

MECHA

C1 USER'S GUIDE



June 10, 2025

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MECHA C1 User's Guide



For firmware version **02434** 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/mecha.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 C1 User's Guide!

If you have never used MECHA before, we recommend that you read the introduction first, to get an overview of how it works and what you can do with it. Then read the Single Axis MECHA part and practice according to the instructions.

Once you are familiar with the Single Axis MECHA, if you are interested in Dual Axis MECHA, you can continue with the second part.



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

If you find the firmware update 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!
- Please test for camera clearance before running any program.
- Test any preset supplied or adjusted WITHOUT a camera mounted FIRST, especially when the clearance is not enough.
- CHECK for clearance with shutter cable attached!
- ONLY use a coiled cable for dual axis that can be stretched to about 1m.
- Use short cable with extreme caution.
- The power button, , can always be used as an emergency stop, except for the speed calibration procedure (123123<).
- If the movement is not as expected, or there is any danger for the moving parts to hit something, please press , the power button of MECHA, to stop the movement immediately.

Regulatory Information

Declaration of Conformity

Trade Name: Nodal Ninja Mecha Controller C1

FCC ID: 2AYQJ-C1

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.

Introduction

What is MECHA?



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

MECHA Overview

MECHA is a smart device that can be used to automate the movement or triggering of various devices and pieces of equipment, such as a camera mounted on a panoramic head.

In general, MECHA can rotate anything that can benefit from controlled rotation, not only cameras directly or mounted on a panoramic or ball-head but also turntables holding objects to be photographed or filmed, as well as lights or stands for presentations, to mention just a few.



MECHA consists of two parts: a motorized rotator such as E1, E2, P1, and a controller such as C1 and C2.

In this guide, we are particularly interested in the C1 Controller.

MECHA can be mounted on a tripod and on any other stand that has a mounting screw.

It can rotate along with anything mounted on it or can rotate only the object mounted on it. The rotations and moves can be pre-programmed and launched using its buttons or can be wirelessly launched via its web interface from any device that can run a web browser.

For example, its commands can have equivalent simple QR codes. At an exhibition, scanning a QR code can rotate the featured object at a certain angle without the need to touch the object or the stand. Series of rotations can be pre-programmed and launched wirelessly by visitors or by the host.

It also has support for IR remote – just like a camera has its remote or a TV set has one – and it also supports wired remote (via the AUX port).

The built-in battery of C1 lasts for one day after a full charge, and it can be charged even while it is in use, from a power bank or outlet adapter, thus allowing non-stop operation.

As it uses Wi-Fi for connection, it can be accessed directly with a phone or via a Wi-Fi network, even through the internet, thus the commands can be sent from a few meters away or from anywhere in the world, with a device connected to the internet.

This is a short description of MECHA. A long one could be a dozen, if not hundreds of pages.

MECHA allows both simple and complex operations to be performed, even the most complex ones can be reduced to something as simple as pressing one or two buttons. This is due to its feature that allows very complex sequences to be assigned to one button or to a code.


The ways for programming MECHA range from just asking for MECHA to be programmed remotely by the manufacturer to using its web interface, or exchanging programs with other MECHA users. Each way has its own levels of complexity, from very easy to the most powerful. For example, the web

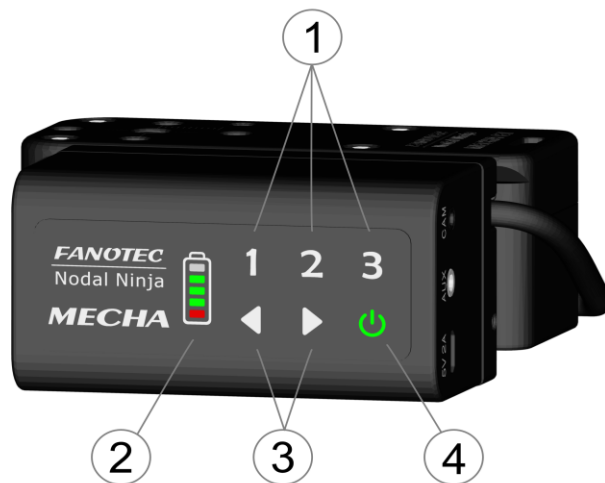
interface can be used to download a preset from the server and use it directly or to download, modify, and then use it. To program presets from scratch, support provided by experts or advanced users can make even programming from scratch easy, considering a starting script that can then be extended and made as complex as needed.

In this user guide, we will focus first on using MECHA to automate the movements of a panoramic head on a single axis, like Fanotec R1, or dual axis, like Nodal Ninja 3 and alike, reducing the panorama shooting to a simple press of a button or two, regardless of its complexity, and doing that without flaws, again and again.

MECHA C1 Presentation

The MECHA C1 Controller has six buttons, three ports, and a cable connector that connects the controller to a motorized rotator, such as E1.

It also has one LED under the power button, , and five LEDs under the battery symbol.



1 — Programmable Buttons

2 — Power / Status LED Indicator

3 — Left / Right Buttons

4 — Power Button

About Buttons

The numerical buttons – **1**, **2**, and **3** – are used to enter some numeric selections or to enter specific codes.



The power button is used to power on/off MECHA, to confirm or cancel some operations, to enter the number 0 (zero) when power codes are entered.



This button comes pre-programmed with 4 shots around. It can also be used to enter the number 1 or to execute the favorite code 1 by long pressing it.



This button comes pre-programmed with 6 shots around. It can also be used to enter the number 2 or to execute the favorite code 2 by long pressing it.



This button comes pre-programmed with 8 shots around. It can also be used to enter the number 3 or to execute the favorite code 3 by long pressing it.




The left and right buttons are used to rotate the system manually to the left and to the right, respectively, and also to specify the direction when launching a preset using the controller buttons, as a terminator for codes (similar to the Enter key).



About UI vs. Codes or Buttons

MECHA can be controlled mainly in two ways: by using the web User Interface (abbreviated UI) and by using its own buttons.

Always start by powering on MECHA by pressing and holding its power button, , for 3 to 5 seconds. A beep will be heard and the LEDs will light up.

Although MECHA can be controlled via its own buttons, sometimes, for more complex tasks or to assign complex tasks to a single button, the UI can be used.

But before diving into assigning complex tasks to buttons, it is worth mentioning that MECHA has a unique set of features – zLM, which stands for zero Learning MECHA – that are specifically designed to allow the use of MECHA without learning something new.

The zLM makes possible this scenario: User calling or chatting with Support and telling:

U: *"I want my MECHA to shoot a panorama 10 shots around, 3 rows, nadir, and zenith."*

S: *"Please press , then , the **right** button."*

And MECHA will do just that.

This will be explained in more detail in the dedicated zLM chapter.

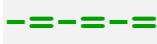
Many tasks, both simple and complex, can be performed either using the UI or the buttons.

About the User Interface

To access the UI of MECHA, a device with an internet browser needs to be used. The simplest and handiest way is a smartphone.

MECHA uses wireless connection, abbreviated Wi-Fi.

It can be set as AP (Access Point), or STA (Station), or even both: AP+STA, as well as no Wi-Fi, in which case the control is possible only by buttons.

The desired mode can be set as default in MECHA's *Configuration* page (more on that later) or by a short press of a button when MECHA expects this, and this is when the LEDs blink alternately:  (splitting lights).

Splitting Lights – Set MECHA in AP, STA, AP+STA Mode



During this period of time:

- By pressing **1**, MECHA will be set in AP mode.
- By pressing **2**, MECHA will be set in STA mode.
- By pressing **3**, MECHA will be set in AP+STA mode.

When MECHA is in AP or AP+STA mode, it broadcasts a SSID with a specific name – the default name contains the word "MECHA" in it – to which the smartphone can be connected using a password, which is 12345678 by default.

Once the smartphone is connected to the MECHA's SSID, the MECHA's User Interface can be accessed in the browser at 192.168.8.1, which is the MECHA's static IP address.

When MECHA is in STA or AP+STA mode, it can also connect to the SSID of a particular network, other than MECHA's own SSID, and as a result, the User Interface of MECHA can also be accessed at the address given in that particular network, like this: 192.168.1.100

As a note, the particular network can be managed by the smartphone itself if on the smartphone a hotspot is enabled and MECHA can connect to it (more on that later).

If, for any reason, the address of the MECHA UI cannot be determined, MECHA can display the UI's address if one of the following codes is entered using MECHA's buttons:

- **321<** will show the last part of the IP address on the LEDs, like .100
- **323<** will show the full IP address on the LEDs, like 192.168.1.100

Table of Equivalences: LEDs – Characters

The conventions for displaying characters on the C1 Controller LEDs are featured in this table.

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |
| ! | . | : | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | A | B | C | D | E | F |


About the Firmware (FW) Update

To benefit from all features implemented in MECHA, update its firmware to the latest version available. The easiest way to update the firmware is via the internet.

To check and perform the update, on the UI there is an *[Update]* button.

If MECHA is not connected to a Wi-Fi with internet access, it will ask for an SSID name and password, just like a guest in your house who asks if there is Wi-Fi available to check something on the internet, a Wi-Fi to which the guest will then connect their phone. The same way, MECHA will use that Wi-Fi in order to download and perform the update.

MECHA is in the idle status after it is powered on, as long as it doesn't execute any preset.

If MECHA is OFF, pressing its power button, , for 3 to 5 seconds, will turn it on, and depending on the configuration, it can take up to 35 seconds until the starting sequence ends, and MECHA reaches the idle status. This time frame will be reduced in future firmware releases.

When MECHA is idle, some codes can be entered to perform specific tasks and tests without using the User Interface. This is useful if you don't know how to use the User Interface yet or you don't want to use the User Interface.

For example, **131>** will perform a test panorama of 6 shots around, 60° apart, in clockwise rotation (CW), while

131< will perform a test panorama of 6 shots around, 60° apart, in counterclockwise rotation (CCW).

These tests can be used for shooting an actual panorama with a fisheye lens on a ring-type panoramic head, like R1, mounted on MECHA.

132> will perform a test panorama of 12 shots around, 30° apart, in clockwise rotation, twice as much as the previous codes, and for counter-clockwise rotation, **132<** can be used.

These tests can also be used for shooting an actual panorama with an 18-55mm kit lens on a panoramic head, such as the NN3, mounted on MECHA.



Whenever you enter codes, press the buttons consecutively, one at a time.

If only one MECHA is used, a cylindrical panorama can be shot automatically, and if the tilting is done manually, even a spherical panorama can be made using the code again for each row, after manual tilting.

When two MECHAs are used, if they are wirelessly connected in DAC, the entire spherical panorama can be done automatically, without the need for manual tilting, using:

- **1313> 1312> 1321>** for clockwise rotation.
- **1313< 1312< 1321<** for counter clockwise rotation.

These codes will shoot a multi-row panorama plus nadir and zenith, the difference being the starting position. The most used is **1313>**.

These 4-digit codes must be entered on the horizontal MECHA, the lower one, when it is idle, in MECHA DAC.

Often, in this guide, we will use the term **preset**, which means a set of settings that can be saved and used when needed to perform specific operations much faster. For example, some presets contain all the information that MECHA needs to execute a whole panorama. You can create your own presets or download presets from the server.

Part 1

Single Axis MECHA

Before First Use

Before using MECHA, we recommend performing specific checks and tests.

First, if you have an R1 or an NN3 model, mount it on MECHA as shown in the images below:




Power On and Test



<https://youtu.be/H5NUuXF1Q14>

Power On and Test – Single Axis MECHA



Power on MECHA by pressing its power button, , for 3 to 5 seconds (long press). It may take about 35-45 seconds to start.





The long press of the power button is only necessary at power on/off. In all other cases, use a normal press.

Assuming that MECHA is mounted as shown in the image above, **without the camera**, let's perform two test rotations.

For a rotation of 90° to the left:

- Press , then quickly press .

For a rotation in the opposite direction, to return to the starting position:

- Press , then quickly press .

For a test panorama, press the following buttons:

-    

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

Now you know how to power on and off MECHA and perform two simple rotations and a test panorama.

We recommend that you perform the above operations a few more times to familiarize yourself with long and normal button presses, then move on to the next section.

Checking the Battery Level



- If no LED lights up, or only a **red** LED lights up, the battery may be discharged. It is recommended to use a 5V-2A charger to charge it. Charging may take 3 to 5 hours.
- Otherwise, if the LEDs light up normally (as shown in the **Power ON and Test** video), you will hear two beeps after 30-40 seconds, and the LEDs below the battery symbol will turn off.







Simple Rotations



<https://youtu.be/075htFzdyaY>

Simple Rotations – Single Axis MECHA

Power on MECHA as shown above.

- For 45° rotations:
 - Press , then quickly press **1**.
 - Press , then quickly press **1** for the opposite direction.
- For 90° rotations:
 - Press , then quickly press **2**.
 - Press , then quickly press **2** for the opposite direction.
- For 180° rotations:
 - Press , then quickly press **3**.
 - Press , then quickly press **3** for the opposite direction.

Note that the rotation angle for the above button combinations can be set on the *Configuration* page.

For **continuous rotation**, press and hold the arrow buttons one at a time.



<https://youtu.be/ejj9EAwrH34>

Simple Rotations 2 – Single Axis MECHA




For example, for continuous left rotation, press and hold

If, for some reasons, you want to **reverse the direction of horizontal simple rotations**, you can use the code **2313<**. After this change, for example, will rotate the system to the right, and to the left. Use the same code to cancel the change.

Note that the above code does not change the rotation of the motor. There is a special code to do that.

Quick Panoramas Using MECHA's Buttons

- **1<** – Press the button, which comes pre-programmed with 4 shots around, then the left button, , to specify the direction of rotation to the left.
- **1>** – Press the button, then the right button, , to specify the direction of rotation to the right.
- **2<** – Press the button, which comes pre-programmed with 6 shots around, then the left button, , to specify the direction of rotation to the left.

- **2>** – Press the **2** button, then the right button, , to specify the direction of rotation to the right.
- **3<** – Press the **3** button, which comes pre-programmed with 8 shots around, then the left button, , to specify the direction of rotation to the left.
- **3>** – Press the **3** button, then the right button, , to specify the direction of rotation to the right.

These are the default presets assigned to the three numerical buttons of MECHA. If the results are as expected, it means they have not been overwritten yet, and you can use them to take panoramas from 4, 6, and 8 shots around with a camera mounted. Later in this guide, we will see how these presets can be overwritten.

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.

However, if you prefer not to update at this time or are not comfortable with the firmware update procedure, you can skip to [Test using MECHA's buttons](#) on the next page.

Firmware Update Using a Hotspot



https://youtu.be/Upb_jgTWw58

Firmware Update Using a Hotspot – Single Axis MECHA


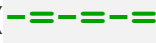

This update method is available starting with firmware version 02118.

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. This means your

smartphone has 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.



Please do not turn off MECHA while updating the firmware!

- First, set up a hotspot with the name **MECHA-UPDATE** and the (default) password **87654321** in the 2.4 GHz band.
- Press the power button, , for about 3 to 5 seconds to power on MECHA, and wait until the splitting lights () stop. There is no more LED activity, and you will hear two beeps. MECHA is now in idle status and can accept commands and codes. If MECHA doesn't reach this status, then please power it down by pressing its power button for 3 to 5 seconds and contact us at mecha@nodalninja.com.
- Using MECHA's buttons, enter the code **312123** followed by pressing the left arrow button, . You can wait and observe how the LEDs display the entered sequence to ensure accuracy before pressing this button. If there is any mistake, short-press the power button and enter the code again. Once you have entered the code correctly, MECHA will begin scanning for existing networks.



<https://youtu.be/LNx64vps6Pg>

LEDs during Firmware Update – Single Axis MECHA

- When MECHA connects to the previously created **MECHA-UPDATE** hotspot, you will hear two beeps. The code **312123<** will initiate a firmware update using this hotspot. The LEDs will display a response: **!!!!** if the update cannot be performed at that time.



See the [Table of Equivalences: LEDs – Characters](#).

The update may take up to 5 minutes, but it could take longer with a slow internet connection.

Test Using MECHA's Buttons



After mounting MECHA on a tripod or any stand with a mounting screw, you can perform a few tests without mounting the camera.

NOTE. The following codes are used to tell MECHA what type of rotator is connected to it. Use these codes if you purchased the rotator separately, changed the rotator type, or want to ensure MECHA has the correct one set.

Set the Rotator Using MECHA's Buttons



- **23131**< set **E1** as preferred rotator.
- **23132**< set **E2** as preferred rotator.
- **23121**< set **P1** as preferred rotator.

The code should match the actual rotator connected to each MECHA and needs to be entered by pressing the buttons on the MECHA to which the rotator is connected.

However, if you are unsure about the type of rotator, you can try each code, then launch a 90° rotation – press the left arrow button, , then quickly the  button – and if it rotates 90°, the rotator is correctly set.

Alternatively, you can contact your dealer or mecha@nodalninja.com for more information or help identifying the type of rotator you have.

Once the rotator is correctly set, power on MECHA and wait until the LEDs are off and you hear two beeps. Then, enter the following codes using MECHA's buttons:

- **131** – To enter this code, press the buttons **1****3****1** sequentially. This is a hard-code for a test of 6 shots around. Then, press the right button, , to specify the direction of rotation to the right, or the left button, , to specify the direction of rotation to the left.
- **132** – Similar to **131**, but for 12 shots around.
- **3212<** – Enter this code to display the firmware version on the LEDs.



Panorama with Automatic Shooting Pattern Using Only the MECHA's Buttons – Single Axis


This method requires the firmware version *02118* or newer and works for rectilinear lenses from 10 to 200 mm (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.




- Place a **sheet of paper in front of MECHA** so that it fills the frame. The frame can be viewed through the viewfinder or 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<** on MECHA. When the power button starts flashing, MECHA waits for two quick presses of its power button, , as follows:
 - **First** – in order to trigger the camera.
 - **Second** – after the camera is 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 return to the initial position, and the LEDs 1, 2, and 3 under the battery symbol will start flashing. MECHA waits (**15 seconds**) for one of the buttons **1**, **2**, or **3** to be pressed to assign the computed preset to

that particular button. To cancel the assignment, press the power button, , instead.

If MECHA cannot compute a pattern using the feedback received when its power button is pressed (mostly because of too small intervals), the LEDs will show "!!!", indicating no change.

To execute the panorama computed by MECHA, ensure 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.



If using a Single MECHA, after completing the first row, MECHA pauses and suggests, on the LEDs, a manual tilt of the vertical axis to continue capturing a full spherical panorama. If only a cylindrical panorama is needed or manual tilting is not possible, press the power button of MECHA, .

How to Access the UI

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 the splitting lights are displayed on the LEDs: 
- To connect your smartphone to MECHA's network, MECHA must be in AP mode. At the splitting lights, press either **1** to set MECHA in AP mode or **3** 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).

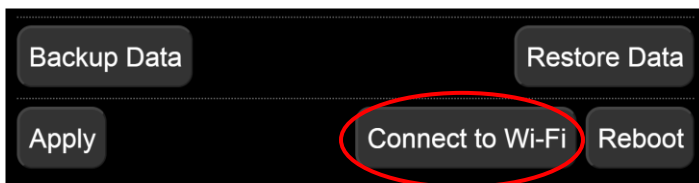


<https://youtu.be/ufIbFlvhHT4>

Using a Smartphone to Access the MECHA User Interface for Dual Axis and Single Axis Controllers

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 splitting lights () are shown on the LEDs. Now press either **2**, to set MECHA in STA mode, or **3**, to set MECHA in AP+STA mode. (You can also change this setting on the *Configuration* page.)
- The next step is to find the IP address, which is dynamic in this case. There are two ways to find it:
 - **1. Using MECHA's buttons:**
 - 1.1. Enter the code 323< to see the full IP on LEDs, like 192.168.2.188



See the [Table of Equivalences: LEDs – Characters](#)

or

- **1.2.** Usually, the IP addresses in your local network differ only by the last number of the IP (the part displayed at the end, after the last dot). To display the last part of the IP, enter the code **321<**. For the example above, **.188** will be displayed.
- **2. Access the UI on a smartphone** as shown above (make sure MECHA is in AP+STA mode, started by pressing **3**), then access the *Configuration* page and scroll to the bottom of the page. Note the static IP address (192.168.8.1) and next to it, the dynamic IP address to access the User Interface on a computer. In our example, it is 192.168.2.188.

```
IP: 192.168.8.1, 192.168.2.188 SN:255.255.255.0
GW:192.168.2.1 DNS:8.8.8.8
```

NOTE. If only the static IP address is displayed, it means that MECHA is in AP mode and, as a result, the dynamic IP address is not displayed.

- Now you can access the MECHA's UI on your computer's browser by entering the IP address you found (for example, 192.168.2.188) in the browser address bar at the top of the window.

https://youtu.be/X-r7_OBMj48

Access the User Interface on Your Computer – MECHA DAC and Single Axis Controller

Test Using the UI

Some tests were performed previously using the controller buttons. Now, in this chapter, we will perform them using the User Interface. Please [access the User Interface](#) on your smartphone, for example.

Set the Rotator on the Configuration Page

At the top of the *New* page, tap the *[Config]* button to access the *Configuration* page (*192.168.8.1/config*). The username and default password are:

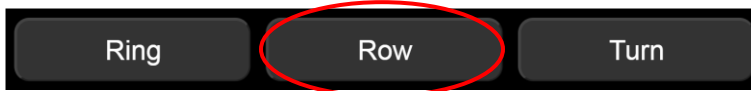
| | |
|-----------|--------------|
| User: | admin |
| Password: | Mecha |

On this page, you can make special settings, as we will see later. For now, enter the name of the rotator you are using: E1, E2, or P1.

| | |
|-----------------------------------|---------------------------------|
| Rotator: | <input type="text" value="E1"/> |
| <input type="checkbox"/> Inverted | |
| Backlash: | <input type="text" value="33"/> |

Then tap the *[Apply]* button at the bottom of the *Configuration* page. This is a one-time setting and is usually done at the factory.

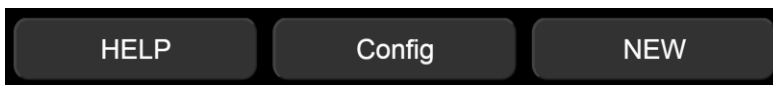
After that, access the *Row* page by tapping the *[Row]* button at the top of the *Configuration* page.



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, a few 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** means **Advanced**.

UI Test – Codes 131 and 132

If you want to perform the same tests that you did before using the controller buttons, proceed as follows using the UI buttons:

- On the *Row* page, tap *Presets*, and select *TEST 131* from the *Presets* list. This is the panorama executed previously in the chapter Test Using MECHA's Buttons (6 shots around).



To load the preset, tap the *[Load]* button if visible under the *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 in this case, so you can proceed to the next step.



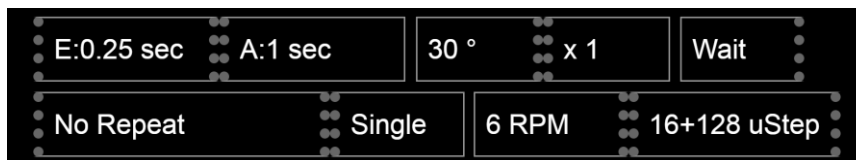
- Tap the *[LEFT]* button to execute the preset to the left, or *[RIGHT]* button to execute the preset to the right.



Do the same with the preset *TEST 132* (12 shots around).

Note how the settings on the *Row* page change when a preset is loaded. In other words, the settings we see are, in fact, the loaded preset's settings.

In the *Degrees of rotation* field, 30° is automatically displayed, not 60° as before. That is because a complete rotation has 360° .



User Interface (UI)

UI Controls

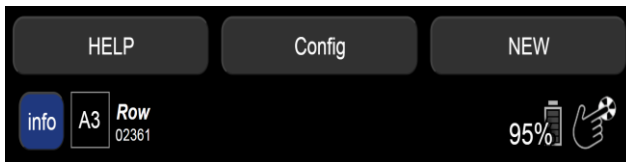


<https://youtu.be/Bb5XPds3SxU>

MECHA User Interface Tips

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.

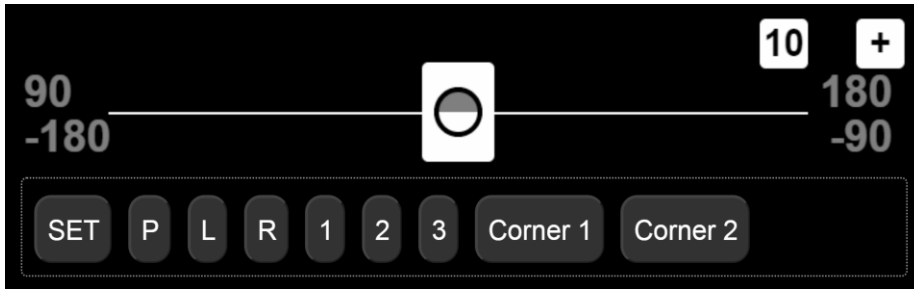


- Tap/click the *[info]* button at the top of the *Row* page to show descriptions for all the controls. At the same time, three more buttons are displayed at the top of the page – *[HELP]*, *[Config]*, and *[NEW]* – for accessing the following pages:
 - *Help* — Useful information and codes. See the [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.

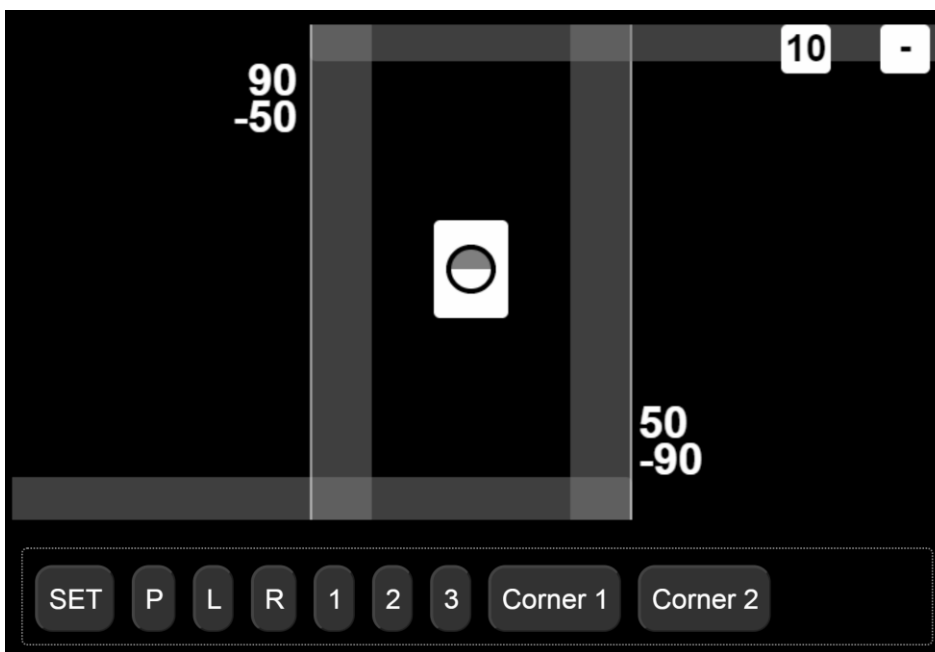
- *Firmware version* — Under the *Row* label, note the current firmware version (for example, 02208 in our example). Images shown in this guide may not be an exact representation of the current firmware version. Click this tag to access the *What's new?* page.
- *Battery percentage* — At the right side of the page, you'll see the battery percentage (84% in our example). If the percentage drops too low and a red LED continuously blinks, it is recommended to recharge the battery; otherwise, MECHA switches off. On the *Configuration* page, you'll find a setting for disabling MECHA during charging to prevent accidents caused by the charger cable, which can twist around the tripod if MECHA is commanded, by mistake, to execute a preset during charging.
- *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 in gesture mode.



- *Status Feedback* — In the next area, the *MECHA's ID*, the *Refresh rate of the motor/controller status*, and the *Current lower rotator* are displayed. This is followed by the *Current angle position* for both rotators and the *Current status* (shots remaining, position, repeat set). On MECHA DAC, 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 upper-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 upper-left and lower-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

- *[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 on the first button below the slider reads *SET*, and go to those positions when the label reads *GO*. To ensure the *[SET/GO]* button works as expected, it is necessary to synchronize the two-axis slider and the upper rail of your panoramic head first, by specifying the position of the upper rail (see *[SET/GO]* button).
- *[Corner 1]* button — Depending on the label of the *[SET/GO]* button, the *[Corner 1]* button allows you to set the upper-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 *sq_7shots* in our example.

The screenshot displays the MECHA C1 control interface with the following settings and controls:

- Direction:** LEFT (selected), 7 Shots, RIGHT
- Shots:** NPP Shots, Live NPP
- Triggers:** 1 TRG, AF 0.01 sec, W:0 sec, B:0 sec, M:1
- Exposure/Interval:** E:0.25 sec, A:1 sec, 51.43 °, x 1, Wait
- Repeat/Speed:** No Repeat, Single, 7 RPM, 16+128 uStep
- Load/Sensor:** Medium Load, No Sensor
- Action Buttons:** 1 x LEFT, SHOOT, 1 x RIGHT, Cancel, PAUSE, STOP
- Status:** sa_7shots
- Notes:** (Empty text area)
- File Management:** Load, Save, Rename, Delete, Import, Export, Empty, >
- Maps/Probes:** MAP, Probe, Template, goVM
- Presets:** Load 0, Load 1, Load 2, Load 3, Save 0, Save 1, Save 2, 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, *28 mm2* will compute the full spherical panorama for a 28 mm 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.



- *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.



<https://youtu.be/RMhjo9BurLo>

Button Confirmation Options – MECHA C1 and C2 Controllers

- *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.



<https://youtu.be/hQVMN8RrYz8>

How Repeat Works – MECHA C1 and C2 Controllers

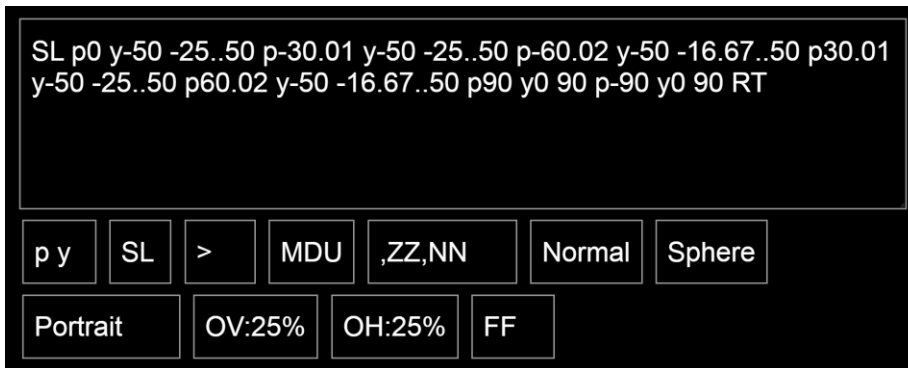
- *Single / Dual / Scripted / Cloned / Mirrored* — Select *Single* for single-axis applications. You can select *Dual* even if there are no instructions for the second axis. *Scripted* is valid for both types of applications. See MECHA's Simple Scripting (MSS) for details about the *Scripted* option. *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 *preset 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 equivalent *preset settings*. The script updates automatically when the *preset settings* are changed, but the *preset settings* do not update if the script is changed manually.

Overridden Preset 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.
- *<?> / > / <* — Direction of rotation: unspecified (*<?>*), 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 using the controller buttons.
- *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 ...* — Zenit 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*).



<https://youtu.be/WjChIxHm5UE>

Shooting in a Zigzag Pattern – MECHA C1 and C2 Controllers

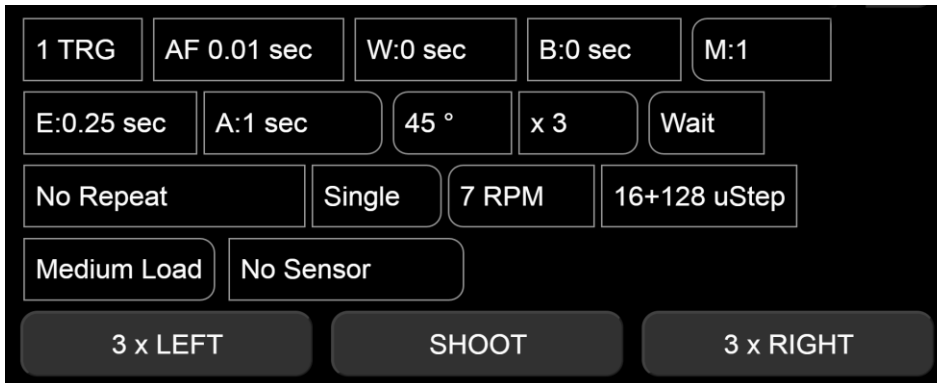
- *Sphere / Grid* — Mapping type.
 - *Grid*: The same number of positions on every row.
 - *Sphere*: A larger number of positions on the middle row.
- *Portrait / Landscape* — Camera orientation.
- *OV* — Vertical overlap. Select the vertical overlap first, then select the horizontal overlap if it differs 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, using 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.




- *[Shoot]* button — Shoots the number of photos in a set for a single position. In our example, one photo is taken (*1 TRG*). 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.



- *[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, just as clicking the *[Pause]* button on the UI or IR remote does. It can be used before launching a preset, for example.
- When MECHA is in pause mode, the LEDs blink like a colon (⋮). In idle status, there is a slow blink; when running presets and paused, there is a regular blink.
- If MECHA is paused while running a preset, you can press  on the controller, or  or  on the IR remote, or *[PAUSE/NEXT]* on the UI to continue to the next position.
- If, instead,  is pressed on the controller or the IR Remote, MECHA will proceed to the next position and toggle step-by-step mode on/off. This allows both:
 - 1. Starting a preset in step-by-step mode, then switching off step-by-step mode when it is no longer needed, thus allowing the preset to continue automatically.
 - 2. If a preset is paused by the remote, UI, or a script, pressing  will advance it and switch the step-by-step mode on/off.

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 the  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 02361, in scripts you can specify a number of seconds from 1 to 254 before the pause, after which the preset will continue automatically.



<https://youtu.be/72NdLU4pBlw>

Panorama Extra Photos with MECHA

- *[STOP]* — Emergency stop.

The screenshot shows a dark-themed interface. At the top, a text field contains 'sa_7shots'. Below it is a larger text area labeled 'Notes'. Underneath the 'Notes' field is a row of buttons: 'Load', 'Save', 'Rename', 'Delete', 'Import', 'Export', 'Empty', and a right-pointing arrow. At the bottom of the interface is another row of buttons: 'MAP', 'Probe', 'Template', and 'goVM'.

- *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 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.nodalininja.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/5e0RxEIFIB8>

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 **1** button using the *[Save 1]* button.
- *[Load 2]* button — Loads the preset assigned to the **2** button using the *[Save 2]* button.
- *[Load 3]* button — Loads the preset assigned to the **3** 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 **1** button. It 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 **2** button. It 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 **3** button. It 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.

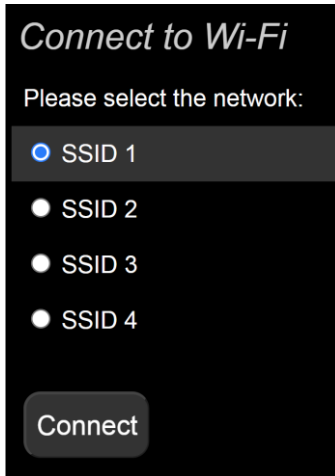


- *Beep Volume* — A value from 0 to 250 can be entered directly via *Custom* or selected from the list. If a *BEEP* value is set on the *Configuration* page, it takes priority over this setting on the *Row* page, as indicated by a gray background.
- *Power Saving Mode* — This setting allows you to configure MECHA to shut down automatically after a specified period of inactivity, or to remain always on. The first *Power Off After* field on the *Configuration* page is equivalent to *Power Saving Mode* on the *Row* page. If a *Power Off After* value (in seconds) is set, it takes priority over the *Power Saving Mode* setting, which is indicated by a gray background on the *Row* page.
- *[Go to Ring]* button — Accesses the *Ring* page and alternates with *[Go to Row]*.
- *[Team]* button — Initiates a temporary pairing with a second MECHA, which can be controlled if it joins the team. To confirm joining, enter the code **12<** on the second MECHA using its buttons. The second MECHA will act as a MECHA-V, and the first as a MECHA-H in the Dual Axis Combo. Both MECHAs can be connected to the local wireless network.

- *[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 its LEDs 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

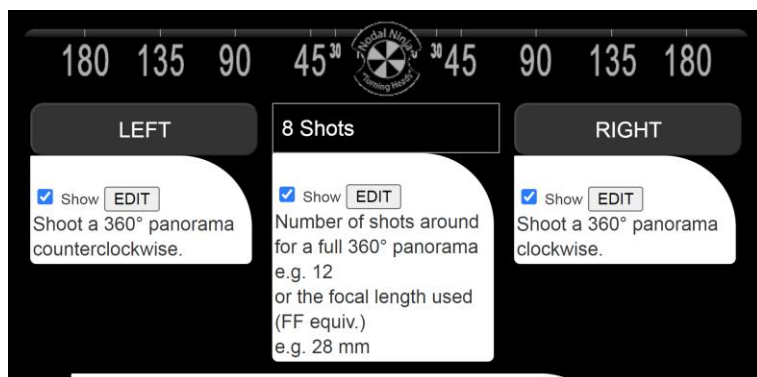
Although this feature is designed to allow users to translate the User Interface into their own language, it can also be used to add notes to the existing descriptions of the UI controls.

- 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 where 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:

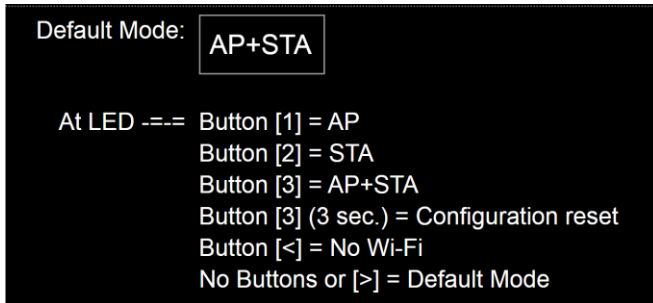
| | |
|-----------|--------------|
| User: | admin |
| Password: | Mecha |

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 **3** button for three seconds at startup (indicated by splitting lights: ).



Wi-Fi Reset

Press the **3** button for 3 seconds – at splitting lights – 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 the password 12345678 is found, the firmware will be updated using that hotspot. If MECHA fails to boot, please activate the hotspot.

MECHA Dual Axis Combo (DAC) users need to pair the two MECHAs again, as pairing is lost after a Wi-Fi Reset.

[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 25.

The screenshot shows a configuration interface with a dark background and light text. At the top left, there is a text box containing '25.00' and a button labeled 'Set Wi-Fi Power'. Below this, the settings are organized into rows with labels on the left and input fields on the right:

- AP Mode SSID:** The input field contains 'MECHA-Single'.
- SSID Password:** The input field contains '12345678'.
- Pairing PIN:** The input field contains '4 numbers.'.
- [admin] Password:** The input field contains 'Mecha'.
- UI Password:** The input field contains 'max. 20 chars.'.
- Trusted IP(s):** There is an empty text box for this setting.

At the bottom of the interface, it says '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**.

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

Pairing PIN — A four-digit number that allows you to pair MECHA units automatically at start when more than two MECHAs are connected to the same network or hotspot. See [MECHA's Pairing PIN](#).

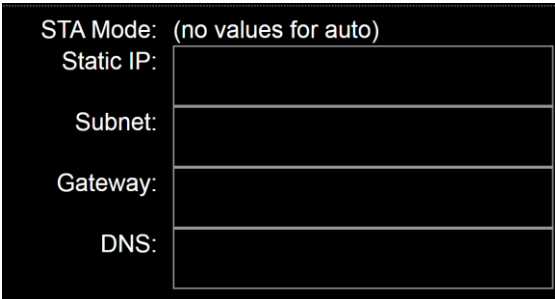
UI Password — Allows you to prevent someone from changing the settings on the *Configuration* page. You may want to allow someone to access your interface but not change the settings.

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

Static IP — Remember that the IP address to access the MECHA's User Interface on your computer is dynamic. Therefore, it changes periodically, and you need to find the current address by accessing the *Configuration* page with your smartphone, for example. Enter a dynamic, available IP address in the *Static IP* field to make it static.



STA Mode: (no values for auto)

| | |
|------------|--|
| Static IP: | |
| Subnet: | |
| Gateway: | |
| DNS: | |

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

Fixed Settings

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]: | <input type="text"/> |
| Micro-stepping: e.g. 16 or 16128 | <input type="text"/> |
| Motion Profile: | <input type="text"/> |
| DAC: | <input type="text"/> |
| BEEP: | <input type="text"/> |
| Power OFF after: | <input type="text"/> |

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.

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: | <input type="text" value="1"/> | sec. |
| <i>1 = No Power OFF</i> | | |
| When Charging: | <input type="text" value="Stay ON"/> | |

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*.

When Charging: Stay ON — Means that MECHA does not stop during charging and can be used as usual. The other possible value is *Turn OFF*, which means that MECHA stops automatically and remains off (except for the charging function) during charging.

Rotator Settings



Rotator — Set the rotator in use by selecting an option from the list or using the following codes: **23131<** for E1, **23132<** for E2, and **23121<** for P1.

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).



<https://youtu.be/foRX9gedqik>

Rotating a Turntable Using the MECHA C1 Controller

Backlash — If the value needs to be entered manually instead of using the automatic procedure, for E1 and E2 rotators it is approximately 21 (33 in our example), and for P1 rotator the value is 0. It is recommended to use the automatic procedure for better results if the conditions to detect the small movements are met. Please see [code 12321<](#) (Backlash compensation calibration) for more details.

☐ 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 portion, 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 arrow buttons' speed and testing to determine the required value for an acceptable noise level. The corresponding code is **2121<**. Disabled by default.

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

Set Low Current if using E2 rotator(s) — This affects the 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



128 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

☐ Use local CAM and AUX ports only.

Use local CAM and AUX ports only — Check this checkbox if you want to connect the camera to the horizontal unit in a Dual Axis Combo. This means faster communication between MECHA and the camera. Note that the camera cannot be connected to the vertical unit while this setting is active.

☒ Use New Shutter Confirmation

Use New Shutter Confirmation — It will be used in both shutter confirmation and the test of shutter confirmation (see code 32313< in the Current Codes List). 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 for MECHA-H, the shutter confirmation will work via MECHA-V if the camera and PC-Sync cable are connected to MECHA-V mounted on the hot shoe.

☒ Enable Fast Mode.

Enable Fast Mode — Leave this checkbox checked.

☐ Enable RAW Interface.

Enable RAW Interface — Check this checkbox 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.
☒ Double press the Nodal Ninja IR Remote Power button for power OFF.

Use Nodal Ninja IR Remote — Check this checkbox to enable the use of the NN IR remote control. You must 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 Two IR Receivers (DAC ONLY).

Use Two IR Receivers (DAC ONLY) — This option allows you to use one receiver on the MECHA-H and one on the MECHA-V. Only one remote control is needed to control both units:

- Commands sent using the ◀ and ▶ buttons will be interpreted and executed only by the MECHA-H unit.
- Commands sent using the ▲ and ▼ buttons will be interpreted and executed only by the MECHA-V unit.

Using two receivers improves the performance of DAC (Dual Axis Combo) because the vertical unit receives commands directly from the remote control and not wirelessly, as is the case when a single receiver is used on the horizontal unit.

You may already know that when we mention the *Configuration (/config)* page, we are referring to the MECHA-H *Configuration* page in DAC. However,

the MECHA-V *Configuration* page can also be accessed after connecting to MECHA-V using your phone by clicking the link at the bottom of the page.

If you have enabled the *Use Nodal Ninja IR Remote* option on the */config* page of your MECHA-V, you now need to disable it for the two receivers to work.

The *Use Nodal Ninja IR Remote* option should only be enabled on the */config* page of MECHA-H, as should the *Use Two IR Receivers (DAC ONLY)* option.

If you have never accessed the *Configuration* page of your MECHA-V, the settings are most likely still at their defaults and no checks or changes are needed.

☐ Use Aux Pulse, if exists.

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:



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.

Reverse Direction of Rotation

☒ Switch the Left - Right rotation when done by MECHA buttons.

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 the code **2313<**. For example, with this checkbox checked, the left button rotates the camera to the left and the controller to the right.

Camera Settings

☒ Camera is in Portrait Orientation.

Preferred MSS pattern :

Default Focal Length :

Sensor Height (portrait) :

Sensor Width (portrait) :

Overlap on Height :

Overlap on Width :

Camera is in Portrait Orientation — This checkbox is checked by default, indicating portrait orientation. Uncheck this checkbox if you want to specify 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 — This setting determines how the MSS scripts are generated automatically. 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 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** (used unless otherwise specified). MECHA supports a focal length from 10 to 1500mm (FF equivalent), with the camera in Portrait or Landscape orientation.
 - *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 Interval Speed [RPM]: | 3.50 |
| Arrow buttons Interval 1 [deg.]: | 45.00 |
| Arrow buttons Interval 2 [deg.]: | 90.00 |
| Arrow buttons Interval 3 [deg.]: | 180.00 |

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 Speed [RPM] — Rotational speed over a certain interval.

Arrow buttons Interval 1 — Rotation angle for buttons ◀1, ▶1.

Arrow buttons Interval 2 — Rotation angle for buttons ◀2, ▶2.

Arrow buttons Interval 3 — Rotation angle for buttons ◀3, ▶3.

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

Safety Interval

| | |
|-------------------------|-------|
| Safety Interval [deg.]: | 10.00 |
|-------------------------|-------|

Safety interval — If, for any reason, the vertical unit loses communication with the horizontal unit, the vertical unit will stop after rotating by an angle equal to the *Safety interval*.

Favorite Codes

| | |
|-----------|-----|
| FavCode 1 | 321 |
| FavCode 2 | 21 |
| FavCode 3 | 23 |

The above settings allow you to assign three of your favorite codes to the **1**, **2**, and **3** buttons, respectively, as follows:

- FavCode 1 to the **1** button
- FavCode 2 to the **2** button
- FavCode 3 to the **3** button

These are shortcuts that allow a quick use of codes by long-pressing the corresponding button.



<https://youtu.be/kVJzwIPtai4>

Favorite Codes – MECHA C1 Controller

More from Server, zLM, Firmware, 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.

Technical Details – IP Addresses, FW

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

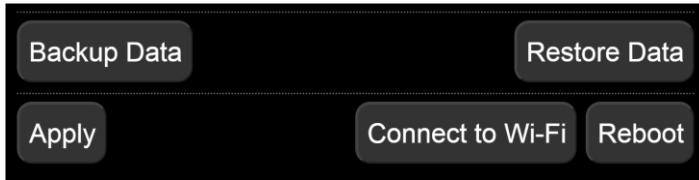
```
SDK: 2.2.2-dev(5ab15d1)
CPU @ 160 MHz; i2c? = OFF
RAM Free: 26720
Storage Free: 1796658
MAC: 84-F3-EB-83-5A-71
Firmware: C1E_02201, C1M_01140
Rot1_00001:01134, MC1:255:255:255
```

```
IP: 192.168.8.1, 192.168.2.188 SN:255.255.255.0
GW:192.168.2.1 DNS:8.8.8.8
```

```
LR: External System
```

- 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

Firmware Update Using a Smartphone: Method 2

- Press the power button, , for about 3 to 5 seconds to power on MECHA and wait until the splitting lights are displayed on its LEDs: .
- At the splitting lights, press the **1** 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 your 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**! This is not about MECHA's passwords, but the Wi-Fi name and password MECHA needs to connect to Wi-Fi.



Please do not turn off MECHA while updating the firmware!

- When the update is complete, you will hear a few beeps, and the new firmware version will be displayed at the top of the page. If it is not displayed within 1-2 minutes, refresh the page or reconnect the smartphone to MECHA if necessary.

Presets for Single Axis MECHA

You can create your own presets or download presets from the server. To download presets, go to the *Row* page, select *More from server* from the *Presets* list, and follow the instructions for downloading.

If the *More from server* option is not in the *Presets* list, tap the *[Connect to Wi-Fi]* button, enter the required SSID name and password for a Wi-Fi network with internet access. Then, after two beeps, reload the User Interface. If no beeps are heard after the MECHA's LEDs scan up and down, please try connecting again and pay attention to the name and password, as they are case-sensitive.

If the Wi-Fi network you connect MECHA to is your regular network that you want to use for MECHA, any time you start MECHA and press **3** at the splitting lights, MECHA will be accessible both via phone and local network, provided that internet is available for the local network. As a benefit, MECHA will also check for any firmware updates and show a dialog box on the User Interface to prompt you to read the news and update the firmware if desired.

Downloaded presets are added to the end of the list and are indicated by names starting with (s), meaning they are not yet saved.

The following single-axis MECHA presets are currently available for download:

- 4_Shots_Around.mps
- 6_Shots_Around.mps
- 8_Shots_Around.mps
- 10_Shots_Around.mps
- 12_Shots_Around.mps

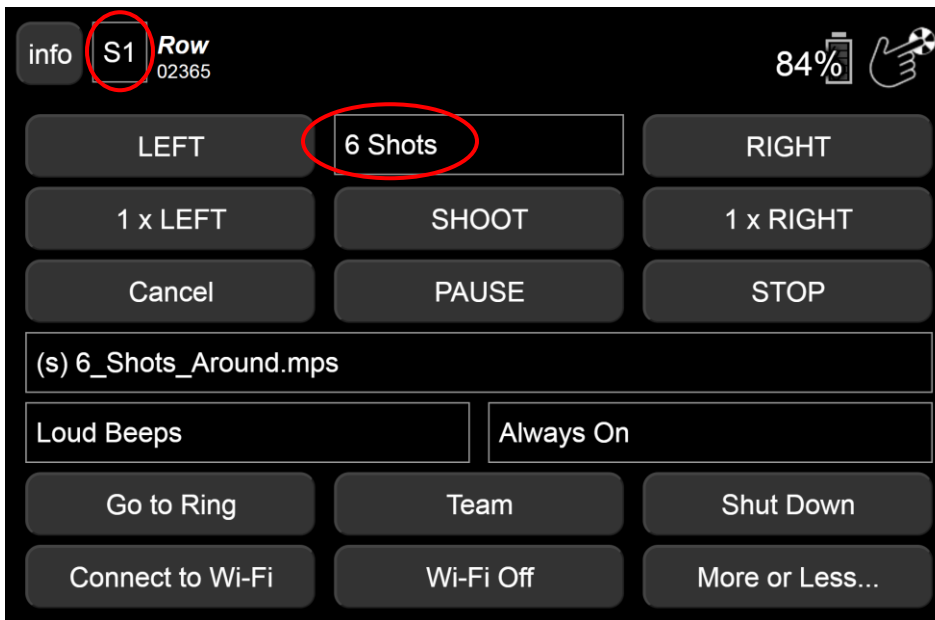
Let's analyze the *6_Shots_Around.mps*, noting that its description is close enough for all the others.

This preset is suitable for a single-row panorama with six shots around and can be used in the *S1* (Simple 1) display level.

The level of complexity for the User Interface can be set using the options available in the select list next to the *[info]* button at the top of the *Row* page.



In *S1*, fewer UI controls are displayed, and you don't need to use any buttons to load a preset; just select the preset from the list, and it loads automatically.

To launch (execute) the preset, click/tap either the *[RIGHT]* or *[LEFT]* button.



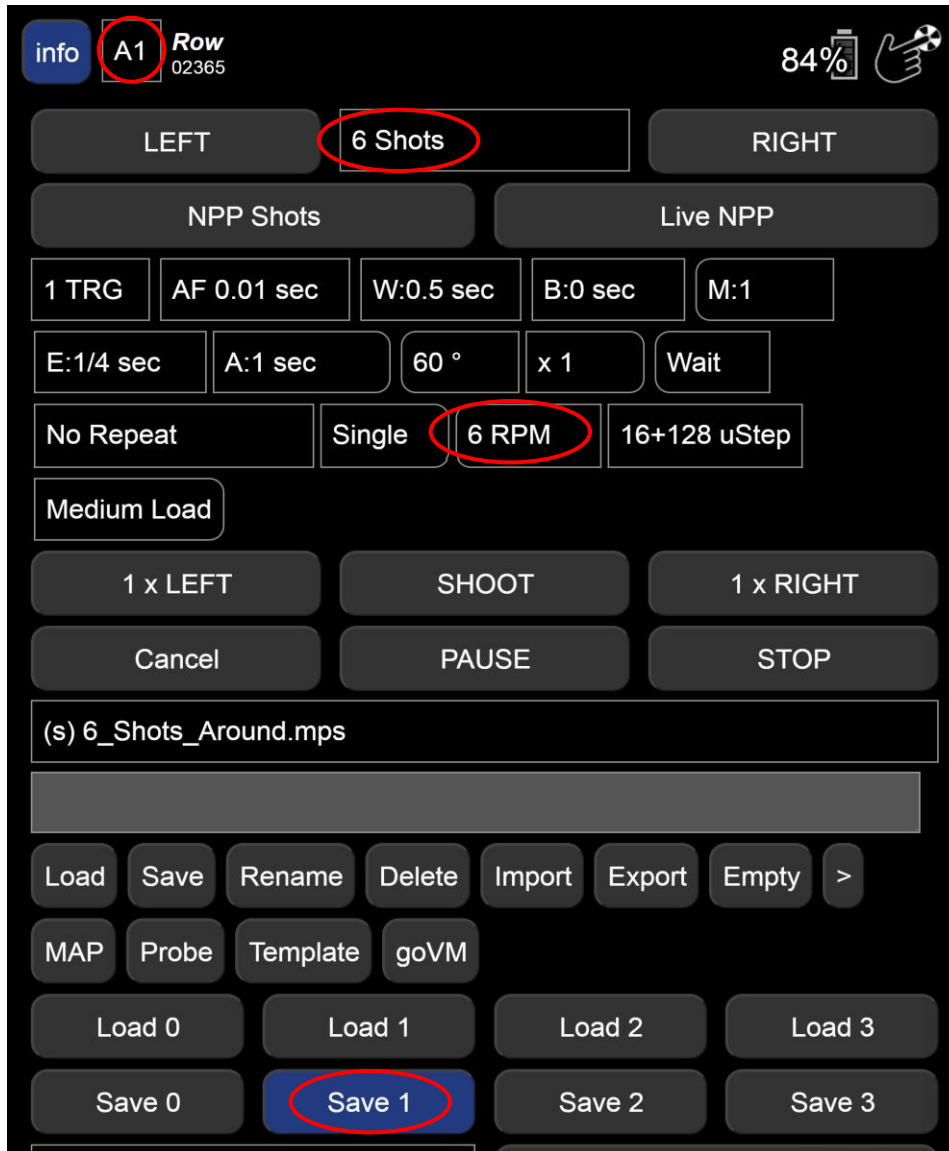
To change advanced settings of a preset, such as speed – for example, from 6 *RPM* to 9 *RPM* – switch to *A1* (Advanced 1) display level, as shown in the image below, and select 9 *RPM* from the speed list.

You can click/tap the *[Save 1]* button to save and assign this preset to MECHA button **1**. You can launch this preset when MECHA is in idle status by simply pressing:

- **1**  for clockwise rotation, or
- **1**  for counter-clockwise rotation.

You can also use the *[Save]* button to save this preset on MECHA in the *Preset* list.

To create a new preset, select any preset from the *Presets* list, make desired changes (if needed), and save them using the *[Save]* button. Entering a new name will create a new preset; otherwise, the current preset will be overwritten.



For more details, please see the chapter [Working with Presets](#).

MECHA MSA



MECHA MSA – Manual Second Axis – mode is used when a single MECHA executes a dual-axis script. For example, this could be the case with an NN3 or another panoramic head mounted on a single MECHA unit.

In MECHA MSA mode, MECHA pauses at the end of each row and waits for the second axis to be manually set/tilted. For example, if a row consists of 12 images, after capturing the 12th image, you will notice the panning back to the initial position. MECHA then waits for the manual tilt adjustment.

The expected manual angle for the second axis is displayed both on the UI and on the LEDs.



To understand what is displayed on the LEDs, please see the [Table of Equivalences: LEDs - Characters](#).

After manually tilting, press  or  on the NN Remote, or click the *[PAUSE]* button on the UI.

Part 2

MECHA Dual Axis Combo – DAC

Before First Use – MECHA DAC

Fanotec, the manufacturer of Nodal Ninja branded products, has over a decade of experience building products specifically designed for panoramic and high-resolution photographers. The auto-rotator (**E1**) with the single-axis controller (**C1**) is precision-built with quality motors, components, and circuitry.

The **MECHA Dual Axis Combo** (DAC) is a compact and affordable dual-axis pan-tilt head solution. We use parts from the NN3 MK3, along with two MECHA E1 Rotators and two C1 Controllers, which are wirelessly linked together.

Use it as a single-axis horizontal rotator for single-row shooting, turntable object VR, or as a dual-axis rotator for both horizontal and vertical movements.

Because the MECHA E1 with C1 has a modular design, it will be compatible with future MECHA rotators and controllers, paving the way for future low-cost upgrade paths.

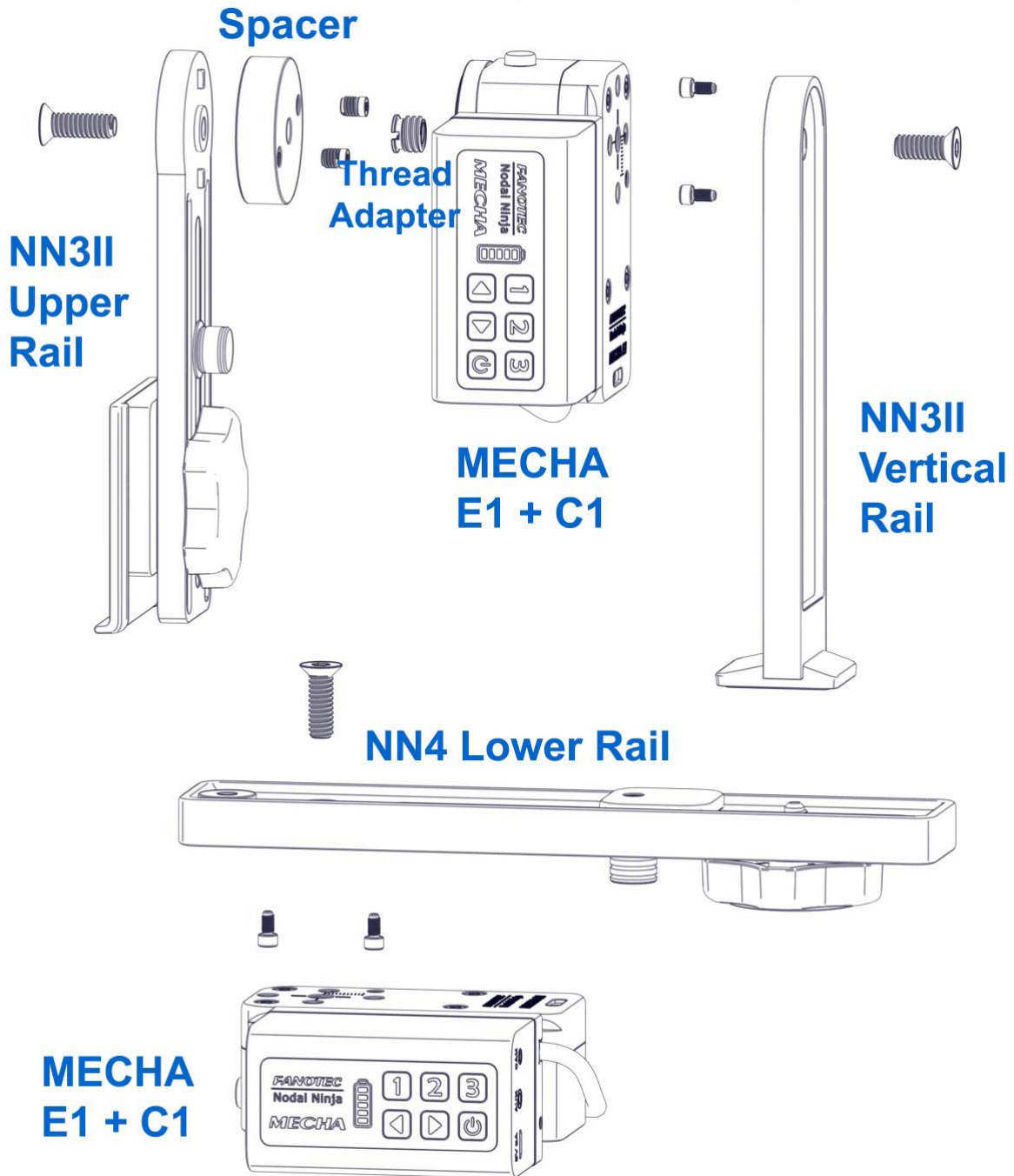
This setup supports a camera/lens up to 1.25 kg (2.75 lb) and NPP up to 110mm from the pivot point, making it ideal for mirrorless, compact, and lighter DSLR cameras. Shoot 360° panoramas or even high-resolution, gigapixel images.

The MECHA Dual Axis Combo – DAC – is preassembled and packed in a carrying case. If the two MECHA units are not mounted, please refer to the DAC installation image below or watch the video:



<https://youtu.be/wvAJoXsX6Kw>

Dual Axis Automated NN3 MK3 with 2 MECHA C1 and E1 Upgrade Instruction



A term used quite often in the second part of this guide is **pairing**. Pairing MECHAs means preparing two or more MECHA units to work as a team.

In general, MECHA units can be both on your desk when you pair them, or even one in one room and the other in another room. You can mount them as

required after pairing. However, we recommend that you do the mounting first, as shown in the image above.

The pairing of MECHA units is the same whether for panoramic photography (dual-axis application) or for other purposes, such as rotating a video camera and a subject simultaneously at different speeds.

In this guide, we will present three methods of automatically pairing MECHA units. This pairing will remain active until you unpair them:

1. **zLM 2** – Pairing using only two of MECHA's six buttons. This is a very quick method, especially for non-technical persons.
2. **zLM** – A method of pairing using a power code, which utilizes a few more of MECHA's buttons.
3. **Pairing using the User Interface**, intended for advanced users.

MECHA has only six buttons, which have various functions, some of them being already mentioned at the beginning of this guide.

As we will see, once paired, usually one MECHA rotates horizontally (MECHA-H), and the other rotates vertically (MECHA-V).

Usually, MECHA-H is mounted on the horizontal rail of the panoramic head, and MECHA-V is mounted on the vertical rail. However, if necessary, MECHA-H can be mounted on the vertical rail, for example, and MECHA-V on the horizontal rail, depending on what you want to do.



Power On and Test – MECHA DAC



<https://youtu.be/wdovZA3IIOQ>

Power ON and Test – MECHA Dual Axis Combo






To power on the MECHA DAC:

- First, press the  button of MECHA-H for 3 to 5 seconds (long press).
- Then, press the  button of MECHA-V for 3 to 5 seconds (long press).



It may take about 35-45 seconds to start, similar to the Single Axis MECHA.

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

Assuming that the controllers and rotators are mounted as shown in the installation image above, **without the camera**, let's perform a test panorama consisting of 3 rows with 12 photos per row:

- Press the following buttons on MECHA-H, then wait for the movement to stop: 

Power off MECHA DAC the same way you power it on:

- Press the  button of MECHA-H for 3 to 5 seconds (long press).
- Press the  button of MECHA-V for 3 to 5 seconds (long press).

The order in which you power off MECHA units is not important.

Simple Rotations – MECHA DAC









<https://youtu.be/owxh7iMnWR4>







Simple rotations – MECHA Dual Axis Combo

Power On the MECHA DAC as shown above.

For MECHA-H

- For 45° rotations:
 - Press , then quickly press **1**.
 - Press , then quickly press **1** for the opposite direction.
- For 90° rotations:
 - Press , then quickly press **2**.
 - Press , then quickly press **2** for the opposite direction.
- For 180° rotations:
 - Press , then quickly press **3**.
 - Press , then quickly press **3** for the opposite direction.

On **MECHA-V**, due to orientation, the left and right buttons appear as up and down buttons.

- For 45° rotations:
 - Press , then quickly press **1**.
 - Press , then quickly press **1** for the opposite direction.
- For 90° rotations:
 - Press , then quickly press **2**.
 - Press , then quickly press **2** for the opposite direction.
- For 180° rotations:
 - Press , then quickly press **3**.
 - Press , then quickly press **3** for the opposite direction.

Note that the rotation angle for the above button combinations can be set on the *Configuration* page.



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



<https://youtu.be/qxq6jvZDpjU>

Simple Rotations 2 – MECHA Dual Axis Combo

For example, for continuous left rotation, press and hold the  button.

If, for some reasons, you want to **reverse the direction of horizontal and vertical simple rotations**, you can use the codes **2313<** and **2323<**. After this change, for example, the  button of MECHA-H will rotate the system to the right, and the  button to the left. Similarly, the left and right buttons of MECHA-V will be reversed. Use the same codes to cancel the change.

Note that the above code does not change the rotation of the motors. There are special codes to do that.

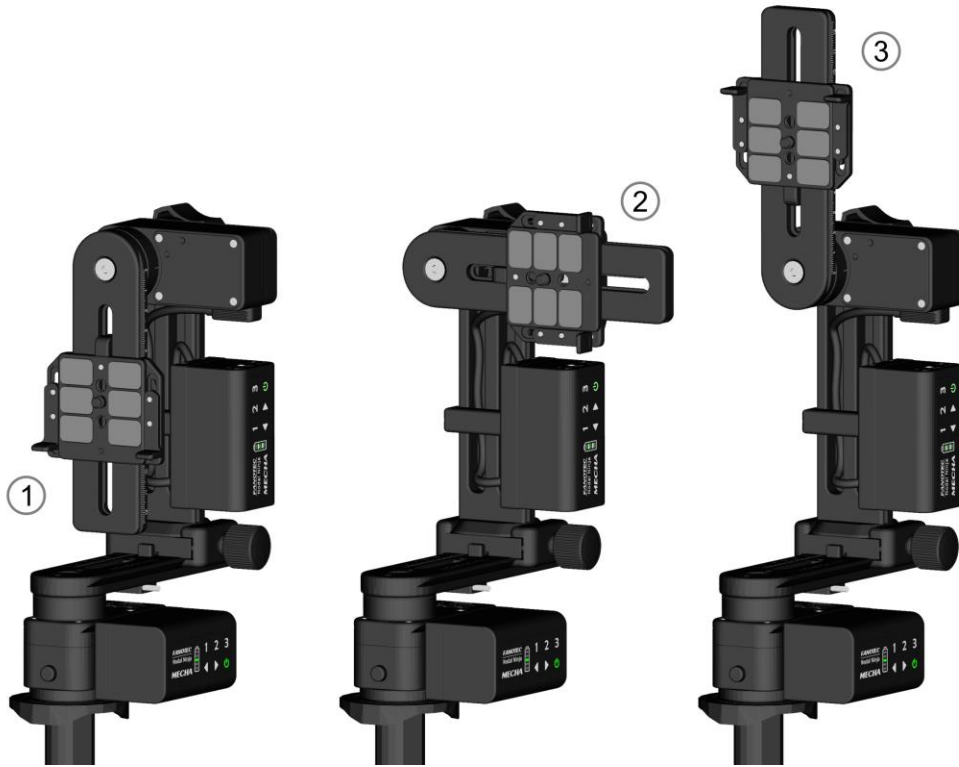
Parked, Level, and Raised Positions

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 and are:

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  (the left button of MECHA-V), then quickly press **2**, and do this twice ($90^\circ \times 2 = 180^\circ$).
- Press  (the left button of MECHA-V), then quickly press **3**.
- Press and hold  (the left button of MECHA-V) until the upper rail reaches the desired position.

Check if Two MECHAs are Paired


How do you know if two MECHA units are already paired?



If two MECHA units are paired, you will notice – a few seconds after both units are powered on – that one unit has the middle LED turned on (MECHA-H), and the other has the two middle LEDs turned on (MECHA-V).



If a **red** LED is lit on MECHA-V, as shown above, this indicates that the firmware versions in both units are not the same. It is recommended to update the firmware.

Also, while MECHA units are on, if you want to check if they are paired, press the  button on MECHA-H, then wait for 10 seconds. The LEDs should light up as mentioned above.

Assuming both MECHAs are mounted as shown in the image above, let's see how to update the firmware, how to pair MECHA units if they are not paired, and how paired units work.

DAC Firmware Update Using a Hotspot

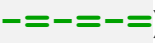


<https://youtu.be/-dp-6bEwAQ4>

Firmware Update Using a Hotspot – MECHA Dual Axis Combo

This update method is available starting with firmware version 02118.

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. We also assume that the MECHA units are already paired.

- First, set up a hotspot with the name **MECHA-UPDATE** and the (default) password **87654321** in the 2.4 GHz band.
- Power on the MECHA DAC as shown above.
- Wait until the splitting lights () stop and you hear two beeps. Using the buttons of the horizontal MECHA, enter the code **312123<**, which will update the firmware of both units.



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

LEDs During Firmware Update – MECHA Dual Axis Combo

- The MECHA's response – displayed on LEDs – can be "!!!" if the update cannot be done at that time.

If internet is available for MECHA, the update will be performed in a maximum of 5 minutes. If you encounter any problems while updating the firmware, please contact us by email at mecha@nodalninja.com, specifying the ID of the MECHA you are using.

In most cases, the problems encountered when updating the firmware are caused by an incorrect Wi-Fi password. However, due to the nature of the internet, sometimes the update server cannot be reached. This can be investigated once we get in contact by email.



See the [Table of Equivalences: LEDs – Characters](#).

Pairing Using MECHA's Buttons


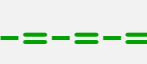


zLM 2 – Automatic Pairing Using Two Buttons



<https://youtu.be/8kSeOC9NHRg>

Automatic Pairing – MECHA Dual Axis Combo

This is a zero-learning method (**zero Learning MECHA**) for firmware version 02057 or newer.

1. Power off both MECHA units if they are running.
2. Power on only the horizontal MECHA (hold down its power button, , for 3 to 5 seconds). When you see the splitting lights (, press the **1** button for 3 seconds (until multiple beeps are heard). The unit powered on first **rotates horizontally**, so we name it **MECHA-H**.
3. Leave the horizontal MECHA running, then power on the other MECHA using its power button, . When you see the splitting lights (, press the **2** button for 3 seconds (until multiple beeps are heard). The second powered-on unit **rotates vertically**, so we name it **MECHA-V**.

On successful pairing, MECHA-H has its middle LED on, and MECHA-V has its two middle LEDs on, as shown in the image on the previous page. Otherwise, power off and on both MECHAs again, preferably powering on MECHA-H first.

The next step is to test the combo using MECHA's buttons and see how it works.

Once you become more familiar with MECHA, you can use it in an advanced way via the UI (User Interface). The zLM pairing method is provided as a quick start with very little to learn.

For those interested in technical details, see **zLM 2** explained below.

Please read the chapter about the UI first.

MECHAs will be automatically paired and will remain paired after power off and on.

This procedure will create:
MECHA-H-DAC with password 12345678
MECHA-V-DAC with password 12345678

If the SSID name and password are changed in the */config* of MECHA-H, and both MECHAs are on and paired, the SSID and password will also be changed in MECHA-V, as long as the SSID starts with MECHA-H in the first one.

After the MECHAs are paired and the SSID name is changed in the */config* of MECHA-H, for example, from MECHA-H-DAC to MECHA-H123 with password 87654321, MECHA-V will receive the name MECHA-V123 and the same password: 87654321.

As a result, without using any pairing method, a MECHA-V999 in STA mode will always attempt to pair with MECHA-H999 if its SSID is on and both have the same password and only the H/V difference in the SSID name.

This also opens the possibility of remotely pairing two MECHAs via support, if needed, if they can access the internet.


<https://youtu.be/nFxr-pXhqdc>**MECHA's Splitting Lights – Dual Axis Combo (DAC)**

DAC Test Using MECHA's Buttons

After pairing, every time the MECHAs are powered on, you will notice they are connected as a DAC (Dual Axis Combo). It is recommended to power on the horizontal unit first, then the vertical unit.





Wait until all LEDs are off and perform the following tests without a camera mounted.





Please note that the power button, , can always be used as an emergency stop if necessary, except during the speed calibration procedure (123123<).

Use the MECHA-V left/right buttons (which look like up and down due to the mounting orientation) to position the upper rail in the **parked**, **level**, or **raised** position.



You can press , then quickly , or  then quickly  to rotate MECHA-V by 90°.

To enter the codes below, use the numerical buttons and the left button, , to enter <, and the right button, , to enter >.

DAC Test Without Camera – 1312 Parked Position

With the upper rail in the **parked** position (as shown in the image below), enter the code **1312<** or **1312>** on MECHA-H using its buttons.



This code instructs the Combo 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.

DAC Test Without Camera – 1313 Level Position

With the upper rail in the **level** position (as shown in the image below), enter the code **1313<** or **1313>** on MECHA-H using its buttons.



This code instructs the Combo 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.

DAC Test Without Camera – 1321 Raised Position

With the upper rail in the **raised** position, as shown in the image below, enter the code **1321<** or **1321>** on MECHA-H using its buttons.



This code instructs the Combo 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.



<https://youtu.be/9bAnR1HHgp4>

MECHA DAC Tests

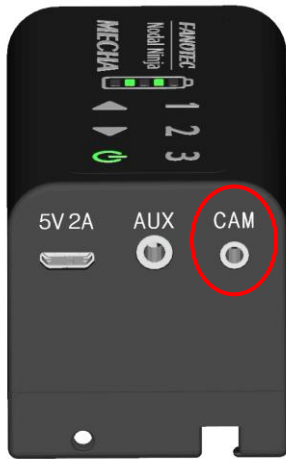
Panorama with Camera Mounted

If the above tests are successful, you can repeat each test 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 you are using into the Camera Port (CAM). This allows the shutter to be triggered automatically.



Since the units are being paired, the camera can be connected to either one.

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




Panorama with Automatic Shooting Pattern Using Only the MECHA's Buttons – DAC


This method requires the firmware version *02118* 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 of MECHA-V.



- Place **a sheet of paper in front of MECHA** so that it fills the frame. The frame can be viewed through the viewfinder or 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<**. When the power button starts flashing, MECHA waits for two quick presses of its power button, , as follows:
 - **First** – in order to trigger the camera.
 - **Second** – after the camera is 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 return to its initial position and begin to slowly tilt downward. It will again wait for **a press of its power button, **, when the sheet of paper is out of the camera's frame.
- Then MECHA will return to its initial position.

- The LEDs 1, 2, and 3, located under the battery symbol, will begin flashing. MECHA waits (15 seconds) for one of the buttons **1**, **2**, or **3** to be pressed, assigning the computed preset to that particular button. To cancel the assignment, press the power button, .

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 LEDs will display “!!!”, indicating no change.

To execute the panorama computed by MECHA, ensure the upper rail is in the **level** position and press the button to which you assigned the panorama. Then, press either the left or right button.



<https://youtu.be/1FMiv1jMa7E>

Creating a Panorama Preset Without UI – MECHA DAC

DAC Test Using the UI

For this test, we assume that the pairing method used was zLM 2.

Considering that both MECHA units are powered on and paired, to access the User Interface (UI) using a device, proceed similarly to the Single Axis MECHA (see [Access the User Interface \(UI\) on a smartphone](#)):

- Open your device's *Settings* app, turn on *Use Wi-Fi*, and in the Wi-Fi network list of the device, tap the network (SSID): *MECHA-H-DAC*

Please refer to your device manual for instructions on connecting to Wi-Fi. Here is a web page with [animated instruction for many smartphones](#). Here is a generic guide about [connecting to a Wi-Fi Network](#).

- Enter the password: 12345678

- After connecting to the network, you can access the web control interface by typing *192.168.8.1* in your web browser's address bar.
- MECHA will display the “*What is new?*” page.

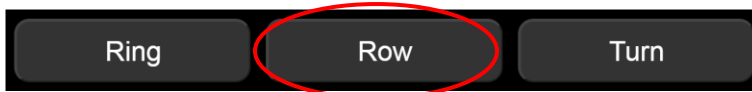
Tap *[Update]* if a newer firmware version is available (indicated at the top of the page) and wait until all MECHA status LEDs turn off. The update may take several minutes.

During the update process, MECHA may ask for a Wi-Fi network with internet access (like your home or office Wi-Fi) and the password to download the firmware.



Please do not turn off MECHA while updating the firmware!

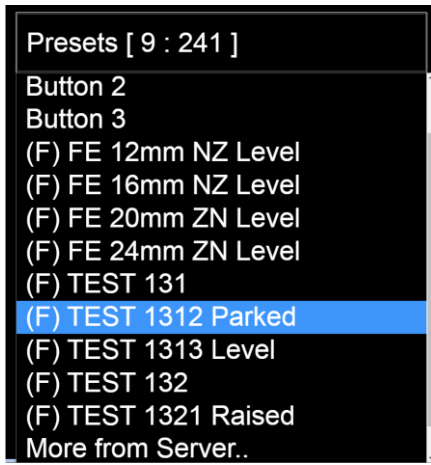
- Tap the *[Row]* button to go to the *Row* page.



UI Test – Codes 1312, 1313, and 1321

To perform the same tests you did before using the controller buttons, 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 previously in the chapter DAC test using MECHA's Buttons (12 shots around, 3 rows – at 0° and +/- 45° – plus zenith and nadir). If necessary, use the left/right buttons of MECHA-V to position the upper rail in the **parked** position.



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



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



Perform the same steps using the presets *TEST 1313 Level* and *TEST 1321 Raised*.

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

How to Change the SSID Password

If your password is *12345678* (automatically created in **zLM 2** pairing, or in **pairing using the UI**), or *01231231* (from our **zLM** pairing example), it is time to change the SSID password.

- Access the MECHA-H web User Interface (UI) using a device, as shown in the chapter [DAC test using the UI](#).
- Access the *Row* page, tap the *[info]* button at the top of the page, then tap the *[Config]* button to access the *Configuration* page.
- The user and default password are:

| | |
|-----------|--------------|
| User: | admin |
| Password: | Mecha |

- On the *Configuration* page, scroll to the *SSID Password* field, delete the current password, and enter the new password. You can also change the default password for the *Configuration* page if you have not changed it yet.
- Scroll to the bottom of the page and tap the *[Apply]* button.
- Once the SSID password is changed on MECHA-H, it changes automatically on MECHA-V because the MECHA units are paired.

Working with Presets

Programming a Preset Using Parameters

This programming method is available starting with firmware version 02134.

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.



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

Let's take a look at some examples first.

While 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** and **Mecha** by default.

MECHA will then create a preset and assign it to button **1** since **b=1** (overwriting the existing 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, under *Preferred MSS Pattern*).

Then launch the preset by pressing either the **1**  or **1**  buttons.



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 button **1**, **2** or **3** respectively. You will launch the preset by pressing this button and either the  or  button to specify the direction of rotation.

If a preset can be launched 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.

- The new preset can be found in the *Presets* list in the User Interface, and the first preset created takes priority over other presets that share the same initial code in their name.

Example:`192.168.8.1/preset?b=020&s=6`

b=20 will also work because MECHA automatically adds a leading zero before the number 20 to convert the parameter value into a power code (a code that 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, ensuring that two identical digits are not in consecutive positions.

To easily remember the rule above, 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.

The **s** parameter is 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 all you have to do is 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 with 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 (0)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 with URL Parameters

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

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

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, 1 second.

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

The **p** parameter specifies 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.

For example, **p=2** means a 2-second pause after each position:

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



Use a negative value (for example, **p=-1**) if the **pause** should occur **after each triggering** (see the **t** parameter above).



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

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

In cases where you are using a Single Axis MECHA and a 50mm lens for a panorama, you need to manually tilt the upper rail or camera up or down. MECHA will indicate when this is necessary and display the tilt angle value on the LEDs. It will then wait until you have tilted the camera and confirmed the adjustment.



To understand the information displayed on the LEDs, please refer to the [Table of Equivalences: LEDs - Characters](#).

If a Single MECHA is running a DAC preset and rotation is required along the second axis, MECHA will pause and display the rotation angle on the LEDs.

The value is rounded to the nearest integer and displayed as follows: for example, for a tilt of 45°: **:45** or **:-45** if the value is negative.

0 is considered to be the **level** position (horizontal).

You can use **-** as tilting up or tilting down, depending on the desired order (upper part first or lower part first).

When you will add a second MECHA to the single one, thus having a MECHA DAC (Dual Axis Combo), the same preset will work automatically without any pause unless you manually add some pauses in the script.

As a result of this new feature, the auto-generated script, when the focal length is inputted, will not contain any pauses. Pauses will occur automatically if a single MECHA is used.

Please see the [User Interface \(UI\)](#) — *Shots* paragraph for more details about how to use the focal length.

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* chapter 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. This is the normal overlap, both horizontally and vertically. However, if the *ovw* parameter is also present, then this value represents only the vertical overlap.

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

bf — before – values: positive and negative.

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 string to identify the preset in the OLED Preset Menu or in the Presets list in the User Interface. If this parameter is not passed, 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) of MECHA-H 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, and 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 02202 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:
 - **1▶**, **2▶**, **3▶** to the right.
 - **1◀**, **2◀**, **3◀** to the left.

More from Server

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

Note that MECHA accessed at *192.168.8.1* is in AP mode, and ***More from Server..*** is not available.

MECHA controllers work in two network modes: Access Point (AP) and Station (STA). AP mode allows the controller to create its own network and have up to 5 devices to connect to it. 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 works 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 we will look at the preset descriptions above and load the preset most similar to what we want to achieve.

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 are taken for a full 360° panorama. Notice how the rotation angle changes according to the number of photos, so that when multiplied, the result is 360°. On the other hand, if you change the rotation angle, the number of images does not change.
- You will get a similar result for a 33mm focal length entered via *Custom* instead of 12 Shots.
- **1 TRG** — 1 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 1 camera trigger signal.
- **AF 0.01 sec** — Auto-focus time (0.01 seconds). If the value is negative, the AF signal will be ON during the entire image sequence. For some Sony cameras, you may need to select the MF option or set a non-zero AF value, even if the camera focus is set to manual, in order to trigger the camera.
- **W:0 sec** — Camera wake-up delay (0 seconds). 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.

| | | | | | |
|--------------------------|-------------|----------|----------|--------------|--|
| 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 | | | | | |

- *B:0 sec* — No delay before triggering sequences. If the delay before triggering sequences is negative, up to 2 seconds will be used for Mirror Lock Up.
- *M:1* — Normal modifier of exposure. The Modifier of Exposure is the Modifier of the Duration of the shutter button signal, a list of multipliers, like 1, 0.5, 2 for normal, half, and double exposure time in case of 3 *TRG*, or it can be entered as -0.7 EV (for under, normal, over) or 0.7 EV (for normal, under, over), in which case it will automatically extend to the number of *TRG*.
- If the modifier starts with B, like B-2EV, or B1, or 1, 0.5, 2, the “Bulb” mode will be assumed.
- *E:0.25 sec* — Exposure: 0.25 seconds. This is the duration of the shutter button signal. For example, enter 3 for a standard exposure, or 0.5*3 for progressive half exposures, or 2*3 for progressive double exposures in a set. These values can be entered as custom values. Values can also be expressed as fractions (for example, 1/100).
- *A:1* — 1-second delay after each triggering sequence or individual triggering. 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 alternative option is *Rewind*, which means rewind to the initial position. This is useful if cables are 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 to 0 (zero) or *No Repeat* if no repeat is needed.
- *SP,0x12,-45x12,45x12,Z,N* — The MSS script that describes our preset: the starting position is **parked**, with 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 + constant speed region.
- *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 checking or range checking for the custom values at this time, so please use this feature with caution.

Modifying a Preset

1. Load the preset you want to modify first. For example, *TEST 1312 Parked*, which is a factory preset, and the preset script is:

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

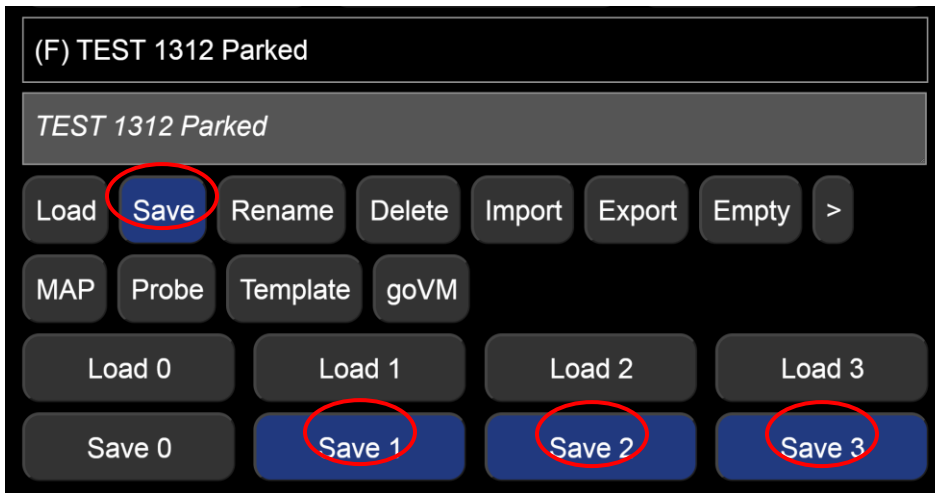
2. Change the preset settings or script as needed. For example, change the script to:

SP, 0x12, Z, N

3. Follow the instructions below to save the preset.

Saving a Preset

To save a preset, do one of the following:



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

The preset name can be preceded by a power code of up to seven digits. This feature also allows you to launch the preset using the remote or MECHA's buttons. For example, if the preset name is "**01** C1-12-shots":

- Use **⏻ 1 ▶** to execute the preset to the right (wait 1 second after pressing **⏻**).
- Use **⏻ 1 ◀** to execute the preset to the left (wait 1 second after pressing **⏻**).

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**, ensuring that no two identical digits are in consecutive positions.

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

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

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

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

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



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

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



<https://youtu.be/3F6fFTW3VYc>

Assigning a Preset to a MECHA Button in the UI – MECHA DAC



<https://youtu.be/d9xLBozF2YM>

MECHA Presets for Time-lapse Photography

MECHA's Simple Scripting (MSS)

Starting with firmware version 02116, **MECHA's Simple Scripting (MSS)** reached a level of flexibility that allows easy scripting for common shooting patterns for both single- and dual-axis applications.

An MSS script looks like the following. You don't 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 upward.

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]*.



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

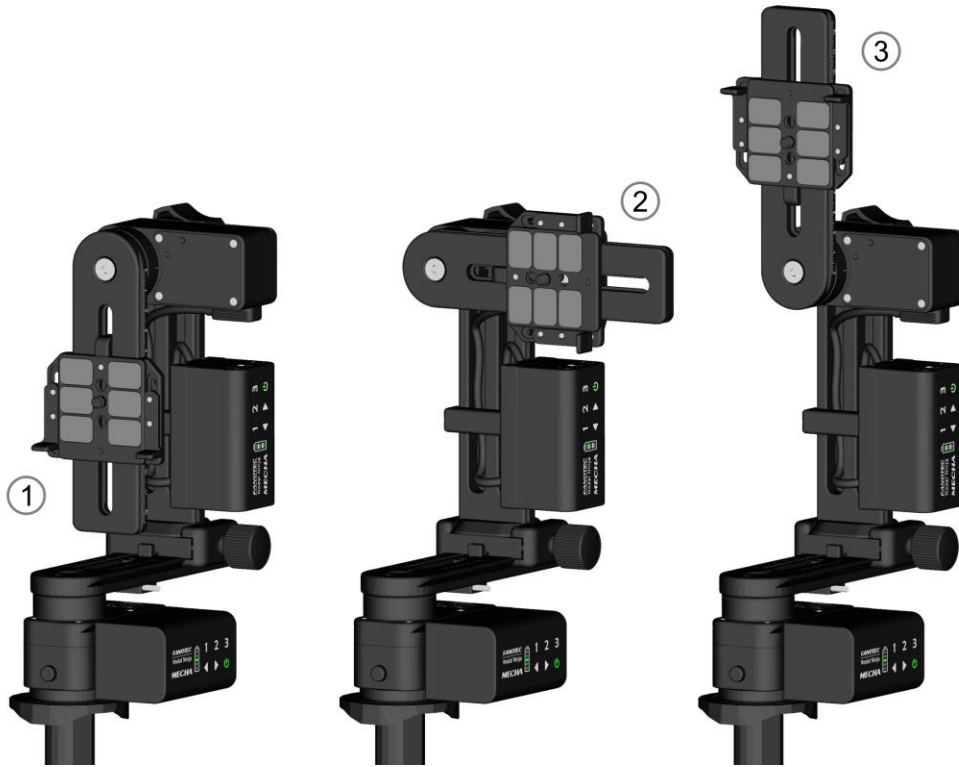


<https://youtu.be/jiBYhnGdIMI>

UI Preset for Any Focal Length – MECHA DAC

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.

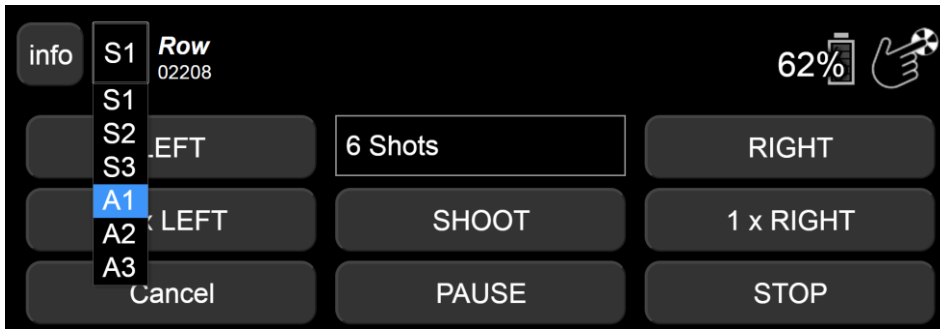
Shooting Panorama Made Easy for Dual Axis

Shooting a panorama is easy by following these steps:

1. Use the  and  buttons on MECHA-V 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.

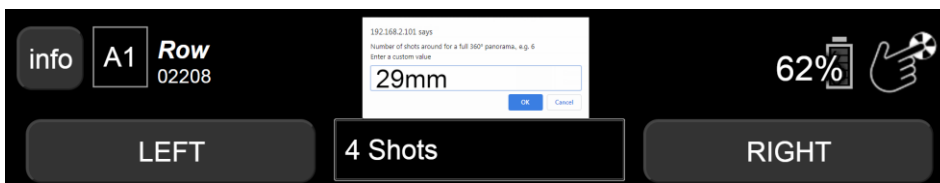
2. Connect to the MECHA's User Interface (see the chapter [How to Access the UI](#)).
3. On the *Row* page, select the *A1* (or *A2*, *A3*) level of complexity for the User Interface. In *A1-A3 (Advanced)* modes, you will see more controls than in *S1-S3 (Simple)* modes.



4. We recommend loading a simple preset, such as the default *Button 2* preset. To load this preset, use the *[Load 2]* button. The current settings are now the loaded preset settings.



5. Click/tap on 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 shooting a full panorama based on the provided focal length:

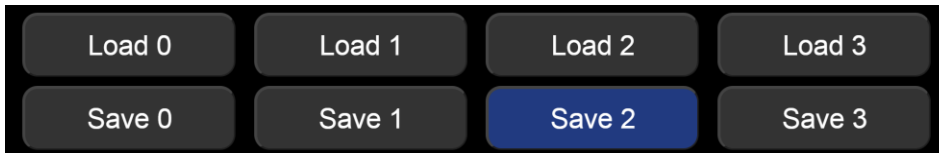
```
SL,0x11,-43.27x10, 43.27x10,ZZ,NN
```

The script has priority over equivalent preset settings.

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



7. To simplify this process further, we recommend saving 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 **2** button by default (see [Saving a Preset](#) for more details).



Next time you need to shoot this type of panorama:

- Load the preset using the *[Load 2]* button and execute it with the *[LEFT]* or *[RIGHT]* button.
- Or execute the preset directly using the **2**▶ or **2**◀ button combinations on MECHA-H.

Next, we present an example of a 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

Considering the **starting 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'll 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

In MECHA DAC, when the units are paired – which is a requirement for the above script to work – after start, the LEDs settle in, showing the status of successful pairing, as shown in this image:



If a **red** LED is lit on the MECHA-V, this indicates that while the pairing is established, the firmware version is different from the one in the MECHA-H. Depending on the differences, some recently added features might not work.



To have the full benefit of MSS, it is recommended to launch an update from the MECHA-H. This should synchronize the firmware by updating both devices to the latest version, resulting in both MECHAs having the same firmware, indicated by no **red** LED illumination.

Assuming the angles of rotation are 45°, 90°, and 180°:

- To go from **parked** to **level** and back, use **▶2**, then **◀2**.
- To go from **parked** to **raised** in one go, use **▶3**. Then use **◀3** to go back to the **parked** position.

NOTE. On the *Configuration* page, there is also a checkbox that establishes whether the left side is left or right regarding movements when the buttons are pressed. You might want to change its status if you prefer a particular behavior.

There are also two codes – **2313<** and **2323<** – for changing the direction of rotation if it is done using the left/right buttons, without needing 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 an incorrect setting regarding the type of rotators you use. The rotators can be set either on the *Configuration* page or using special codes.

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 this 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 **2** zeniths **90°** apart, the **ZZ** convention can be used, or **^90**, which tells the system 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 **2** 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°**. In this case, **90x1** will do the same as **Z**, thus **80x1** is what you need for a zenith at a tilt of **80°**.

For **2** zeniths at a tilt of **80°** and **180°** apart, we use **80x2**. For **2** zeniths **90°** apart, we can use **80x2^90**. This results in the following script:

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

Suppose that the rows at a tilt of **+45°** 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 this case, we can use **N, NN, -90x1, -80x1, -80x2^90**.

A 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 Using MECHA

When making a panoramic photo, photographers usually set the focus to hyperfocal distance, which will allow most features to be in acceptable focus and leave 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 (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 a 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 a **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, in the above scenarios, we need a pause, say, before the horizontal row or before nadir, to ensure we are out of view.

The pause can be added using **P**, so:

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

P0x12 will mean the same but with a pause before it, and 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).



That pause can be used to adjust some camera settings, like exposure, aperture, white balance (WB), focus, and more.

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

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

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

or even before nadir and zenith:

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

To customize it even more, let's say we want an extra image at the beginning – a kind of clapboard you may want to use for white balance (WB) or even for focusing. It will be a kind of image you need to retake without the extra elements and then take a second one to 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 a pause or without. For example, if starting from **level**, we may not need a pause, as we can launch the preset after the clapboard preparations are done. We will then have the pause only before the actual row of 12 to start, allowing 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 Denser Approach with More Photos Toward Gigapixel Imagery

Suppose we want a shooting sequence made up 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 up 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 applies to 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, the process will take some time.

Now, suppose we want only a vertical slice of it, of **45 degrees** – a kind of preview – also to test overlap and to see if the full 360° around can be used in production or just simply as a partial panorama 45° wide instead of 360°, with 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 a 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 a 50mm lens (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
```

Script for Two Focal Lengths – Dual Axis MECHA

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 **1** button.

Since the preset is assigned to the **1** button, you can start shooting using the

1  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 Two Focal Lengths – Dual Axis MECHA

Absolute Positions in Pitch and Yaw Conventions

As you have likely seen by now, 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 level starting 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 are connected to a power bank. **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 ensure 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 checking 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 the option *More from server* from the *Presets* list on the *Row* page. If *More from server* is not displayed in the list, MECHA is not 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 download 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 what the preset does, and over time you will learn which keywords to use. For example, the sequence *_P_* in a preset name means that the preset includes a pause.
- *(S)* in a preset name means that the preset is not yet saved on MECHA.
- Save presets you find useful as shown 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 necessary.
 - Save the preset with the same name, or with a different name.

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 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.

With MECHA DAC and C1, scanning a QR code from the table on the above-mentioned page will launch a preset whose name begins with the numeric code* corresponding to the QR code. For example, the QR code **020** will launch a preset such as **020 mypreset**, if this preset exists.



* The numeric code is a preset power code, meaning a code that starts with the digit zero. Remember that certain power codes can be used to launch a preset using the controller buttons. Read [Preset Power Code](#) for more details.



<https://youtu.be/UDqwkxyolyg>

Launching a MECHA Preset by Scanning a QR Code

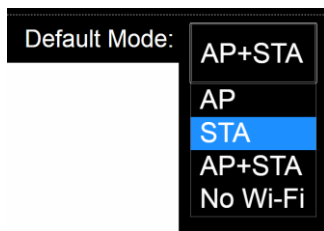
How to Set up Internet Access for Both MECHA and Smartphone

This chapter explains how to set up internet access for both your MECHA device and smartphone, enabling you to update your MECHA and browse the internet simultaneously.

First, set up a hotspot on your smartphone in the 2.4 GHz band and name it **MECHA-PHONE**. 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 connected devices.

1. Start your paired MECHA devices, beginning with MECHA-H.
2. Connect to MECHA-H's */config* using your smartphone. Set MECHA-H to STA mode by selecting STA from the Default Mode dropdown list.



Scroll down to the STA Mode section and enter the following values:

- Static IP: 192.168.43.101
- Subnet Mask: 255.255.255.0
- Gateway: 192.168.43.1
- DNS: 8.8.8.8 (or leave blank)

| | |
|------------|----------------------|
| STA Mode: | (no values for auto) |
| Static IP: | 192.168.43.10 |
| Subnet: | 255.255.255.0 |
| Gateway: | 192.168.43.1 |
| DNS: | |

3. Scroll to the bottom of the page and tap the *[Apply]* button.
4. Switch to the MECHA-V */config* (at the bottom of the page).
5. Set it in STA mode and enter the following values in the STA Mode fields:
 - Static IP: 192.168.43.102
 - Subnet Mask: 255.255.255.0
 - Gateway: 192.168.43.1
 - DNS: 8.8.8.8
6. Tap the *[Apply]* button.
7. Tap the *[Connect to Wi-Fi]* button at the bottom of the page, then enter **MECHA-PHONE** and the required password. Please see [User Interface – Connect to Wi-Fi](#) for more details.
8. Switch to the MECHA-H */config* by tapping the *[H MECHA / config]* button, which should be visible at the bottom of the page.
9. Tap the *[Connect to Wi-Fi]* button at the bottom of the page, then enter **MECHA-PHONE** and the required password.
10. Start the MECHA-PHONE hotspot.

MECHAs should connect to **MECHA-PHONE** after a short time.

As a result:

- Your MECHAs will be connected to your smartphone's Wi-Fi hotspot, which provides internet access if 3G, 4G, or other cellular data is available.
- This enables downloading presets from the server, receiving updates, and using your phone for internet browsing as usual.
- MECHA-H-DAC will always be accessible at 192.168.43.101, and

- MECHA-V-DAC will always be accessible at 192.168.43.102

To ensure connectivity:


- Turn on your **MECHA-PHONE**'s hotspot when powering on the MECHAs.
- Keep the hotspot enabled while using the MECHAs. For example, disable any automatic turn-off feature for the hotspot on your phone/device.

Now your devices are connected to the internet and to each other, allowing you to download presets from the server.

Other Pairing Methods

zLM – Automatic Pairing Using Buttons

This is a zero-learning method (**zero Learning MECHA**) for firmware *02011* or newer.

As you already know, we communicate with MECHA through a web interface or using its own buttons, especially to enter codes. We use the power button, , to enter 0 (zero) on the MECHA unit. Therefore, a code that starts with zero is called a power code.

In the **zLM** method of pairing, the first step is to create a power code, and the second step is to use this code to pair the MECHA units.

Step 1

Create an 8-digit code followed by the **greater-than sign** (>), as follows:

- The first digit must be **0** (zero) .

- The next sequence of seven digits must be a combination of the digits **1**, **2**, and **3**, ensuring that no two identical digits are in consecutive positions.
- Add the **greater-than sign** (>) at the end.






Example:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | > |
|---|---|---|---|---|---|---|---|---|


Please do not use this example code, as it also functions as a password.

When the **power code** is entered into both MECHAs, these two MECHA units connect automatically and become a Dual Axis Combo (DAC).

Step 2

1. Power off both MECHA units if they are running. To do this, hold down the power button, , for 3 to 5 seconds.
2. Power on the horizontal MECHA unit (hold down its power button, , for 3 to 5 seconds). Wait until the splitting lights () stop and all LEDs are off. The unit powered on first **rotates horizontally**, so we name it **MECHA-H**.
3. Enter the **power code** on the MECHA-H using its buttons. After entering the code, MECHA-H emits 5 beeps if not muted in settings. This indicates that it is ready for pairing with another unit: *"I'm ready, another unit can pair with me"*.
4. Power on the other MECHA using its power button, , and wait until the splitting lights () stop and all LEDs are off. The second powered-on unit **rotates vertically**, so we name it **MECHA-V**.



As an alternative to „Wait until the splitting lights stop“, on steps 2 and 4, you can press the **1** button when the LEDs show .

5. Enter the same **power code** on MECHA-V using the buttons of MECHA-V.
After entering the code, MECHA-V emits two beeps if not muted in settings.
This means *"I'm done, I'm the pair of MECHA-H"*.

On successful pairing, MECHA-H has the middle LED on, and MECHA-V has the two middle LEDs on. Otherwise, power off and on both MECHAs again, preferably powering on MECHA-H first.

The next step is to test the combo using MECHA's buttons and see how it works.

MECHA's Pairing PIN

This section should be read after you read [DAC test using the UI](#), where we explain how to access the User Interface.

The pairing PIN is an optional feature that ensures a specific pair of devices connects at startup when multiple units are in operation. For example, one can power on the MECHA-V unit in one DAC and then power on the MECHA-H unit in a second DAC. Assuming the pairing method is zLM or zLM 2 and the units are connected to the same network or hotspot, MECHA-V (in the first DAC) will pair with MECHA-H (in the second DAC).

If a pairing PIN is set on MECHA-H, the same pairing PIN is automatically set on MECHA-V in a DAC, and the two units will reliably connect from then on.

Here are the steps to set a pairing PIN.

- Access the MECHA-H web interface, as shown in the chapter [DAC test using the UI](#), and go to the `/config` page.
- Create a four-digit number – the pairing PIN – and enter this number in the *Pairing PIN* field.
- Then click the *[Apply]* button at the bottom of the page.

The MECHA units that have the same PIN will be paired together.

All pairing methods and requirements presented in this guide are still valid.

Once paired, if the PIN number is changed on MECHA-H, it will automatically be set to the same value on MECHA-V.

If you want to break the pairing, please set a different PIN on MECHA-V.



<https://youtu.be/zC6VMr3kn1M>

MECHA's Pairing PIN

Temporary Pairing

This type of pairing, or team, lasts only until the MECHA units are powered off. To temporarily pair two MECHA units:

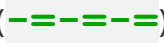
- Power on both MECHAs.
- Start team building by entering the code **1212<** on the horizontal MECHA. In other words, the unit on which you enter this code, will rotate horizontally.
- Confirm participation in the team by entering the code **12<** on the vertical MECHA. This unit will rotate vertically.

Automatic Pairing Using the UI

Power on the horizontal MECHA and press **1** when the LEDs show splitting lights (, where the icon shows a horizontal bar with a vertical line through the center, and the top half is green and the bottom half is red).

1. Connect to the horizontal MECHA with its SSID and password. Refer to the [MECHA Controller C1 Manual](#) if needed. The SSID and password are printed on the supplied QR code label. Record them if the label is not available.
2. Open *192.168.8.1/config*

| | |
|-----------|--------------|
| User: | admin |
| Password: | Mecha |

3. Select *Default Mode: [AP+STA]*
4. Click the *[Apply]* button.
5. Power on the vertical MECHA and press **1** when the LEDs show splitting lights ().
6. Connect to the vertical MECHA using its MECHA SSID and password.
7. Open *192.168.8.1/config*

| | |
|-----------|--------------|
| User: | admin |
| Password: | Mecha |

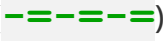
8. Select *Default Mode: [STA]*
9. Click the *[Apply]* button.
10. Click the *[Connect to Wi-Fi]* button, enter the SSID and password for the horizontal MECHA.
11. Connect to the horizontal MECHA again using its MECHA SSID.
12. Access *192.168.8.1/row*
13. If pairing is successful, the UI will show *[H]* at the upper left corner and *[Team .x]* near the bottom of the page, where *x* is the last part of the IP address in *192.168.8.x*. The vertical MECHA can be accessed by selecting the *[H]* icon or by typing *192.168.8.x* into the browser address bar. The vertical MECHA UI will show *[V]* at the upper left corner and *[Team]* near the bottom of the page. Select *[V]* to return to the horizontal MECHA. Use two tabs with MECHA IPs in your browser to access both MECHAs quickly.



14. To get presets from the server, click the *[Connect to Wi-Fi]* button and enter the SSID and password for the Wi-Fi network with internet access.
15. Select *[Presets]*, then load *[More from Server]* to get some presets to test. You can ask for presets for your specific setup at forum.nodalininja.com
16. Note that MECHA (accessed by 192.168.8.1) is in AP mode. If you use the hotspot/Wi-Fi tethering function on the same device to provide internet access, MECHA cannot connect to the internet and *[More from Server]* is not available. You can use MECHA's STA IP to access it. For example, on Android, STA IP is 192.168.43.x, where x can be 2-254; on iPhone/iPad, STA IP is 172.20.10.x, where x can be 2-14. Refer to the [MECHA Controller C1 Manual](#) for details on STA mode.

How to Unpair MECHAs


Temporary Unpairing

Power on MECHA-V and **press the 1 button on MECHA-V** when the LEDs show splitting lights () . It does not matter whether MECHA-H is on or off at this moment. The units will remain unpaired until you power on the system again.

Permanent Unpairing

While the units are temporarily unpaired, access the *Configuration* page of MECHA-V and select the *AP* option from the *Default Mode* list, then tap/click the *[Apply]* button at the bottom of the *Configuration* page.

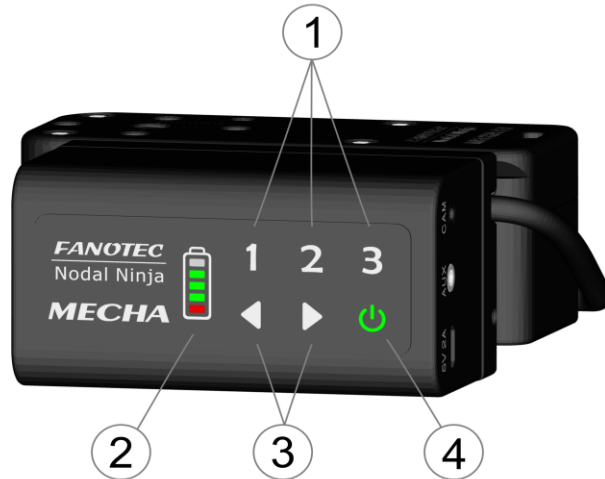
Re-Pairing after Unpairing

Power on MECHA-V and **press the 2 button on MECHA-V** when the LEDs show splitting lights () . It does not matter whether MECHA-H is on or off at this moment. When both units are powered on, they will pair automatically.

If a Pairing PIN is Set

If a pairing PIN is set and you want to permanently break the pairing, please set a different PIN on MECHA-V.

MECHA's Current Codes



1 — Programmable Buttons

2 — Power / Status LED Indicator

3 — Left / Right Buttons


4 — Power Button

MECHA's buttons allow you to quickly perform some operations, and they can be an alternative to the web interface in most cases.

MECHA has five LEDs which show you the result of the performed operation.



See the [Table of Equivalences: LEDs – Characters](#).

Power on the device by pressing its power button, , for a few seconds, then enter the code you need using MECHA's buttons.

See below the equivalence between buttons and characters:




For example, to enter the code **1<**, use the **1** and **<** buttons. This code executes the preset *Button 1* to the left.

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 (123123<).

Current Codes List



<https://youtu.be/iyqOHKhIS3I>

MECHA C1's LED Indicators

1< or 1>

Executes the preset *Button 1* to the left or to the right.

By default, the preset *Button 1* consists of 4 shots around, or it is the preset saved with the *[Save1]* UI button.

2< or 2>

Executes the preset *Button 2* to the left or to the right.

By default, the preset *Button 2* consists of 6 shots around, or it is the preset saved with the *[Save2]* UI button.

3< or 3>

Executes the preset *Button 3* to the left or to the right.

By default, the preset *Button 3* consists of 8 shots around, or it is the preset saved with the *[Save3]* UI button.

131< or 131>

Executes a panorama of 6 shots around to the left or to the right, for a single MECHA.

132< or 132>

Executes a panorama of 12 shots around to the left or to the right, for a single MECHA.

1312< or 1312>

Executes a panorama of 12 shots around, 3 rows – at 0° and at +/-45° – plus zenith and nadir, to the left or to the right, for MECHA DAC. The code must be entered on MECHA-H, and MECHA-V must be **parked**, i.e., oriented upward, as for the zenith photo. First time, please test the codes without a camera mounted on the panoramic head.

1313< or 1313>

The same as 1312, but with MECHA-V 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 MECHA-V in the **raised** position. First time, please test the codes without a camera mounted on the panoramic head.

1212<

Starts an assembly of a team of MECHAs; it can be canceled or ended with the power button, , or *[Team]* button on its UI (User Interface).

After entering the code 1212<, or after the first tap/click of the *[Team]* button in the UI, the LEDs will show scanning for any MECHA willing to join the team and be controlled.

The MECHA where the Team was started in the UI, or the code 1212< was entered, becomes the main MECHA and will have control over other MECHAs.

To join any other MECHA in the team, enter the code 12< on that MECHA. The effect of joining by 12< should be instant and echoed by beeps in the main MECHA. However, if nothing happens, the code can be entered again. To stop the team assembly, either tap/click again on the *[Team]* button in the UI or press the power button, , on the main MECHA.

Regardless of being in a team or not, each MECHA still has its UI functional. Furthermore, each MECHA can start its own team: for example, with five MECHAs in the network, 1 can assemble the 1,2,4 team and, at the same time, 2 can assemble the 2,1,3,4 team, provided the other MECHAs confirm the participation.

For now, the control is limited to dual axis: the main MECHA and the last MECHA joined with 12<.

12<

Confirms participation in a MECHA team started by another main MECHA. After entering the code, the unit will send its IP address to other MECHAs in the same network. On the first MECHA, there is no need to enter the IP manually, except when you want to use a different second MECHA in the network.

Team build started on one MECHA with *[Team]* or the **1212<** will automatically exit from team building once a signal from another MECHA is received (after the **12<** confirmation on the other MECHA), and the LEDs will light accordingly.

121<

Shows the MECHA's ID, like "123ABC".

123<

Shows the **entire** MAC address, like "123ABC123ABC".

323<


Shows the **full** IP address, like "192.168.0.100". To avoid confusion, the IP address is shown only once and then it automatically exits from IP address display.

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 **1** button for three seconds at splitting lights () will enable the AP mode and allow access to the web interface at 192.168.8.1

13<

Shows the battery percentage.

131313<

Reboots MECHA without power cycling it.

This is useful when you want MECHA to reboot (for example, 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<

Sets MECHA to pause mode or takes MECHA out of pause mode, the same as clicking the *[PAUSE]* button on UI, or  on IR Remote.

2121<

Code to enable/disable the noise reduction for E rotators.

23<


Disables/Enables the motor.

UI *[Reboot]* command will be ignored if the motor is disabled.


While the motor is disabled, the power LED blinks rarely; it also blinks in UI, and "(o)" is shown over it.

Disabling the motor is useful to prevent MECHA from turning on by accident while charging, for kids' protection, or to simulate the functioning of MECHA for learning purposes, or to save energy, and also the battery can be charged faster. There are other applications, not listed here.




Before disabling the motor of MECHA-V, we recommend that you position 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 Part 2.

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 the second after the camera was 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, just after the sheet of paper is out of the camera's frame.

Then MECHA will go back to its initial position and wait for one of the 1, 2, or 3 buttons to be pressed, to assign the computed preset to that particular button.

To cancel the assignment, the  button can be pressed instead.


For single-axis applications, after the first row, MECHA will enter pause mode, and 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.

231<

Everything OFF for faster battery charge. First, plug in the charger cable, then enter the code. Press the power button, , to toggle the battery **level** display on the LEDs while charging.

If there is no power when plugging in the charging cable, the code will be ignored. If the code is executed, the LEDs will show charging. After that, the charging cable must be unplugged and MECHA powered on again to return to normal use.

Pressing any buttons other than  will have no effect.

As an alternative, on the */config* page of the UI, the value for the *When Charging* option should be *Turn OFF*. This reduces the charging time to a minimum, and it is also recommended if MECHA is not intended to be used with the charging cable inserted, to prevent accidental rotation of MECHA by UI commands while charging.


232<

Disables/Enables all LEDs, which can be useful during night photography.

As the power LED is off, don't forget the device is turned on. The LEDs will light up however if buttons are pressed for entering a code, to show the result of a code, or for battery check.

12321<



Backlash compensation calibration.

After entering the code, MECHA will turn slowly to the right, then the power LED will start flashing. After that, press  when you see or feel MECHA starting to move very slightly to the left.

You can use the viewfinder, live view with zoom, or other attached devices (like a laser pointer) to observe this movement, or merely sense it manually at the onset of the slight motion.

At the end, the LEDs will display a value, such as ":24", where 24 is the new calibration factor (it should be around this value).

You can re-enter the code if you want a better result or have more precise methods to determine the small movement.

You can cancel the procedure by pressing any other button when  flashes, or press  immediately after it starts flashing to have no compensation at all. If no buttons are pressed, the procedure will time out in five minutes.



TIP: When using an R1 with a camera in portrait mode and no live view, you can look through the viewfinder with your left eye (if the grip is mounted at the top) or right eye (if it is mounted at the bottom), without needing to close the other eye. This will make the process more comfortable.

123123<

Speed calibration.

The procedure takes **one hour** and is silent; the motor is not moving.

Please wait until MECHA turns OFF automatically, and do not use the web interface during this time.

This is a one-time procedure that can be omitted if you wish, as default factory calibration is good.

It cannot be canceled once started.



Both **backlash compensation** and **speed calibration** codes can be used only if they are absolutely necessary for your application. Both procedures save their 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 intended to compensate for the backlash of the gear assembly, resulting in better precision for left-right movements, such as rewinding to the initial position for cable protection or in cases of partial panoramas and time-lapses.

The procedure can be repeated after a longer period of time if the gears wear out.

If you notice a slight right-left movement when starting the unit, a compensation is set. Otherwise, the compensation is 0 or is not set.

3212<

Shows the firmware version on the LEDs, then the code **32123<** can be used to update the firmware, provided MECHA has internet access or was previously connected to a Wi-Fi network with internet connectivity, and the Wi-Fi connection remains active.

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*, it may be necessary to enable *STA* or *AP+STA* temporarily at startup via buttons, then enter the code **32123<**. MECHA's LEDs will show "..." if no update was found, or "!!!" if there is no internet connection.

3212312<

Updates the firmware on both paired MECHAs if a new version is available.

312123<

Update the firmware using a hotspot with the name **MECHA-UPDATE** and the password **87654321**, which must be created and active before entering the code.


31212<

The code must be entered in the horizontal unit; it will re-update both MECHAs. If there is no firmware version newer than the current one, then the latest update is performed again.

312<

Like **31212<**, but only re-updates the unit where the code was entered.

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 the LEDs the code of the button pressed (after the button is released), and over the battery symbol in UI. To end the test, press the power button, , which flashes during the test.



<https://youtu.be/agfwRVsfII8>

IR Remote Test – C1 and C2 MECHA Controllers

3232<

Allows you to enable/disable the use of Nodal Ninja IR Remote.

32313<

Code to test the shutter confirmation.

First, connect a camera to the MECHA's CAM port using a PC sync cable, then launch the test by entering the code as usual. 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).

Now MECHA will count the shutter detections from the camera via the AUX port and show on LEDs the number of detections after 10 seconds of idling. For example, if you trigger the camera **four** times, the LEDs should show **4** if the test is successful.

If the above test fails, please perform the test again with the **Use New Shutter Confirmation** disabled on the *Configuration (/config)* page.

For DAC, if the camera is connected to MECHA-V and the confirmation is via the AUX Port of MECHA-V, the **[x] Shutter Confirmation via other MECHA** checkbox needs to be enabled in the */config* of MECHA-H.

3123<

This code will temporarily switch from **AP** to **STA** mode and connect MECHA to the last Wi-Fi network if it is detected by MECHA.

2313<

Changes the sense of left/right rotation when it is done manually using the

 and  buttons.

The following three codes should match with the current rotator connected to the controller.

23131<

Sets E1 as the preferred rotator.

23132<

Sets E2 as the preferred rotator.



23121<

Sets P1 as the preferred rotator.

231231<

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 LEDs stop lighting as  , (one **green** LED at the top and one **red** LED at the bottom),
- 2) enter **231231<** again.

When the power LED starts flashing, press the  button (short press).

231231231<

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 LEDs stop lighting as  , (one **green** LED at the top, and one **red** LED at the bottom),
- 2) enter **231231231<** again.

When the power LED starts flashing, press the  button (short press).

Note that pairing is lost when resetting the MECHA DAC to factory settings, and you need to pair the two units again.



<https://youtu.be/nE18P2LIBi4>

FACTORY RESET – Restoring MECHA C1 to Factory Settings

Appendix

MECHA's S (Shots) Language

The S Language requires firmware 02054 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 of MECHA-H using the User Interface and select *Scripted*. As a result, a blank text area is displayed where you will write the script.

The screenshot displays the MECHA-H User Interface for configuring a shooting pattern. The interface is organized into several sections:

- Top Section:** Includes buttons for 'LEFT' and 'RIGHT', a central display showing '38 Shots', and a 'RIGHT' button.
- Mode Selection:** Two main modes are available: 'NPP Shots' and 'Live NPP'.
- Configuration Parameters:**
 - 1 TRG:** A button to select the trigger.
 - MF:** A button for Manual Focus.
 - W:0 sec:** A field for Wait time.
 - B:0 sec:** A field for Burst time.
 - M:1:** A field for Magnification.
 - E:0.25 sec:** A field for Exposure time.
 - A:0 sec:** A field for Aperture time.
 - 9.47 °:** A field for Angle.
 - x 1:** A field for Magnification.
 - Wait:** A button to set a wait time.
- Repetition and Load Settings:**
 - No Repeat:** A button to disable repetition.
 - Scripted:** A button to enable the scripted mode, which is highlighted with a red circle.
 - 6 RPM:** A field for Rate of Fire.
 - 16+128 uStep:** A field for the number of steps.
 - Medium Load:** A button to set the load level.
- Script Area:** A large text area at the bottom for writing the script. It contains the following text:

```
S=90,  
1=0_0, =_30, 11=45, 12=-45,  
12=-90, =90_0, =
```

A red arrow points to this text area.

The script starts with the initial position of MECHA, as follows:

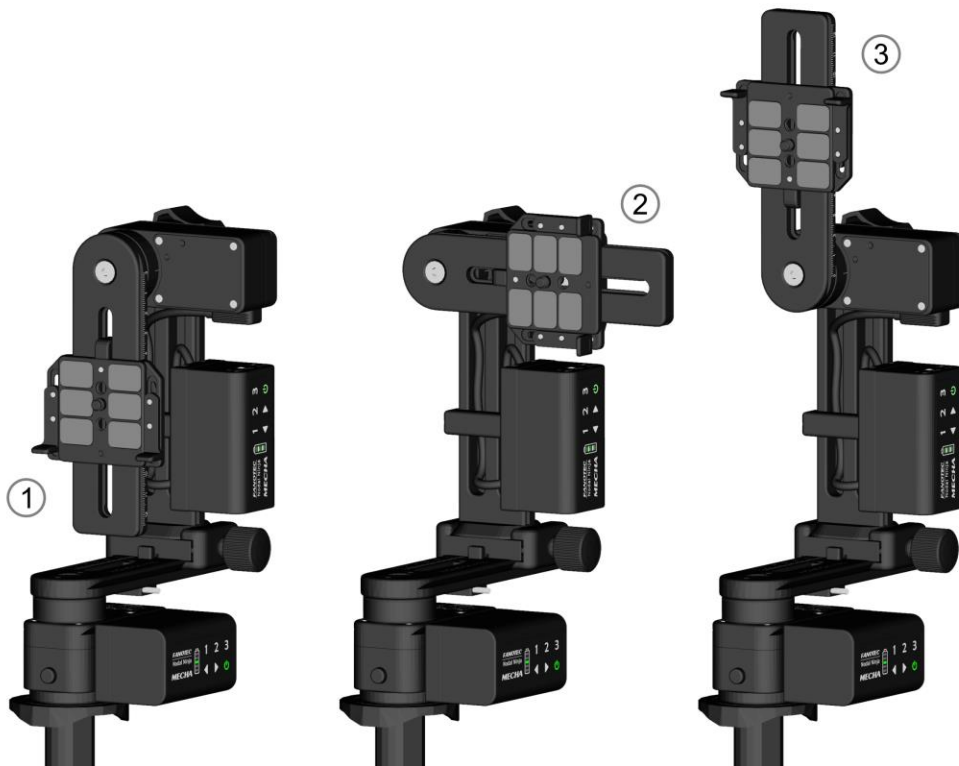
S={position in degrees}




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 Part 2.

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. |
| ^ | <i>Caret</i> 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 MECHA-V** 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}
 ={MECHA-V position}_{MECHA-H 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 MECHA-H rotation will be 30°, while for MECHA-V 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 MECHA-V.

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 MECHA-H. Then,

at the 11th photo, something changes: MECHA-V 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, MECHA-V 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, MECHA-V 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 MECHA-H. 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 MECHA-V tilts **3°** from the previous position (specified by the ^ sign).

In the loop, we have only the tilting of **3°** for MECHA-V, and no changes for the horizontal interval.

The above loop repeats with **-3°** instead of **3°** for MECHA-V:

=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 the **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 MECHA-H.

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 by 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 the **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 C1-E1-E1, the page above displays data similar to the example below in **XML format**:

```
<xml>
<m0> 1</m0> /controller type
<m1> MECHA-H-DAC</m1> /MECHA ID
<m2> 02349</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":1, /controller type
  "m1":"MECHA-H-DAC", /MECHA ID
  "m2":"02349", /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.

Commands for Displaying Text on C1 LEDs

text

Use the **text** parameter to display text on the C1 Controller LEDs. Provide the actual text as shown in the following example, but note that you can only use the characters listed in the table below, including lowercase letters.

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | | | | | | |
| ! | . | : | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 0 | A | B | C | D | E | F |

```
http://192.168.2.1/i?text=ace!
```

Rotator Specific Commands

Usually, we will 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:

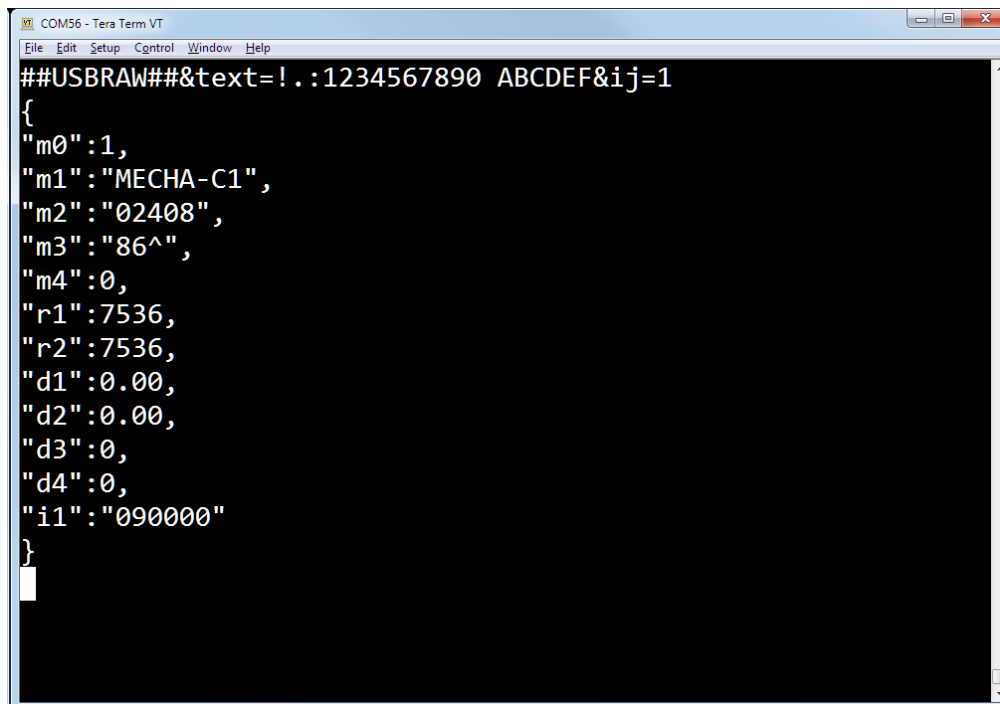
```
##USBRAW##&pr1=medium&ms1=32&fs1=7536&fs2=7536&sp1=6.0&rd1=30&rd2=45&synch=true
```

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
```

For example, the following command displays the text **!.:1234567890 ABCDEF** on the C1 Controller LEDs:



The screenshot shows a Tera Term window titled 'COM56 - Tera Term VT'. The command entered is '##USBRAW##&text=!.:1234567890 ABCDEF&ij=1'. The response is a JSON object containing various parameters.

```
##USBRAW##&text=!.:1234567890 ABCDEF&ij=1
{
  "m0":1,
  "m1":"MECHA-C1",
  "m2":"02408",
  "m3":"86^",
  "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>



<https://youtu.be/EuSxe3xMFus>

Continuous Rotation with MECHA DAC Using the RAW Interface

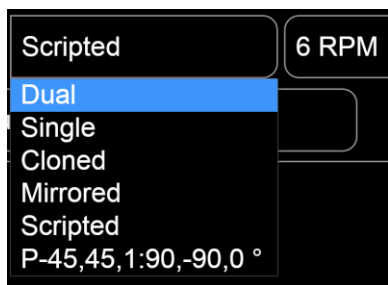
Chain of Cloned MECHAs

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.

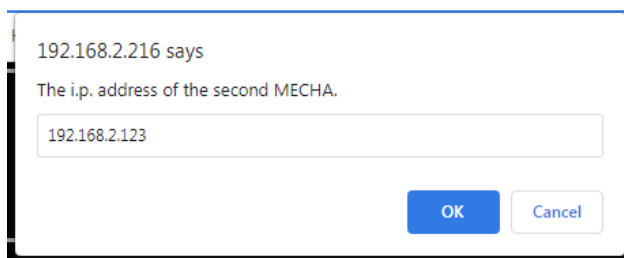
Here is how you create a chain of MECHAs:

- Access the User Interface of the master MECHA, then:

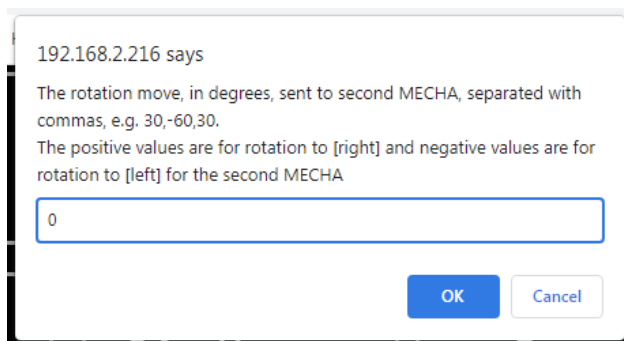
- Select *Dual* from the *Single/Dual...* list.



- 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.



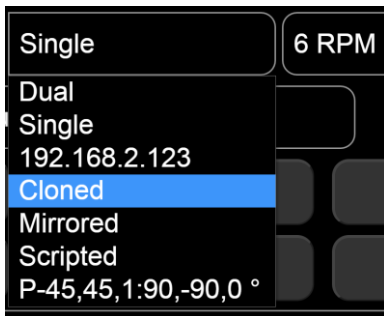
- Access the User Interface of the second MECHA and select *Dual* from the *Single/Dual...* list. Enter the IP address of the third MECHA in the displayed dialog box, then click OK. Another dialog box will appear; enter 0 (zero), as before.

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.

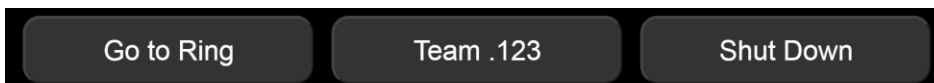
Once the MECHA chain is created, you only need to access the User Interface of the master MECHA.

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

What is New

- **Version 7.2.12 – 2025.06.10:**

- Revised: *Preset with Power Code Using URL Parameters, Modifying a Preset, Saving a preset, Script field, Beep Volume, Power Saving Mode, Pause Mode, UI buttons [1] [2] [3], [N x LEFT] button.*
- Additional minor changes.
- Added links to videos:
 - *MECHA's Pairing PIN*
 - *MECHA User Interface Tips*
 - *Rotating a Turntable Using the MECHA C1 Controller*
 - *Favorite Codes – MECHA C1 Controller*
 - *Button Confirmation Options – MECHA C1 and C2 Controllers*
 - *Continuous Rotation with MECHA DAC Using the RAW Interface*

- **Version 7.2.11 – 2025.23.05:**

- Revised: *MECHA's Pairing PIN.*

- **Version 7.2.10 – 2024.12.10:**

- Revised: *Part I, Part II, Appendix.*

- **Version 7.2.9 – 2024.07.11:**

- Revised: *Introduction, Script field, MECHA's Current Codes.*
- Added links to videos:
 - *Chain of MECHAs*
 - *How Repeat Works – MECHA C1 and C2 Controllers*
 - *Launching a MECHA Preset by Scanning a QR Code*
 - *MECHA C1's LED Indicators*
 - *MECHA Overview*
 - *MECHA Presets for Time-lapse Photography*

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



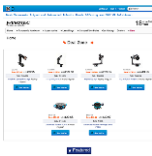
<https://www.youtube.com/user/NodalNinja>

Nodal Ninja YouTube Channel



<https://forum.nodalninja.com/>

Nodal Ninja's Panoramic Photography Forum



<https://www.nodalninja.com/>

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