 2 (upper rotator)
<d1> 0.00</d1> /yaw
<d2> 0.00</d2> /tilt
<d3> 0</d3> /position (in degrees) along the axis 3
<d4> 0</d4> /position (in degrees) along the axis 4
<i1> 090000</i1> /a feature in development at the moment
</xml>

```

As mentioned before, to get the status in JSON format, access the `/ij` page:

```
http://192.168.8.1/ij
```

Output in **JSON format**:

```

{
  "m0":2, /controller type
  "m1":"MECHA-664B83", /MECHA ID
  "m2":"12349", /firmware version
  "m3":"88%", /battery level
  "m4":0, /m4 becomes 1 when the power button is pressed during
the execution of commands

```

```

"r1":7536, /number of full steps per revolution for rotator 1
(lower rotator)
"r2":7536, /number of full steps per revolution for rotator 2
(upper rotator)
"d1":0.00, /yaw
"d2":0.00, /tilt
"d3":0, /position (in degrees) along the axis 3
"d4":0, /position (in degrees) along the axis 4
"i1":090000 /a feature in development at the moment
}

```

The positions along axes 3 and 4 are only available if these axes (or rotators) exist.



The resolution of the C2 OLED display is **128x64** pixels, which you need to take into account when specifying the position of the text on the OLED display.



View the result of some commands directly on the OLED display or on the virtual display on the */i-example* page.

Commands for Displaying Text and Symbols on C2's OLED

text

Use the **text** parameter to display a text on C2's OLED. Provide the actual text and its properties (size, vertical/horizontal position, and background) as in the examples below.

```
http://192.168.8.1/i?text=[1,10,35]HELLO
```

- The first property in square brackets is the **font size** and can be:
 - 1 (small)
 - 2 (medium)
 - 3 (large)
- The second property is the **vertical position** – the distance in pixels from the top edge of the OLED display to the middle of the text.
- The third property is the **horizontal position** – the distance in pixels from the left edge of the OLED display to the middle of the text.
- After the square bracket, specify the **text to be displayed** on the OLED display.

The OLED will show:



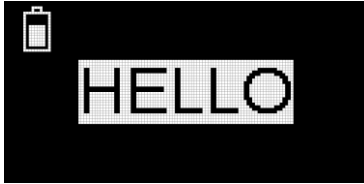
- The text will be **centered** if the horizontal and vertical positions are omitted (do not omit commas).

```
http://192.168.8.1/i?text=[3,,]HELLO
```



- The number 1 before the font size means **white background** text.

```
http://192.168.8.1/i?text=[13,,]HELLO
```



- **By default**, the font size is 2 (medium), and the text is displayed centered horizontally and vertically on a black background. The default values can be omitted.

```
http://192.168.8.1/i?text=HELLO
```



- Display multiple lines of text on the OLED display by using the text parameter only once.

```
http://192.168.8.1/?text=[3,0,0]HELLO[2,54,0]Press [=] to exit.&nb
```



nb — no battery

By default, the battery symbol is also displayed in the upper left corner of the OLED. Add the **nb** parameter to the URL to hide it.

```
http://192.168.8.1/i?text=HELLO&nb
```

Rotator Specific Commands

Usually, we use index 1 to refer to the lower rotator of a Dual Axis MECHA and index 2 to refer to the upper rotator. The Raw Interface accepts commands for up to four rotators.

***sp** — rotational speed

sp1 .. sp4 parameters can take values from 0.1 to 12.

```
http://192.168.8.1/i?sp1=7
```

***ms** — number of microsteps per step

For a number consisting of four or five digits, the first two digits apply to the regions where the movement is accelerated (*mcstep*), and the rest of the digits apply to the regions where the movement is done at a constant speed (*mcstepcs*).

ms1 .. ms4 can take the following values:

- 1632: *mcstep*=16; *mcstepcs*=32;
- 1664: *mcstep*=16; *mcstepcs*=64;
- 16128: *mcstep*=16; *mcstepcs*=128;
- 3264: *mcstep*=32; *mcstepcs*=64;
- 32128: *mcstep*=32; *mcstepcs*=128;
- 64128: *mcstep*=64; *mcstepcs*=128;

```
http://192.168.8.1/i?ms1=16128
```

***pr** — load profile

Valid values for pr1 .. pr4 parameters: light, medium, heavy.

```
http://192.168.8.1/i?pr1=medium
```

The numbered parameters, such as sp1 .. sp4, ms1 .. ms4, and pr1 .. pr4, can be written in a more compact form if their values are equal. For example:

```
sp1=7&sp2=7&sp3=7&sp4=7
```

can be written as:

```
sp=7
```

* MECHA stores the values transmitted via the **sp**, **ms**, and **pr** parameters (both numbered and unnumbered), so you only need to set them once in a work session.

fs — number of full steps per revolution

The fs1 .. fs4 parameters can take the following values, depending on the rotator model:

- E1 Rotator: 7536
- E2 Rotator: 8640
- P1 Rotator: 6000

```
http://192.168.8.1/i?fs1=6000
```

Rotation Commands

rd — relative degrees — Rotation from the current position.

rd1 .. rd4 can take values from 0 to 72000.00 (°).

```
http://192.168.8.1/i?rd1=15&rd2=60
/15° for rotator 1, 60° for rotator 2
http://192.168.8.1/i?rd2=-30
/30° counterclockwise for rotator 2
http://192.168.8.1/i?rd3=45 /45° for rotator 3
http://192.168.8.1/i?rd4=60 /60° for rotator 4
```

ad — absolute degrees — Rotation from the origin, which is either the initial position (or the position after starting MECHA), or the origin computed by MECHA based on the value of **sd** parameter.

ad1 .. ad4 can take values from 0 to 360.00 (°).

```
http://192.168.8.1/i?ad1=15&ad2=60
/15° for rotator 1, 60° for rotator 2
http://192.168.8.1/i?ad2=-30
/30° counterclockwise for rotator 2
http://192.168.8.1/i?ad3=45
/45° for rotator 3
http://192.168.8.1/i?ad4=60
/60° for rotator 4
```

sd — set degrees — Allows you to provide the current position to be used by MECHA to compute the origin.

sd1 .. sd4 can take values from 0 to 360.00 (°).

```
http://192.168.8.1/i?sd1=0&sd2=0
/sets 0° as current position for both rotator 1 and 2, so the
computed origin will also be at 0°
http://192.168.8.1/i?sd2=30
/sets 30° as the current position for rotator 2, so the
computed origin will be at -30°
```

Commands Related to Signals

focus — duration of the auto-focus signal

Valid values for focus: 0 to 32767 (ms).

```
http://192.168.8.1/i?focus=1000 /1000 ms
```

shutter — duration of the shutter button signal

Valid values for shutter: 0 to 32767 (ms).

```
http://192.168.8.1/i?shutter=2000 /2000 ms
```

Other Commands

synch — ignore commands while moving

If you send commands while MECHA is performing moves, they will be ignored. However, the browser may queue them and therefore execute them by MECHA at the end.

```
http://192.168.8.1/i?rd1=15&rd2=60&synch=1
```

nx — no xml

The **nx** parameter tells MECHA not to produce XML. Use it to shorten the command execution time.

```
http://192.168.8.1/i?rd1=180&rd2=90&sp1=6&nx
```

pause — no action

A period of time in which no action is performed.



```
http://192.168.8.1/i?pause=1000 /1000 ms
```

beep — number of beeps

MECHA will produce the specified number of beeps (values from 1 to 255).

```
http://192.168.8.1/i?beep=2 /2 beep sounds
```

okgo — unlocking the Raw Interface

By pressing the  button during the execution of commands, the Raw Interface will be locked (m4 becomes 1). You can unlock it with the **okgo** parameter.

```
http://192.168.8.1/i?okgo
```

sim — simulation only

The presence of the **sim** parameter in a command tells MECHA not to move the motors, but only simulate the movement and return the values.

```
http://192.168.8.1/i?rd1=15&rd2=60&sim
```

USBRAW — commands for USB

If the *USBRAW* checkbox is checked, the commands are displayed for USB instead of HTTP in the *Console* on the */i-example* page, which is useful for learning purposes.

The RAW interface can be accessed via serial communication using the USB port at 115200 baud. Power on MECHA and wait until the boot sequence ends successfully, then insert the USB cable into MECHA's USB port. MECHA will reboot and the RAW interface can be used via USB.

For example, this command for HTTP:

```
http://192.168.8.1/i?pr1=medium&ms1=32&fs1=7536&fs2=7536&sp1=6.0&rd1=30&rd2=45&synch=true
```

is equivalent to this command for USB:

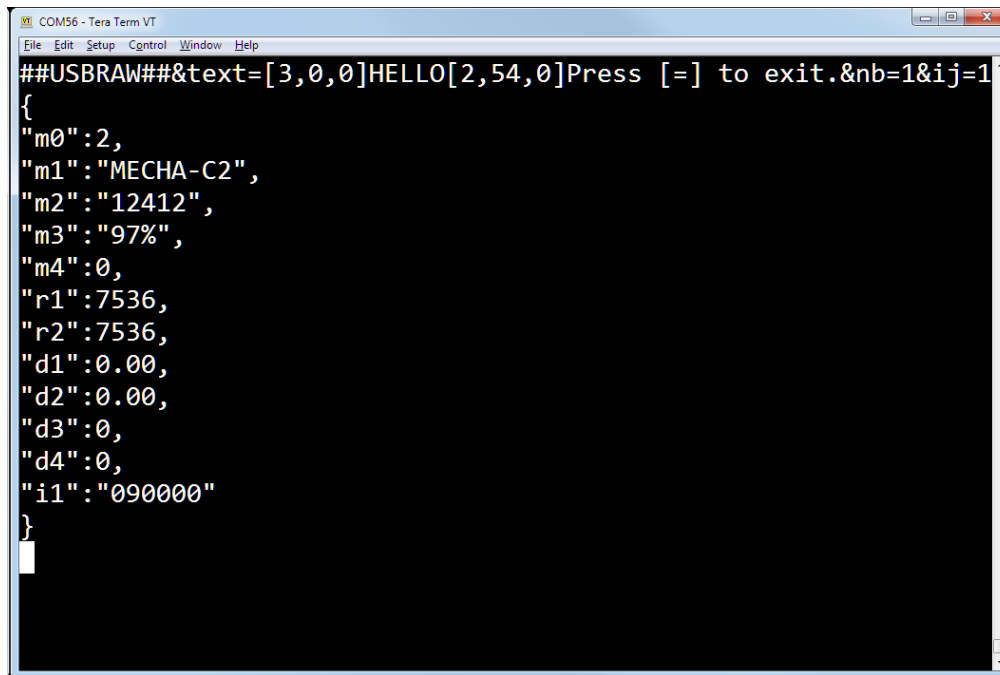
```
##USBRAW##&pr1=medium&ms1=32&fs1=7536&fs2=7536&sp1=6.0&rd1=30&rd2=45&synch=true
```

The result will be a string sent back to USB in XML format.

To get the result in JSON format instead, add the *ij* parameter to the USB command:

```
##USBRAW##&pr1=medium&ms1=32&fs1=7536&fs2=7536&sp1=6.0&rd1=30&rd2=45&synch=true&ij=1
```

Example of a command that displays two lines of text on the OLED display:



```
COM56 - Tera Term VT
File Edit Setup Control Window Help
##USBRAW##&text=[3,0,0]HELLO[2,54,0]Press [=] to exit.&nb=1&ij=1
{
  "m0":2,
  "m1":"MECHA-C2",
  "m2":"12412",
  "m3":"97%",
  "m4":0,
  "r1":7536,
  "r2":7536,
  "d1":0.00,
  "d2":0.00,
  "d3":0,
  "d4":0,
  "i1":"090000"
}
```





Note that all parameters for USB must have a value.

ij=1 added to a USB command is valid, but *ij* is not valid as it has no value.



For multi-parameter commands, keep in mind that the execution order is as follows, regardless of the order of the parameters in the command: 1) okgo, 2) text, 3) nb, 4) focus, 5) shutter, 6) pause, 7) rotation, 8) beep, 9) nx.

Please see some usage examples at

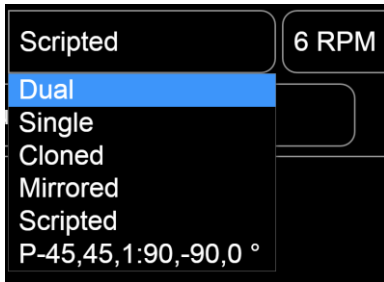
<http://192.168.8.1/i-example>

Chain of Cloned MECHAs

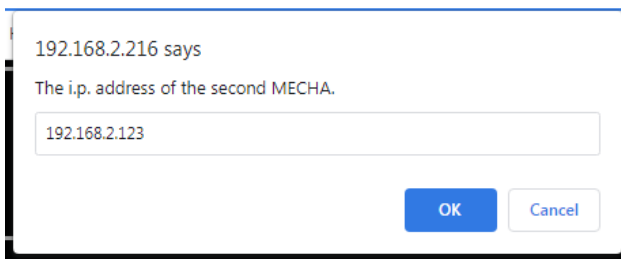
Imagine a series of MECHAs where the first MECHA knows the IP address of the second MECHA, and the second knows the IP of the third MECHA, and so on. This forms a chain of MECHAs. If the first MECHA in the chain – the master – receives a command to execute a certain preset, it can transmit the command to the second MECHA, which then transmits it to the third, and so on. Therefore, all the MECHAs in the chain can execute the same preset simultaneously. This can greatly reduce the time required to perform certain tasks and has other interesting applications.

Here is how you create a chain of MECHAs:

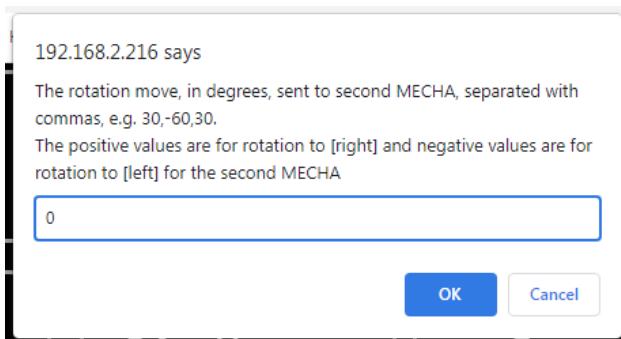
- Access the User Interface of the master MECHA, then:
 - Select *Dual* from the *Single/Dual...* list.



- Enter the IP address of the second MECHA in the displayed dialog box and click OK.



- Another dialog box will appear; enter 0 (zero) in this case.



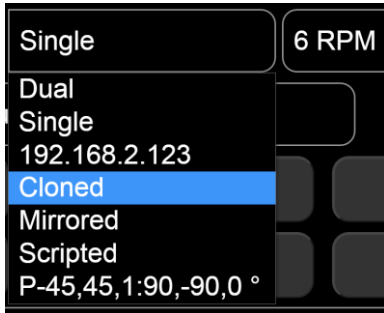
- Access the User Interface of the second MECHA and select *Dual* from the *Single/Dual...* list. Enter the IP address of the third MECHA in the displayed dialog box, then click OK. Another dialog box will appear; enter 0 (zero), as before.

This establishes a connection where the master MECHA knows the IP address of the second MECHA, and the second MECHA knows the IP address of the third MECHA. To add another MECHA to this chain, follow the same procedure.

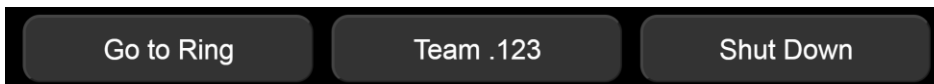
Once the MECHA chain is created, you only need to access the User Interface of the master MECHA.

Select a preset from the *Presets* list or create a new one if needed. Set a long enough *B* value (*Before* – pause before each triggering sequence) to allow command propagation in the chain of MECHAs and avoid desynchronization during preset execution (due to rotation).

For all chained MECHAs to execute the same preset in the same direction, select *Cloned* from the *Single/Dual...* list.



Notice that the IP address of the second MECHA is displayed in the selection list, and the last part of the IP address is displayed on the *[Team]* button.



If you select *Mirrored* from the list, the second MECHA will rotate in the opposite direction to the master, and the third MECHA will rotate in the opposite direction to the second (that is, the same as the first or master), and so on.

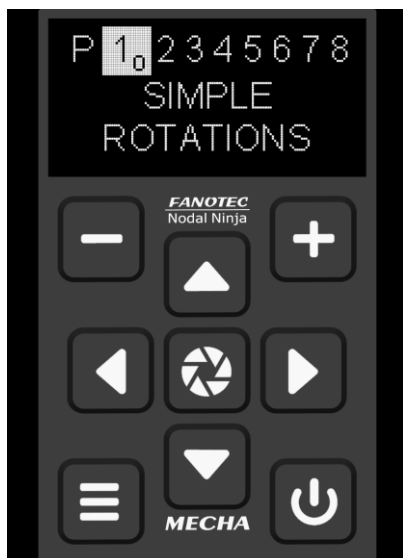
Launch the preset using either the *[RIGHT]* or *[LEFT]* button.



<https://youtu.be/v1Ax6GRh4GU>


Chain of MECHAs

C2 Interface



The C2 interface allows you to control MECHA remotely without touching the C2 Controller buttons.

First, connect your computer or smartphone to MECHA's Wi-Fi network. Then, go to the /c2 page.

 **MECHA's static IP address is 192.168.8.1.** If you are connecting to MECHA's network using a computer, please use the dynamic IP address.

```
http://192.168.8.1/c2
```

The C2 interface emulates the OLED display and physical buttons of the C2 Controller. Depending on your device, click or tap the virtual buttons to send commands similar to pressing the physical buttons of the controller.

What is New

- **Version 3.2.14 – 2024.12.10:**
 - Revised: *Simple/Advanced Mode* – minor changes.
- **Version 3.2.13 – 2024.10.08:**
 - Revised: *Advanced Mode* – second part of the user guide.
- **Version 3.2.12 – 2024.09.26:**
 - Revised: *Simple Mode* – first part of the user guide.
 - Added - link to videos: *Using Your Own Remote Control to Command MECHA, A tour of MECHA's Simplified User Interface, MECHA Overview, Launching a MECHA Preset by Scanning a QR Code, Shooting in a Zigzag Pattern – MECHA C1 and C2 Controllers, Tilt and Number of Positions vs. Pitch and Yaw – MECHA C1 and C2 Controllers, Preset Repeat with MECHA C2 Controller, Panorama Extra Photos with MECHA.*
- **Version 3.2.11 – 2024.08.16:**
 - Added: *C / P Menu* number.
- **Version 3.2.10 – 2024.04.04:**
 - Updated: *Repeat* setting.
 - Added - link to videos: *Settings for Bracketed Photos – MECHA C1 and C2 Controllers, Comparison between the MECHA C1 and C2 Controllers.*
- **Version 3.2.9 – 2023.09.13:**
 - Use of *delay* instead of *pause* for time setting.
- **Version 3.2.8 – 2023.07.17:**
 - The *Repeat* parameter is now editable via the OLED Menu.
 - New URL parameters: *bf* (before), *pf* (profile), *lb* (label).

Useful Links



<https://www.nodalninja.com/Manuals/mecha-card.pdf>

MECHA Quick Reference Card



<https://www.nodalninja.com/manual>

Quick reference guides and complete manuals



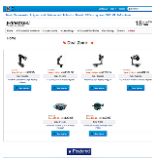
<https://www.youtube.com/user/NodalNinja>

Nodal Ninja YouTube Channel



<https://forum.nodalninja.com/>

Nodal Ninja's Panoramic Photography Forum



<https://www.nodalninja.com/>

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