

MECHA

C1 USER'S GUIDE



September 13, 2023

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MECHA C1 User's Guide



For firmware version **02423** 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, www.fanotec.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: Flat 2, 4/F, Kar Wah Indl. Bldg. 8 Leung Yip Street Yuen Long, 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?

In short, MECHA is a wireless controlled motor that can rotate and trigger a camera or other devices.

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



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/moves can be pre-programmed and launched using its buttons, or can be wireless 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 wireless by the visitors or by the host.

It also has support for IR remote – just as the camera has its remote, or a TV set has one – and support for wired remote.

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

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 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 server and use it directly, or to download, and modify, 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,

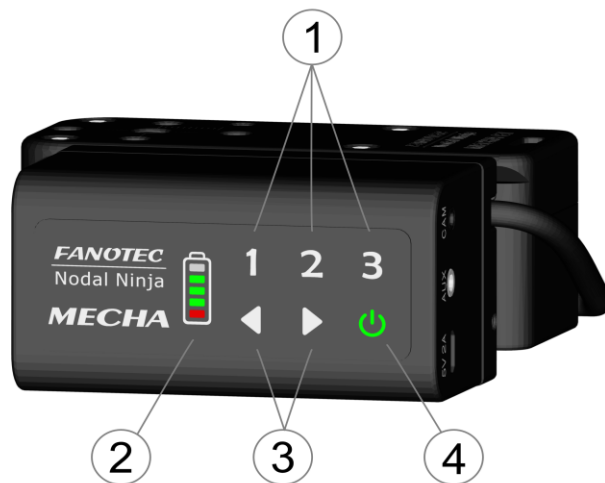
like Nodal Ninja 3 and alike, reducing the panorama shooting to a simple press of a button, or two, regardless of its complexity, and to do that without flaws, again and again.

MECHA consists of two parts: a motorized rotator (abbreviated E), and a controller (abbreviated C), and in this guide we are particularly interested in the controller.

MECHA C1 Presentation

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, and it is also the equivalent of 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 terminator for codes (similar to the Enter key).

About UI vs. Codes or Buttons

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

Always start by powering up MECHA, by pressing and holding the 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 in 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 to or chatting with Support and tell:

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 details in the dedicated zLM chapter.

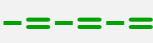
Many tasks, both simple and complex, can be performed either using the UI or the buttons.

About the User Interface

To access the UI of MECHA, a device with an Internet browser needs to be used. The simplest and handy, really handy, will be 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 MECHA SSID, the MECHA UI can be accessed in browser at 192.168.8.1

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 smartphone a hot-spot is enabled and MECHA can connect to it (more on that later).

If, for any reasons, the address of the MECHA UI cannot be known, MECHA has a way to show the address of the UI, if one of these codes is entered using MECHA's buttons:

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

Table of Equivalences: LEDs – Characters

The conventions for displaying characters on 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, it is recommended to update its firmware to the latest version available.


There are a couple of ways to update the firmware, and the easiest 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 a SSID name and password, just like a guest in your house will ask if there is a Wi-Fi

available, to be able to check something on Internet, a Wi-Fi the guest will connect the phone to. 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 up, as long as it doesn't execute any preset.

If MECHA is OFF, pressing the 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 the 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 counter-clockwise rotation (CCW).

These tests can be used for shooting an actual panorama with a fish-eye lens on ring type panorama 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 a real panorama with an 18-55mm kit lens on a panoramic head, like 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 shoot 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 wireless connected in DAC, the entire spherical panorama can be done automatically, without the need for manual tilting, using

1313> 1312> 1321> for CW, or **1313< 1312< 1321<** for CCW.

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 instructions and configurations, 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 server.

Part 1

Single Axis MECHA

Before First Use

Before using MECHA, we recommend that you do specific checks and tests.


First, if you have an R1 or an NN3, mount them 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 the 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 go back to the starting position:

- Press  then quickly press .

For a test panorama, press the following buttons:

-    

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

Now you already know how to power MECHA on and off 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.

Check the Battery Level



- If no LED lights up, or only a **red** LED lights up, the battery may be discharged, and it is recommended to use a 5V-2A charger to charge it. It may take 3 to 5 hours to charge the battery.
- Otherwise, if the LEDs light up normally, as shown in the **Power ON and Test** video, after 30-40 seconds, you will hear two beeps, 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 **2313<** code. 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 the MECHA. If the results are as expected, it means that they have not been overwritten yet, and you can use them to take panoramas from 4, 6 and 8 shots around with camera mounted. Later in this guide, we will see that these presets can be overwritten.

MECHA's firmware act as the device's complete operating system, performing all control, monitoring and data manipulation functions, and it is important to have the latest version installed.

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

Firmware Update Using a Hot-spot



https://youtu.be/Upb_jgTWw58

Firmware Update Using a Hot-spot – 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 hot-spot on your 3G, 4G, or 5G smartphone, a smartphone with

mobile data enabled and Internet available to it; in other words, you can navigate the Internet using that smartphone alone, without the smartphone being connected to a Wi-Fi.



Please do not turn off MECHA while updating the firmware!

- First, set up a hot-spot with the name **MECHA-UPDATE** and (default) password **87654321**, in 2.4 GHz band.
- Press the power button, , for about 3 to 5 seconds to power on MECHA, and wait until the splitting lights end: , 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 the power button 3 to 5 seconds, and contact us at mecha@nodalninja.com.
- Using MECHA's buttons, enter the code **312123<** by pressing one after another each button. Before pressing the last button, you can wait and look how the LEDs show the entered sequence, just to be sure you entered the correct code. If there is any mistake, short-press the power button and enter the code again, and terminate with < by pressing the left arrow button, . Now, notice how MECHA starts scanning the existing networks.



<https://youtu.be/LNx64vps6Pg>

LEDs during Firmware Update – Single Axis MECHA

- And when it connects to the previously created hot-spot, two beeps are heard. The code **312123<** will update the firmware using the MECHA-UPDATE hot-spot you set. The response – displayed on the LEDs – can be: **“!!!”** if the update cannot be done at that time.



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

The update may take up to 5 minutes, but it could take longer in case of slow Internet connection.

Test Using MECHA's Buttons



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

NOTE. The following codes are used to tell MECHA what type of rotator is connected to it, if you purchased it separately, or changed the rotator type, or if you want to be sure 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 with the actual rotator connected to each MECHA, and needs to be entered by pressing the buttons of the MECHA to which the rotator is connected.

However, if you are in doubt 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 is indeed 90°, then the rotator is correctly set.

Alternatively, you can contact your dealer, or mecha@nodalninja.com, for more

info or help in 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**, which is a hard-code for a test of 6 shots around, then 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** is similar to **131**, but for 12 shots around.
- **3212<** – enter this code to find out the firmware version, which will be displayed 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 lens from 10 to 200 mm (FF equivalent).

The shooting pattern will be computed by MECHA based on only few presses of a button without using the User Interface, as follows:

- First, position the vertical rail in **level** position.




- Place a **sheet of paper in front of MECHA** in such way to fill the frame. The frame can be viewed through viewfinder or through the live view. Instead of the 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 as well.
- The camera and lens must be set the same as for shooting the actual panorama.
- Enter the code **31<** on MECHA, and when the power button starts flashing, MECHA waits for two quick presses of the power button, , as follows:
 - **first** – in order to trigger the camera
 - and the **second** – after the camera was triggered
- After that, MECHA will rotate slowly to the right and wait for another **press of the power button**, , right after the sheet of paper is out of the camera's frame.
- Then MECHA will go back to the initial position, and
- the LEDs 1, 2 and 3, under the battery symbol, will start flashing, and 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, the power button, , can be pressed instead.

If MECHA is unable to compute a pattern using the feedback received when the power button is pressed (mostly because of too small intervals), the LEDs will show "!!!", which indicates that there is no change.

To execute the panorama computed by MECHA, make sure the vertical rail is in **level** position, and press the button to which you have assigned the panorama, then press either the left or right button.

If Single MECHA is used, after first row MECHA pauses and suggests, on LEDs, a manual tilt of the vertical axis to continue to full spherical panorama.



If only cylindrical is needed or no manual tilt is possible, press the power button of MECHA, .

How to Access the UI

Access the User Interface (UI) with 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 LEDs: 
- To be able to connect your smartphone to MECHA's network, MECHA must be in AP mode. So, at splitting lights, press either **1**, to set MECHA in AP mode, or **3**, to set MECHA in AP+STA mode.
- Tap *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).

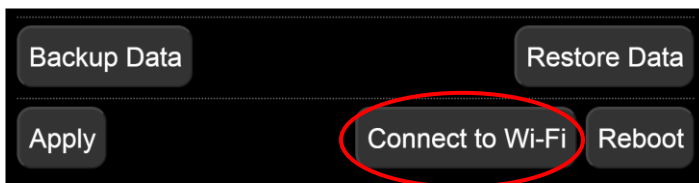


<https://youtu.be/ufIbFlvhHT4>

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) with 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 be able 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 next 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 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 with 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 is displayed, it means that MECHA is in AP mode and, as a result, the dynamic IP is not displayed.

- Now you can access the MECHA's UI on your computer's browser by entering the IP address you found, like 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 performed before – using the controller buttons – now, in this chapter, we want to perform them using the User Interface, so please access the User Interface with your smartphone, for example.

Set the Rotator on Configuration Page

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

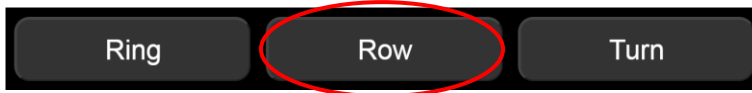
User:	admin
Password:	Mecha

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.

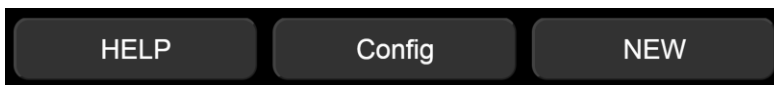
After that, access the *Row* page by tapping the *[Row]* button at the top of the *Configuration* page.



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, at the top of the page are displayed a few links to some useful pages: a quick *help* page, the *configuration* page and the *new* page:



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

UI Test – 131, 132 Codes

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, which is the panorama executed before, on chapter Test Using MECHA's Buttons (6 shots around).



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



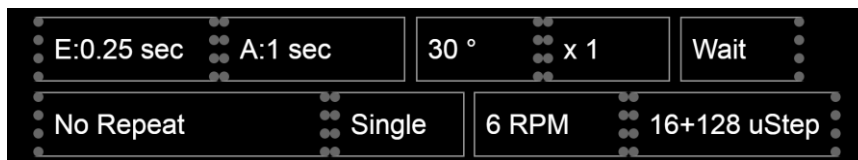
- Tap the *[LEFT]* button to execute the preset to the left, or *[RIGHT]* button to execute the preset to the right.



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.

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

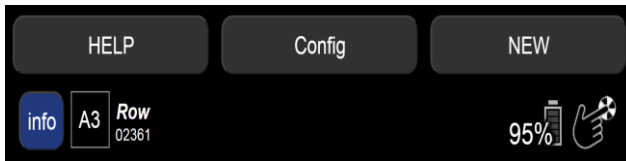


User Interface (UI)

UI Controls

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

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

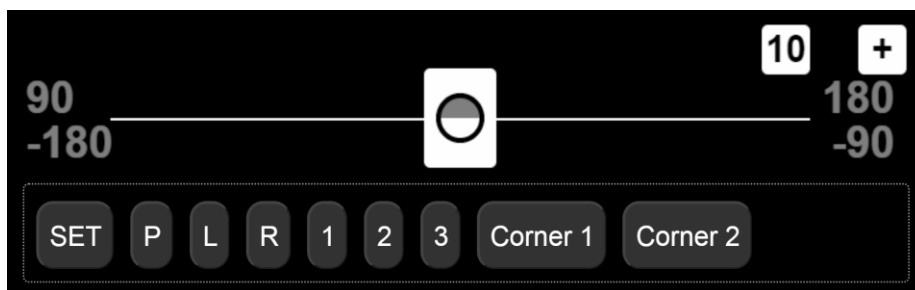


- Tap/click the *[info]* button, at the top of the *Row* page, to show the descriptions for all the controls. At the same time, three more buttons are displayed at the top of the page – *[HELP]*, *[Config]*, and *[NEW]* – for accessing the following pages:
 - *Help* — Useful information and codes. See the [Current Codes List](#) at the end of the 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 there 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, *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, see the battery percentage (84% in our example). If the percentage drops too much and a **red** LED continuously blinks, it is recommended to recharge the battery, otherwise MECHA switches off. On the *Configuration* page, we will see that there is 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 do a preset during charging.
- *Hand symbol* — Toggles gesture mode. Tap the screen and drag to see how it works. Always make sure there are no objects near the robot, especially in gesture mode.

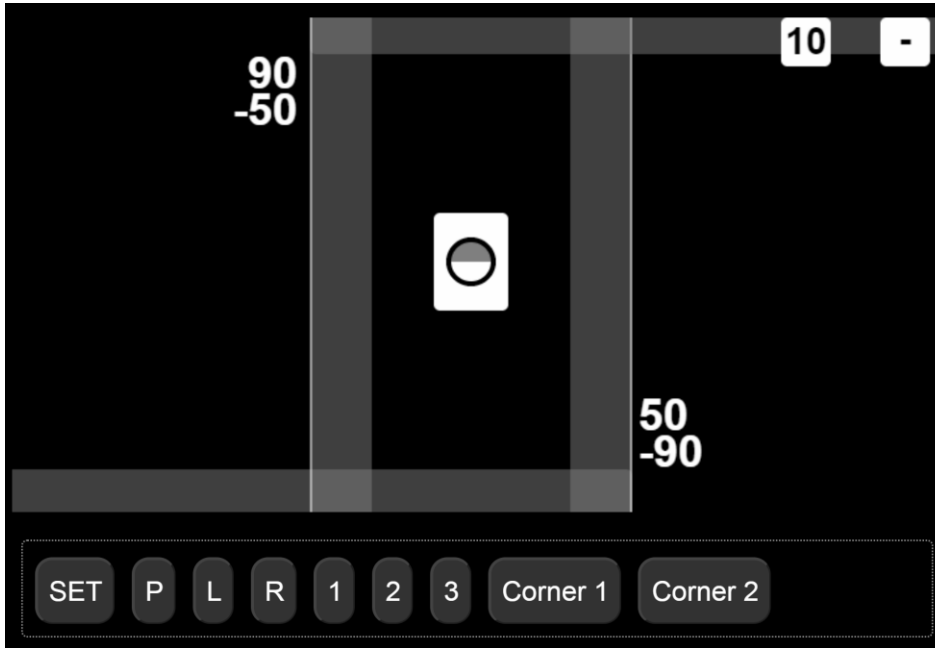


- *Status Feedback* — In the next area, the *MECHA's ID*, the *Refresh rate of the motor/controller status* and the *Current lower rotator* are displayed, followed by the *Current angle position* for both rotators, and the *Current status* (shots remaining, position, repeat set). On MECHA DAC, the *Status feedback* (SF) also reflects the tilt angle for the 2nd 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*, *Seconds remaining in current delay*.




- *Two-axis slider* — Only available in complexity levels A3 and S3 of the User Interface. It is a tool that allows you to perform common rotations and specify the extent of partial panoramas by setting the top left and lower right

corners. The slider step can be changed using the precision button at the top of the slider. Click / tap the slider's plus button to expand the slider. The top left and lower right corners, and also 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. Make sure 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 in a work session, but note that this setting is lost when you press the  button on the controller, so you have to specify the position again. Specifying the position of your upper rail and positioning it in a certain position are two different things. Click the *[SET]* button and make sure that its label becomes *GO*, then use *[P]*, *[L]* or *[R]* button to position the upper rail as needed.

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

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

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

- LEFT** button: Initiates a 360° panorama counter-clockwise.
- 7 Shots**: Number of shots around for a 360° row.
- RIGHT** button: Initiates a 360° panorama clockwise.
- NPP Shots** and **Live NPP** buttons.
- 1 TRG**, **AF 0.01 sec**, **W:0 sec**, **B:0 sec**, **M:1** buttons.
- E:0.25 sec**, **A:1 sec**, **51.43 °**, **x 1**, **Wait** buttons.
- No Repeat**, **Single**, **7 RPM**, **16+128 uStep** buttons.
- Medium Load**, **No Sensor** buttons.
- 1 x LEFT**, **SHOOT**, **1 x RIGHT** buttons.
- Cancel**, **PAUSE**, **STOP** buttons.
- sa_7shots** text field.
- Notes** text area.
- Load**, **Save**, **Rename**, **Delete**, **Import**, **Export**, **Empty**, **>** buttons.
- MAP**, **Probe**, **Template**, **goVM** buttons.
- Load 0**, **Load 1**, **Load 2**, **Load 3** buttons.
- Save 0**, **Save 1**, **Save 2**, **Save 3** buttons.

- **[LEFT]** button — Shoots a 360° panorama counter-clockwise. In our example, the panorama consists of 7 photos, and the first photo is taken in the current position, followed by the second 51.43° apart, 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 is similar to *[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 the instructions for determining the NPP along lens axis using camera live view, as follows:
 - Use two vertical reference points with one far behind the other. Turn on live view mode. Position tripod to line them up at image center. Use 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 image center. Nudge tripod to line them up, if needed.
 - Check if the reference points are lined up to the same extent as in the last step. Carefully adjust to achieve similar alignment.
 - End of Live NPP procedure. Repeat the process to confirm alignment, if needed.

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

- *TRG* — Number of camera trigger signals per position. Select zero if no camera trigger signal is needed. When using automatic exposure bracketing in continuous shooting or self-timer mode, MECHA treats it as 1 camera trigger signal. In our example: 1 camera trigger signal. Negative values can

be used for simulation purposes, meaning that there will be no *AF* nor *E* signals, but only the delays and durations set.



<https://youtu.be/dPz3iTjweY>

Using MECHA Only For Rotation

- *AF (Auto-Focus)* — Duration of the AF signal time, for example, 0.05. 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, 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. Also, it will 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. Useful for moving out of the camera's view.
 - When *W* delay is negative, *B* delay is referenced to MCU's clock rather than added delay. For example, in time lapse sessions, for *W:-0.001 sec* and *B:5 sec*, 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 ms, between the triggerings of the shutter 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)* — 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, respectively, in case of 3 *TRG*, or it can be entered as -0.7EV (for under, normal, over), or 0.7EV (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 (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. The values can be entered as 1/100 as well.

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 decided that flash should not be used in some scene modes.
- Some cameras will output flash signal at 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 some 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 will make sure the specified number of images are triggered, before it moves to the next position. This prevents missing shots that can ruin the final panorama. It also greatly simplifies the time delay settings. MECHA will use the shortest delay time automatically. 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 comes 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, the camera should be set 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, and only then continue with the next position in the preset. This is useful when you set your camera for bracketing in continuous shooting mode. So, the shutter button only needs to be pressed once, and the camera takes automatically the whole bracketing set as quickly as possible. Please note that some cameras revert to single shooting mode when the exposure is 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 in the */config* page. Depending on the camera used, the shutter release confirmation may not work with this option enabled. We recommend that you disable 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 in the */config* page of horizontal MECHA (or MECHA-H).



<https://youtu.be/X25c13rsBYE>

Shutter Release Confirmation Basics – MECHA C1 and C2 Controllers

To be able 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 used 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 cable for shutter release confirmation (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 32313< code in [Current Codes List](#)), otherwise use the Button Confirmation instead: *E:BTN > C.* or *E:BTN > CT.*



1 — Mecha 3.5mm to Male PC Sync Cable




2 — Flash Shoe to PC Sync Adapter

3 — Receiver

4 — MECHA C1 Controller

5 — MECHA C2 Controller

E:BTN > C.
E:BTN > CT

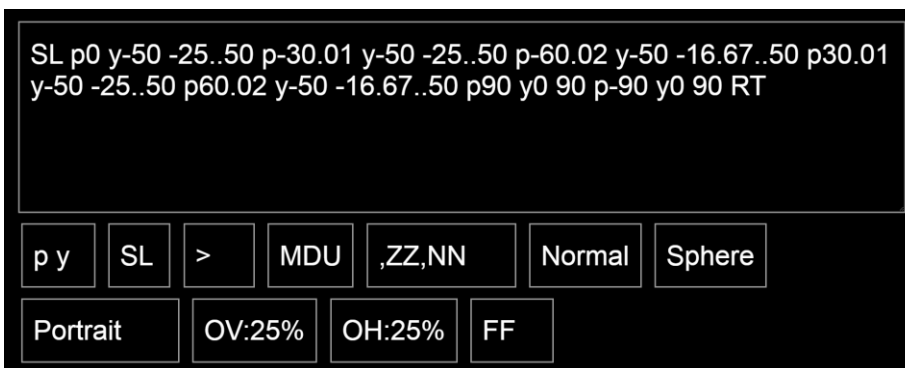
- *E:BTN > C., E:BTN > CT* — Button confirmation options.
 - *E:BTN > C.* — MECHA will wait, after any triggering, for confirmation with the  button on the controller or NN IR Remote to continue.
 - *E:BTN > CT* — MECHA will only wait for *TRG* confirmations with the  button on the controller or NN IR Remote, then it will use the learned delay(s) to finish the preset.
- *A (After)* — The delay after each triggering sequence or individual triggering. 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, not an entire panorama. Specify this number in the next field (*x N*), and execute the sequence with the *[N x LEFT]* or *[N x RIGHT]* button. The value of the *Demo* option is 3600°.
- *x N* — The number of moves (*N*) for *[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 repetition of the sequence for 5 minutes. A number followed by an asterisk specified before the delay tells MECHA how many times to 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 repetition is needed.

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



If the Speed value is too high, the device may stop or move too fast, in which 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 + constant speed region.
- *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 number of shots, taking into account the *script settings* (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 in the image above. The script controls the movements and has priority over the *script settings*. The script updates automatically when the *script settings* are changed, but the *script settings* do not change if you change the script manually.

Script Settings

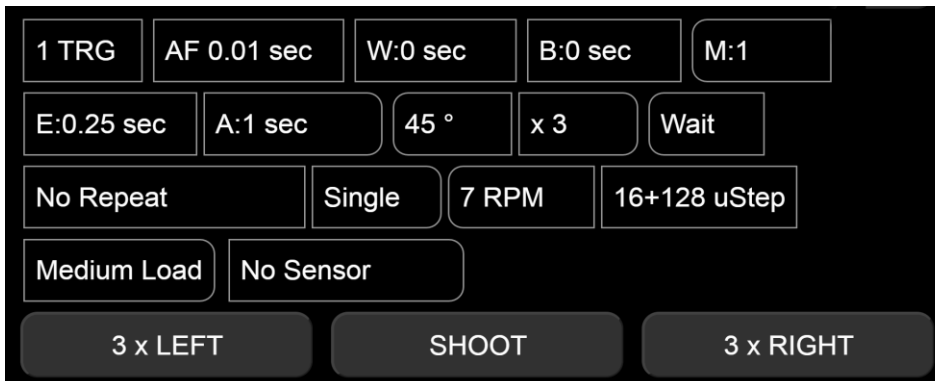
- *py / TxN* — Script type. MECHA generates a script with pitch and yaw conventions (*py*, as in the image above) if you specify corners using the two-axis slider. The script type can be changed to *TxN*, which stands for tilt and number of positions for each tilt. A dialog box will show up asking you to remove the corners.
- *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 given by the button used to launch the preset – *[RIGHT]* or *[LEFT]* – regardless of this setting. Instead, this setting is important when launching the preset by 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, or *Zigzag*.
- *Sphere / Grid* — Mapping type. *Grid* means the same number of positions on every row, whereas with the *Sphere* option, we have 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 is different 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 & rotates counterclockwise for N positions with the degrees interval specified above, regardless of the number of shots specified in the *Shots* field.





For example, if you want to take 3 shots 45° apart to the left, set the degrees of rotation to 45°, and the number of positions to 3, as 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, 1 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 *[N x LEFT]*, but the shooting and rotation are done clockwise.




- *[Cancel]* button — Executes a smooth stop.

- *[PAUSE] button* — Pauses the current running preset. Click/tap again this button to continue.
 - The **21<** code switches MECHA to or off pause mode, the same as clicking the *[Pause]* button on UI, or on IR Remote.
 - When MECHA is in pause mode, the LEDs blink like : (a colon). In idle status, there is a slow blink, and when running presets and paused, there is the regular blink.
 - When MECHA runs a preset and is paused, you can press , or  on IR Remote, or *[PAUSE/NEXT]* on UI, to continue to the next position.
 - If, instead,  is pressed on C1 or on IR Remote, MECHA will continue to the next position and switch on/off the step-by-step mode.
 - The above allows both:
 - 1. Starting a preset in step-by-step mode, then switching off the step-by-step mode when it is no longer needed, thus the preset will continue automatically.
 - 2. If a preset is paused by remote/UI/script, then pressing  will advance and switch on/off the step-by-step mode.

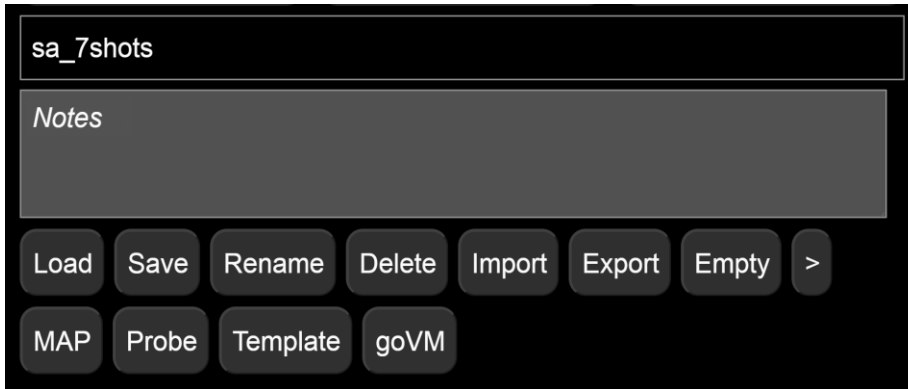
A possible application is a spherical panorama with certain areas needing to be done step by step, and which areas depends on the events on the field.

During the pause, by pressing  on IR Remote, or *[SHOOT]* on UI, MECHA will trigger the number of shots specified by *[TRG]* in presets.

This can be used for extra shots for a particular position.

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

- *[STOP]* — Emergency stop.



- *Presets list* — This list contains all the presets, both created and downloaded from the server.
 - The names of the presets downloaded from the server start with (s), which means 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 preset selected 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 (overwrite), 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, or imports multiple presets at once if *all_presets(..).mps* file is given when importing. Also, in the */row* and */turn* pages, a shooting pattern can be imported from the following programs: (1) **PTGui**, if the project is exported as PTGui 10 project (.pts), (2) **Hugin** (.pto, .txt), (3) **Autopano** (.xml file with Papywizard conventions).
- *[Export]* button — Exports the selected preset, or exports all the presets, if *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 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 file for a full preview of the panorama with the current preset as shooting pattern. Use this button after all the settings are set as you want.

MECHA will also offer to download a map.zip file containing three small .png images required for preview in PTGui. 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 zip password:

<https://www.nodalninja.com/MECHA-MAP/map-png.zip>

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

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

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

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



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

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

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



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



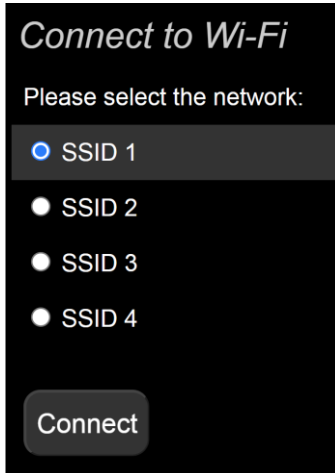
- *[Reboot]* button — Restarts MECHA, similar to restarting a computer.
- *Default page at start* — MECHA's home page, or start page, can be one of the following pages: *Row*, *Ring*, or *New* (like in our example). Select the desired option from the list.



- *Volume of Beeps* — A value from 0 to 250, and can be entered via *Custom*, or select another option from the list.
- *Power Saving Mode* — A list of options to set MECHA to shut down automatically after a certain number of minutes of inactivity, or vice versa, to keep it always on. The setting for this field can be done on the *Configuration* page, in which case it has priority over other options, and is displayed on a gray background.
- *[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 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*] button — Initiates the process of connecting to a Wi-Fi network to use MECHA in STA (Station) mode or for firmware update. Available networks are displayed as in the image shown below.



If you have successfully connected to one of the networks in the list, it is displayed on a gray background and you can 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 not in range.



Wi-Fi Test

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

The 2 or 3 dots represent the quality as follows: *Lowest*, *(Recent Low)*, *High*, and they can be reset by double clicking the scale.

For better accuracy, it is good to open only this page in the browser.



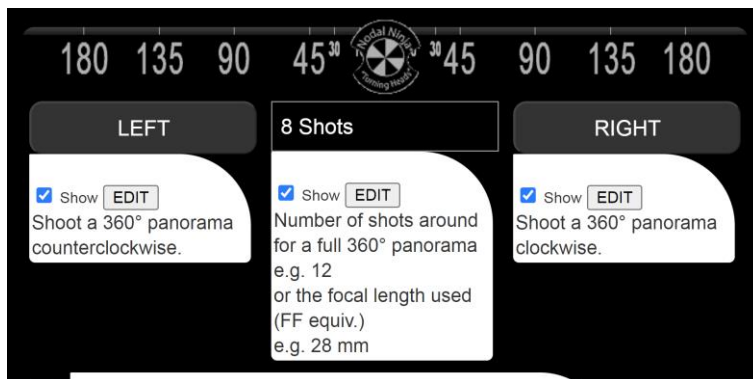
- *[Wi-Fi Off]* button — Turns Wi-Fi OFF. It needs power cycling to have it ON again.
- *[More or Less...]* button — Shows more or less settings.

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 description of the UI controls.

- To enter the 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 some fields in which you can enter your own translation or notes.

If the UI control is button type, in the first field enter a button caption. For example, the description of the *[RIGHT]* button, in French, 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 Use Interface is displayed. If, for some

reason, 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 Use 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:

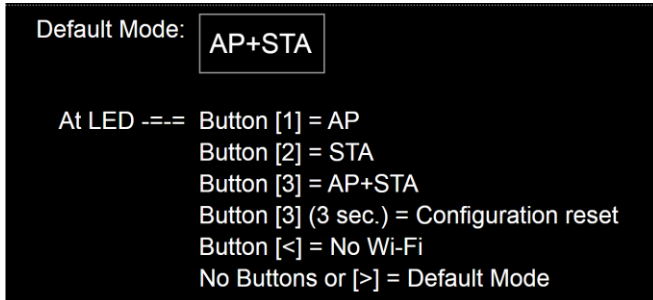
User:	admin
Password:	Mecha

At the top of the *Configuration* page, there are links to access *Ring* page (for single-axis applications), *Row* page (for dual-axis applications), and *Turn* page (for turn table applications – work in progress, at the moment). These pages are quite similar and, as a result, are not presented separately in this user guide. And 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. 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 3 seconds at 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
- Password for *Configuration* page → Mecha
- Hot-Spot password for firmware update → 87654321
- UI Password → none
- Trusted IP → none
- Wi-Fi Power → 100
- Default Mode → AP
- STA Mode → no settings (auto)

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

Also, if a hot-spot with the name M-XXXXXX (where XXXXXX is the MECHA ID)

and the password 12345678 is found, the firmware will be updated using that hot-spot. If MECHA fails to boot, please activate the hot-spot.

MECHA Dual Axis Combo (DAC) users need to pair the two MECHAs again, as pairing is lost after 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 25.

The screenshot shows a configuration interface with a dark background. At the top left, there is a text input field containing '25.00' and a button labeled 'Set Wi-Fi Power'. Below this, the interface is organized into several sections:

- AP Mode SSID:** A text input field containing 'MECHA-Single'.
- SSID Password:** A text input field containing '12345678'.
- Pairing PIN:** A text input field containing '4 numbers'.
- [admin] Password:** A text input field containing 'Mecha'.
- UI Password:** A text input field containing 'max. 20 chars'.
- Trusted IP(s):** A large, empty text input field.

 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 *Configuration* page is **Mecha**.

Pairing PIN — Is a four-digit number that allows you to pair automatically at start more than 2 MECHAs connected to the same network or to the same hot-spot. See [Pairing PIN for more than 2 MECHAs](#).

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 may not want the settings to be changed.

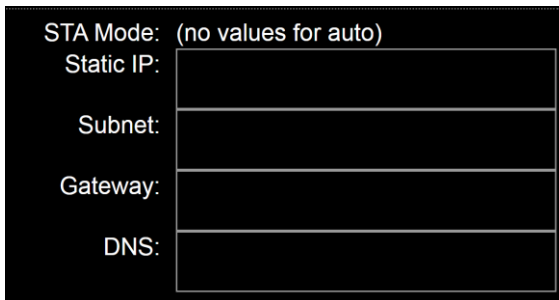
Trusted IP(s) — The IPs added to this field will not be restricted in any way when

accessing MECHA. Add the IPs of your personal devices that you use to connect to MECHA.

Using — This is the IP of the current device connected to MECHA. In our example, 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 from time to time, and you need to find it 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:	<input type="text"/>
Subnet:	<input type="text"/>
Gateway:	<input type="text"/>
DNS:	<input type="text"/>

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 7, the one provided via preset will be ignored, and MECHA will use 7 RPM as speed.

Power OFF after — If this field is not empty, then the value specified here tells MECHA to power off if there is no activity a number of seconds equal to this value.

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

The second *Power OFF after* field — The same as the first field, but it 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 you can use it as usual. The other possible value is *Turn OFF*, which means that MECHA stops automatically and remains off, except the charging function during charging.

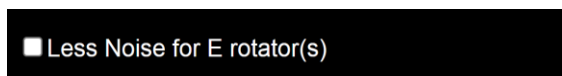
Rotator Settings



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 turn table.

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



Less Noise for E rotator(s) — Check this checkbox to reduce the noise from the E rotators. As it eliminates the accelerated part, the gear will produce less noise in some cases. The motion profile is constant, at the speed set for the arrow buttons (*Arrow buttons Speed [RPM]*). We recommend setting various values for

the speed of the arrow buttons and testing to determine the required value for an acceptable noise level. The corresponding code is **2121<**. 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 that you do so. 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 the sound loudness. We recommend that you try a few values to find your preferred value.

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 camera to the horizontal unit in Dual Axis Combo. This means faster communication between MECHA and 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 test of shutter confirmation (see 32313< code in [Current Codes List](#)). If the test fails, please perform the test again with this option disabled.

Shutter Confirmation Time Out (sec.) :

Shutter Confirmation Time Out — This is the maximum time MECHA waits for the shutter confirmation to occur (30 s 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 hot shoe.

☒ Enable Fast Mode.

Enable Fast Mode — Leave this checkbox checked.

☐ Enable RAW Interface.

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

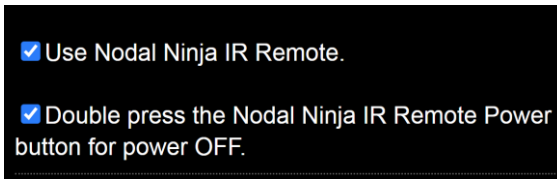
☒ Hide some controls in web UI when a motor is running.

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]*, *[PAUSE]* – while the motor is running. Enabled by default.

☐ Use cache for UI translation.

Use cache for UI translation — Enable it to make the UI pages load faster, and disable it if the */row*, */ring* or */turn* UI web pages do not load at all. Disabled by

default, which means slower loading of pages.



Use Nodal Ninja IR Remote — Check this checkbox to enable the use of the NN IR remote control. It is also necessary to 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 be able to power off MECHA by pressing the power button on the remote control twice.



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 the two units:

- the commands sent by using the ◀ and ▶ buttons will be interpreted and executed only by the MECHA-H unit,
- while the commands sent by 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), as 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 on a 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.

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, most likely the settings are the default ones and no checks or changes are needed.

☐ Use Aux Pulse, if exists.

Use Aux Pulse, if exists — Check this checkbox if you use MECHA in applications requiring the Aux Pulse file. Default is clear 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, 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 + blank.
- **-045=1A** executes a preset whose name starts with 045 + blank, 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 Home position, absolute.
 - **-45.0=1A** rotates MECHA -45.0° from Home position, absolute.
 - **^45.0=1A** rotates MECHA 45.0° from previous position, incremental.
 - **^-45.0=1A** rotates MECHA -45.0° from previous position, incremental.
- **H=1A** returns MECHA to 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. The equivalent of **2313<** code. The left button, for example, rotates the camera to the left, and the controller to the right, when this checkbox is checked.

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. You can uncheck it if you want to specify that the camera is in landscape orientation. For example, if the number of shots around is *35mm* or *35mm2*, via custom, the shooting pattern will be computed considering the camera orientation.

Preferred MSS pattern — This is how you want the MSS scripts to be produced 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, to 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, and a single Zenith photo instead of two, and a pause before the first row, the *Preferred MSS Pattern* should be: **SP,PMDU,Z,NN**

Usually, the following settings do not need to be changed. If these values are changed, the script on the *Row* page must be generated again 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 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) — Rotation speed when a button is held down. If the *RPM* is zero, by pressing MECHA's directional buttons, the rotator will start slowly and accelerates afterwards, if the button is kept pressed. Useful for precise alignment done with the buttons of the controller or IR remote.

Arrow buttons Interval Speed (RPM) — Rotation speed over a certain interval.

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

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

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

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

Safety Interval

Safety Interval [deg.]: 10.00

Safety interval — If, for some reasons, the vertical unit no longer communicates with the horizontal one, the vertical one stops after a rotation equal to the *Safety interval*.

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 follow:

- *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.

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 specially created according to the specifications provided by you.

Technical Details – IP Addresses, FW

Finally, several technical details are displayed, including the firmware version and the IP addresses at which the User Interface can be accessed:


```

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

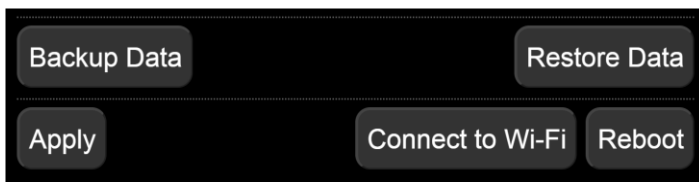
IP: 192.168.8.1, 192.168.2.188 SN:255.255.255.0
GW:192.168.2.1 DNS:8.8.8.8

LR: External System

```

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

Backup and Restore Data



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

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



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

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

[Apply] button — Applies / 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: .
- At splitting lights, press the **1** button to set MECHA in AP mode.
- Tap *Settings* icon on your device. Under *Wireless and Networks*, make sure *Wi-Fi* is turned on, then tap *Wi-Fi*. Tap the network name that contains **MECHA** in its name, to connect the smartphone to MECHA. The default password for MECHA's network is **12345678**.
- Now MECHA's User Interface (UI) can be accessed on the smartphone's browser at: **192.168.8.1** (which is a static IP address).



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

- This is the *New* page. At the top of the page, the current firmware version is displayed. Tap the *[Update]* button and follow the instructions to update the firmware:
 - Connect to Wi-Fi for Internet access. Enter the Wi-Fi network name that you want to connect to. It can be your home or work Wi-Fi. The name and the password are case sensitive, like **MyWiFi** and **myPassword**! It's not about MECHA's passwords here, but the Wi-Fi name and password MECHA needs to connect to Wi-Fi.



Please do not turn off MECHA while updating the firmware!

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

Presets for Single Axis MECHA

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

If *More from server* option is not in the *Presets* list, then tap the *[Connect to Wi-Fi]* button, enter the required SSID name and password for a Wi-Fi with Internet access then, after two beeps, re-load the User Interface. If no beeps are heard after the MECHA's LEDs scan up and down, then please try to connect 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 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 update and show a dialog box on the User Interface to read the news and update the firmware, if you want.

Downloaded presets are added to the end of the list, and note their names start with (s), which means that they are not saved yet.

The presets for Single Axis MECHA available for download, at the moment, are:

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

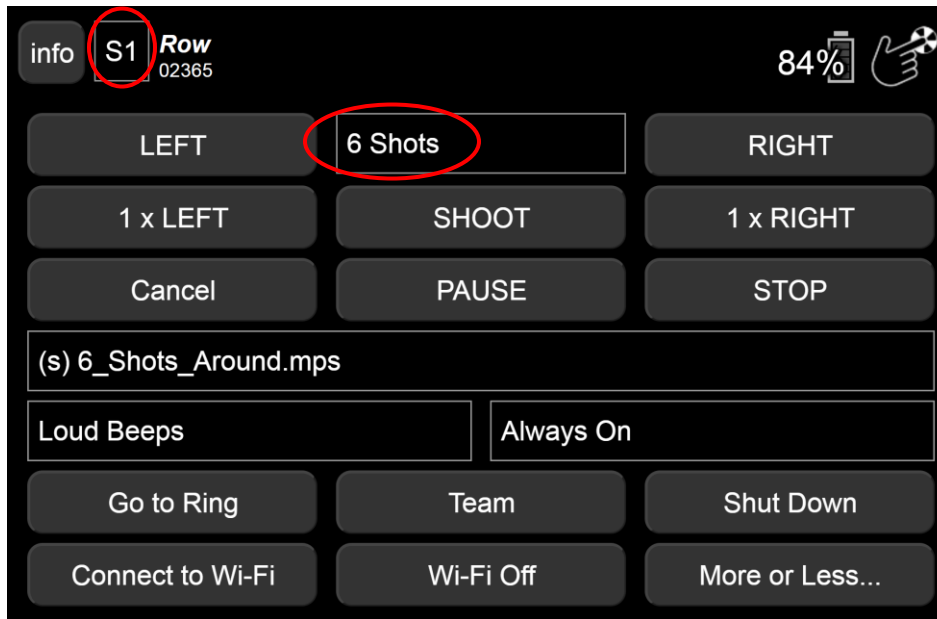
Let's analyze the *6_Shots_Around.mps*, noting that the description is close enough for all the others.

This preset is suitable for a single-row panorama, 6 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 button 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.



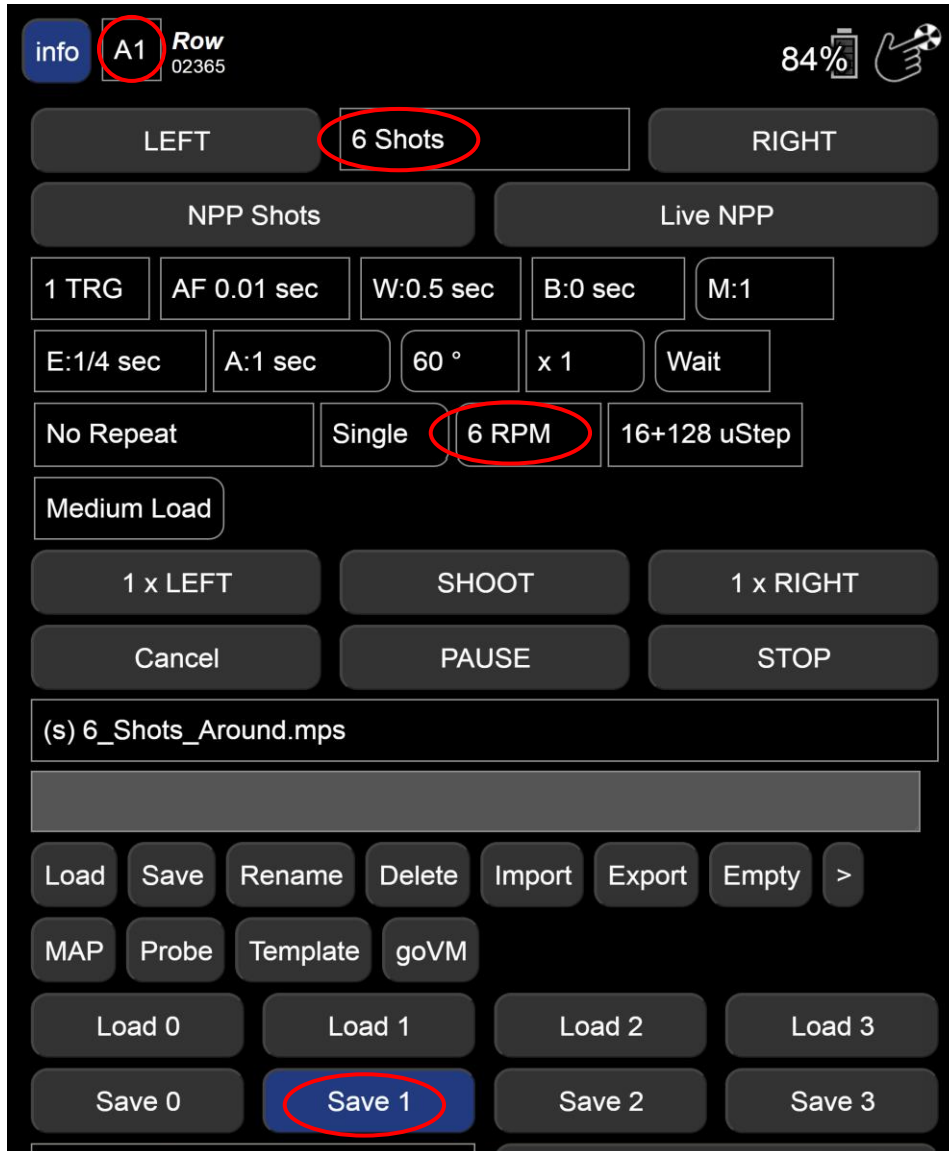
To change some advanced settings of the preset, such as speed, for example, from 6 RPM to 9 RPM, switch to A1 (Advanced 1) display level, as shown in the image below, and select the option 9 RPM from the speed list.

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

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

Also, you can use the [Save] button to save it on MECHA, in the *Presets* list.

To create a new preset, select any preset from the *Presets* list, make any changes you want (if you need to), and save it with the [Save] button. If you enter a new name, a new preset will be created, otherwise the current preset will be overwritten.



Please see the chapter [Working with Presets](#) for more details.

MECHA MSA


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

In MECHA MSA, MECHA enters in pause at the end of each row and waits for the 2nd axis to be set/tilt manually. For example, if a row consists of 12 images, after the 12th image you will notice the panning to the initial position, and then MECHA waits for the manual tilt.

The expected manual angle for the 2nd axis is shown both on UI and on LEDs.



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

After manual tilting, press , or  on NN Remote, or click the *[PAUSE]* button on 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 in building products specifically designed for panoramic and high-resolution photographers. The auto-rotator (**E1**) with the single-axis controller (**C1**) are precision built with quality motors, components and circuitry.

MECHA Dual Axis Combo – DAC – is a compact and affordable dual-axis pan tilt head solution. We use parts from NN3 MK3, together with 2 MECHA E1 Rotators and 2 C1 Controllers which are wireless linked together.

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

The MECHA E1 and C1 being modular in design, will be compatible with future

MECHA rotators and controllers paving the way for future low-cost upgrade paths.

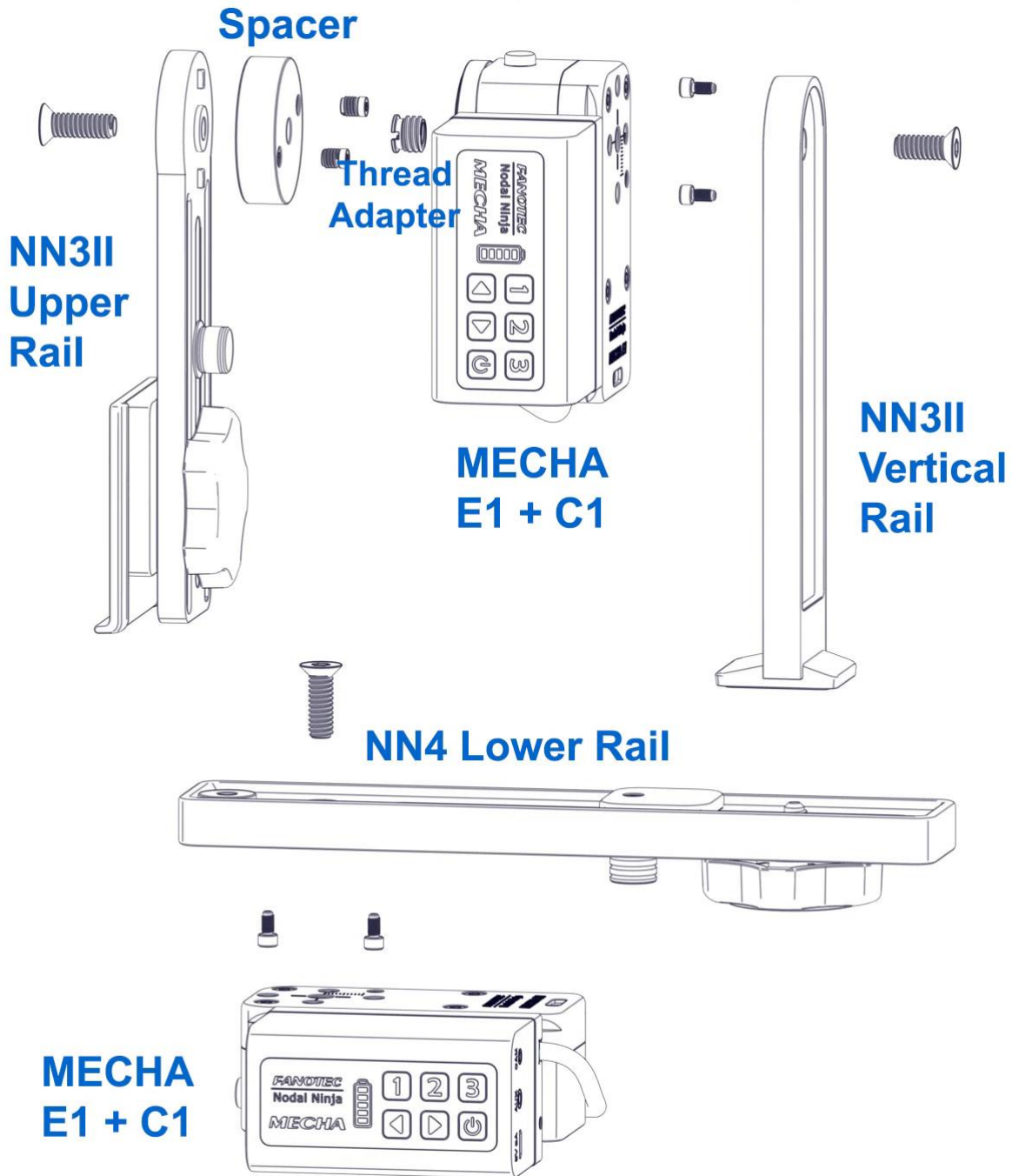
This setup supports a camera/lens up to 1.25kg (2.75 lb) and NPP up to 110mm from the pivot point, making it ideal for mirror-less, compact and lighter DSLR cameras. Shoot 360° panoramas or even high-resolution, gigapixel images.

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



<https://youtu.be/wwAJoXsX6Kw>

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, the MECHA units can be both on your desk when you pair them, or even one in a room and the other in another room, and 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, both in case of panoramic photography – dual-axis application – and in case you use them for other purposes, for example to rotate a video camera and a subject at the same time and with different speeds.

In this guide, we will present three methods of automatic pairing of MECHA units, automatic meaning that the units remain paired until you unpair them:

1. **zLM 2** – pairing using only 2 of MECHA's 6 buttons, a very quick method, especially for non-technical persons.
2. **zLM** – a method of pairing using a power code, using a few more of MECHA's buttons.
3. The third method – **pairing using the user interface**, 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/wdovZA3IIQ>

Power ON and Test – MECHA Dual Axis Combo






Power on 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, as in the case of Single Axis MECHA.

The long press of the power button is only necessary at power 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, 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 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 look like 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 .

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

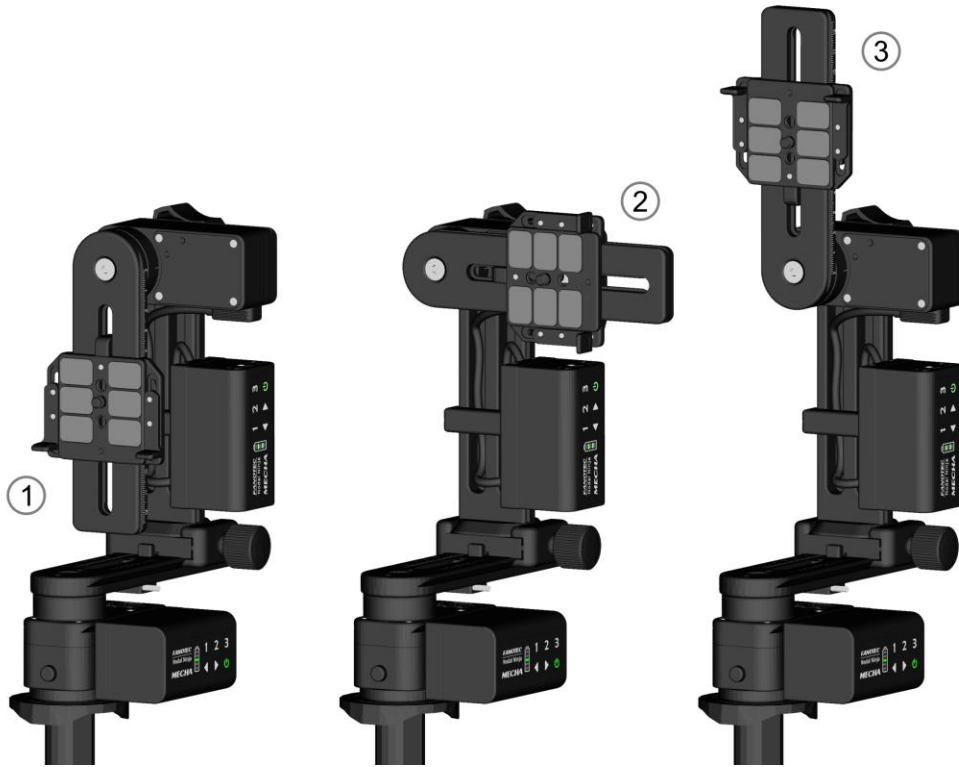
Parked, Level and Raised Positions

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 they are:



Parked (1) — the most compact position, the upper rail is oriented vertically down.

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




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



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 do this with one of the following:

- 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 that two MECHA units are already paired?




If two MECHA units are paired, you will notice – few seconds after both units are powered up – 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 it is not the same firmware version in both units, and it is recommended to update the firmware.

Also, while the MECHA units are on, if you want to check if they are paired, press

the  button of MECHA-H, then wait for 10 seconds, and 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 Hot-spot




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

Firmware Update Using a Hot-spot – 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 hot-spot on your 3G, 4G, or 5G smartphone, a smartphone with mobile data enabled and Internet available to it. We also assume that the MECHA units are already paired.

- First, set up a hot-spot with the name **MECHA-UPDATE** and (default) password **87654321**, in 2.4 GHz band.
- Power on MECHA DAC as shown above.
- Wait until the splitting lights end:  and you hear two beeps and, using the buttons of 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 problem while updating the firmware, please contact us by e-mail at mecha@nodalninja.com specifying the id of the MECHA you're using.

In most cases, the problems encountered when updating the firmware are caused by the wrong Wi-Fi password. However, due to the nature of the Internet, sometimes the update server cannot be reached, and this can be investigated once we get in contact by e-mail.



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





Pairing Using MECHA's Buttons

zLM 2 – Automatic Pairing Using Two Buttons



Automatic Pairing – MECHA Dual Axis Combo

This is a zero learning method – **zero Learning MECHA** – for firmware 02057 or newer.

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

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

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

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

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

First, please read the chapter about the UI.

MECHAs will be automatically paired and will remain paired after power OFF then ON.

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

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

So, after the MECHAs are paired and the SSID name is changed in */config* of MECHA-H, say, 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 of these, without using any method of pairing, a MECHA-V999 in STA mode will always try 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 way to pair remotely 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 up, you will notice they are connected as DAC (Dual Axis Combo). It is recommended to power on the horizontal unit first, then power on the vertical unit.

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

⚠ Please note that the power button, , can always be used as an emergency stop, if necessary, except for 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 vertical rail in **parked**, **level**, or **raised** position.



You can press  then, quickly, **2** or  then, quickly, **2** to rotate MECHA-V by 90°.

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

DAC Test Without Camera – 1312 Parked Position

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



This code tells 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 vertical rail in the **level** position, as shown in the image below, enter the **1313<** or **1313>** code on MECHA-H, using the buttons of MECHA-H.



This code tells 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 vertical rail in the **raised** position, as shown in the image below, enter the **1321<** or **1321>** code on MECHA-H, using the buttons of MECHA-H.



This code tells 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

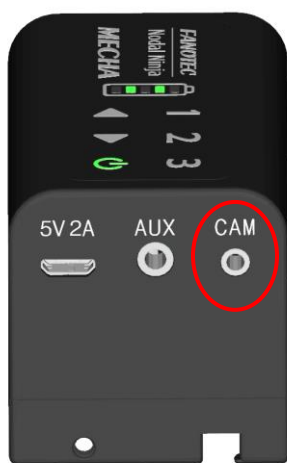
Panorama with Camera Mounted

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 in use into the Camera Port (CAM). This allows the triggering of the shutter automatically.



The units being paired, the camera can be connected to any of them.

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 firmware version *02118*, or newer, and works for rectilinear lens from 10 to 200 mm (FF equivalent).

The shooting pattern will be computed by MECHA based on only few presses of a button, 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** in such way to fill the frame. The frame can be viewed through viewfinder or through the live view. Instead of the 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 as well.
- The camera and lens must be set the same as for shooting the actual panorama.

- Enter the **31<** code. After entering the code, MECHA waits for two quick presses of the power button, , as follows:
 - the **first** – in order to trigger the camera
 - and the **second** – after the camera was triggered.
- After that, MECHA will rotate slowly to the right and wait for another **press of the power button**, , right after the sheet of paper is out of the camera's frame.
- Then MECHA will go back to the initial position and start to slowly tilt down and, again, wait for **another press of the power button**, , when the sheet of paper is out of the camera's view.
- Then MECHA will go back to the initial position, and
- the LEDs 1, 2 and 3, under the battery symbol, will start flashing, and MECHA waits (**15 seconds**) 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 power button, , can be pressed instead.

If MECHA is unable to compute a pattern using the feedback received when the power button is pressed (mostly because of too small intervals), the LEDs will show **"!!!"**, which indicates that there is no change.

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



<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 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 \(UI\) with a smartphone](#)):

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

Please refer to your device manual on how to connect 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 the web browser address bar.
- MECHA will show the “*What is new?*” page.

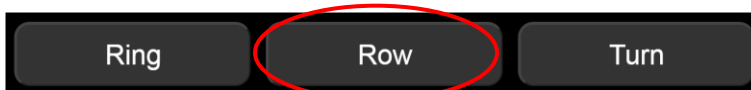
Tap *[Update]* if there is a newer firmware than the current one displayed at the top, if you want, and wait until all MECHA status LEDs are off. The update may take several minutes.

In the update process MECHA may ask for a Wi-Fi network with Internet access (like your Wi-Fi at home or office) and the password to be able to download the firmware from the Internet.



Please do not turn off MECHA while updating the firmware!

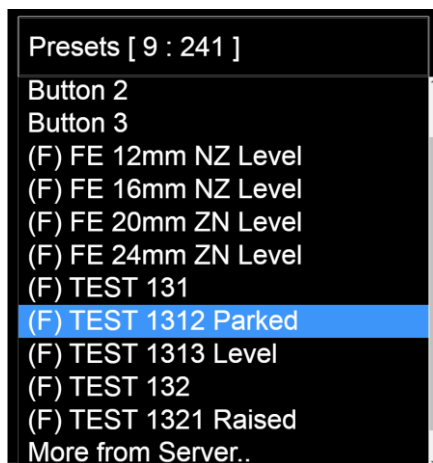
- Tap the *[Row]* button to go to *Row* page.



UI Test – 1312, 1313, 1321 Codes

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 1312 Parked* from the *Presets* list, which is the panorama executed before, on 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, it means 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.



Do the same with the presets *TEST 1313 Level* and *TEST 1321 Raised*. Use the ◀▶ buttons to position the upper rail in the **level** or **raised** position.

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), now is time to change the SSID password.

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

User:	admin
Password:	Mecha


- On *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 *Configuration* page, if you have not changed it yet.
- Scroll to the bottom of the page and tap *[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

A programming method 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.

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

or **3**.

Let's take a look at some examples first.

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

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

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

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

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

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

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

Then launch the preset by pressing either 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 three values: 1, 2, 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), which allows you to launch the preset in different ways (in addition to the usual method available on the *Row* page in the User Interface).

Assigning a Preset to a Controller Button Using Url Parameters

If the value of the **b** parameter is 1, 2 or 3, MECHA will assign the preset to either the **1**, **2** or **3** button, and 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 by using the Controller buttons, we will specify only the ▶ button in all the examples below, for the sake of simplicity.

Examples:

192.168.8.1/preset? b=1 &s=6	1 ▶
192.168.8.1/preset? b=2 &s=6	2 ▶
192.168.8.1/preset? b=3 &s=6	3 ▶

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 has priority over the other presets that have the same code at the beginning of their name.

Example:

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

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




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

To easily remember the above rule, you should know that MECHA has only 3 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 the 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, 0.25s.

The default values can be omitted.

With newer firmware versions, use the trigger parameter – **t** – to specify the number of camera trigger signals per position, and use 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), 3 triggerings per position (t=3), a shutter button signal duration of 1s (e=1), 2s 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: $(3 \times 1) + 2$.

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: $(3 \times 1) + (3 \times 2)$.

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

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

p — pause – by default, 1s

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

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

Maybe we will say “the pause after each **shot**” if we only have one shot per position. But when we have a set of shots, or camera trigger signals, in each position, the correct wording is “the pause after each **position**”.

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

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



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



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

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

In case of Single Axis MECHA, for a panorama made with a 50mm lens, you need to manually tilt the upper rail, or camera, up or down.

MECHA will show you when to do this, and also shows you the value of the tilt angle on the LEDs, and waits until you tilt and confirm the tilting.



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

If a Single MECHA is running a DAC preset, when rotation is needed along the second axis, MECHA will pause and show on LEDs the angle of rotation along the second axis.

The value is rounded to the nearest integer and is 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 script.

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

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

Other Url Parameters

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

Some parameters, like *sp*, *gr*, *zg*, *mdu*, *ov*, *ovw*, *bf*, *pf* are also options in the in [Config \(C\) Menu](#). We recommend reading this section for more details.

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

gr — grid – no value.

zg — zigzag – no value.

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

u — up limit – values from -90 to 90.

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

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

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

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

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

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

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

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

Example of using *bf* and *pf*:

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

lb — label – the value can be a simple text to identify the preset in the OLED Preset Menu or in the Presets list in the User Interface. Without passing this

parameter, MECHA will use the default label, which is *MECHAAuto*.

Example of using *lb* parameter:

```
192.168.8.1/preset?b=031&lb=my_preset&s=12&p=2&bf=5&p
f=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 by Using the UI

Besides the very simple method with buttons only (see [Panorama with Automatic Shooting Pattern](#)), and the url with parameters method (see [Programming a Preset Using Parameters](#)), the following is 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, 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 server. See the chapter [Downloading Presets from 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 [MECHA Controller C1 Manual](#) on STA mode for more details.

Now we will take a look at preset descriptions above and load the preset most similar to what we want to get.

Loading a Preset

Suppose we want **6 shots around, 1 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 *[info]* button, at the top of the page.

Select A3, which is the most advanced **level**.

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



- **12 Shots** — 12 shots around for a full 360° panorama. Notice how the rotation angle changes according to the number of photos, so that if we multiply them, the result is 360°. On the other hand, if we change the rotation angle, the number of images does not change.
- We will get a similar result for 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 0.01 sec. 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, even if the camera focus is set to manual.
- **W:0 sec** — No delay for camera wake up. If the value is negative, the delay will be forced even when the camera is ON, before each sequence begins. 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 -0.7EV (for under, normal, over) or 0.7EV (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 sec. The duration of the shutter button signal, for example, 3 or 0.5*3 for progressive half Exposure, or 2*3 for progressive double Exposure in a set. These can be entered as custom values. The values can be entered as 1/100.
- *A:1* — 1 sec. 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 $[N \times LEFT]$ or $[N \times RIGHT]$ buttons.
- $x1$ — 1 move. The number of moves (N) for $[N \times LEFT]$ or $[N \times RIGHT]$ buttons.
- *Wait* — Wait after the last shot. The other option is *Rewind*, which means rewind to the initial position. Useful if there are cables attached, or when shooting partial panoramas and time-lapse photography.
- *No Repeat* — This is the delay in seconds until the shooting sequence will be repeated automatically. Set 0 (zero) or *No Repeat* if no repetition is needed.
- $SP,0x12,-45x12,45x12,Z,N$ — The MSS script that describes our preset: the starting position is **parked**, 3 rows of 12 positions, one Zenith and one Nadir (see [MECHA's Simple Scripting \(MSS\)](#) for more details).
- $6\ RPM$ — Speed denoted by Revolutions Per Minute.
- $16+128\ uStep$ — Micro-stepping value, simple or combined; for example, different values for acceleration + constant speed region.
- *Medium Load* — Means a profile for an average load. The other options are *Light*, *Heavy*, and *Ring*.

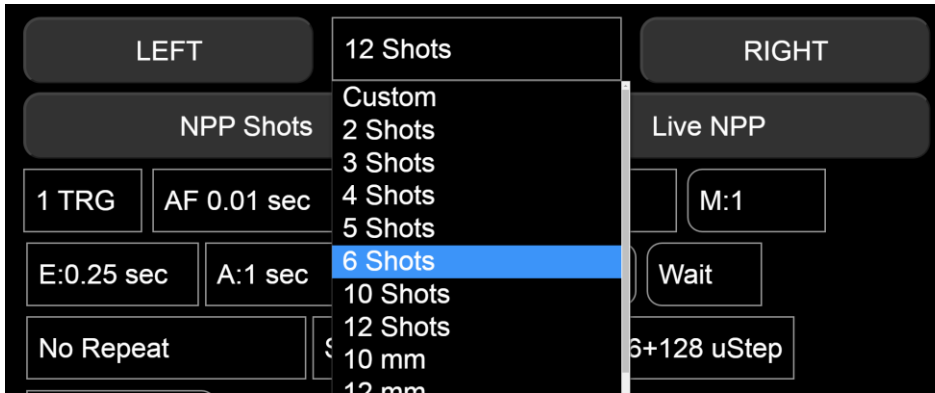


Most input lists, in both *Ring* and *Row* pages, can receive custom values. There is no error check, nor range check for the custom values at the moment, so please use this feature with caution.

Modifying a Preset

To get a preset with *6 Shots* and just *1 horizontal row*:

1. Instead of *12 Shots* select *6 Shots*:



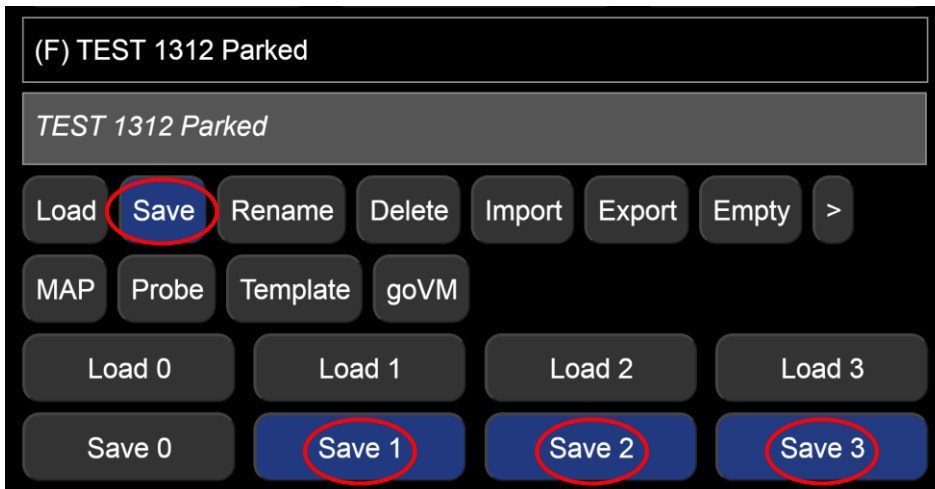
2. Remove the second row (-45x12,) and third row (45x12,) from the MSS script as follows:

```
P, 0x12, Z, N
```

3. Follow the instructions below to save the preset.

Saving a Preset







To save a preset, do one of the following:



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

The preset name can be preceded by a power code of maximum 7 digits. This feature also allows you to execute/launch the preset using the remote

or MECHA's buttons. For example, if the preset name is **01 C1 6 shots**:




- use  (wait 1s)   to execute the preset to the right,
- use  (wait 1s)   to execute the preset to the left.

Preset Power Code

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

- The **first digit** must be **0** (zero) (remember that every power code starts with zero).
- The **next sequence of maximum six digits** must be a combination of the digits **1, 2, or 3**, so that two identical digits are not in consecutive positions.

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

2. **Tap/click the [Save 1]** button to overwrite the preset with the name *Button 1*, assigned to the  button.
3. **Tap/click the [Save 2]** button to overwrite the preset with the name *Button 2*, assigned to the  button.
4. **Tap/click the [Save 3]** button to overwrite the preset with the name *Button 3*, assigned to the  button.

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



<https://youtu.be/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

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.

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

Three-row Panorama + Nadir + Zenith (MSS)

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




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

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

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

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


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


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

If we want a pause before a row, we can add **P** in 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]*.

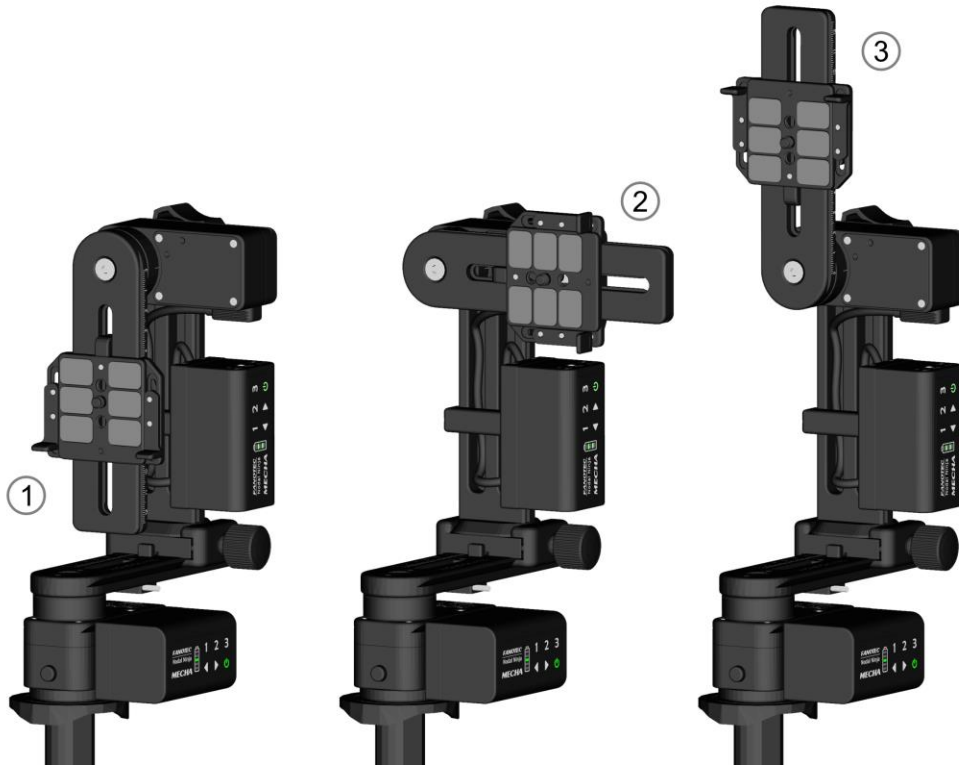
 MSS scripts are row and column oriented and help you photograph a panorama with few clicks or button presses, without the need to understand the script. You only provide the focal length, and MECHA generates the script.

 <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 Server.





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

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

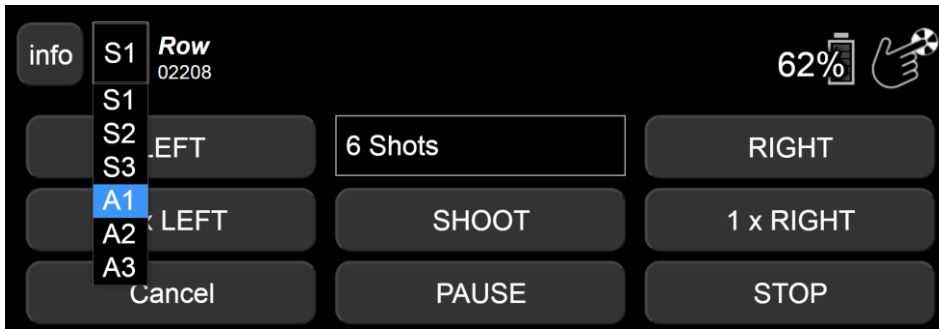
Shooting Panorama Made Easy for Dual Axis

Shooting a panorama is made easy by following the steps below.

1. Use the  and  buttons of MECHA-V to position the upper rail in **level** position (see the section Parked, Level, Raised Positions).

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

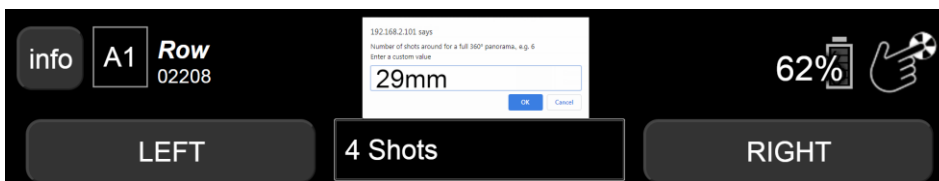
2. Connect to the MECHA's User Interface (see the chapter [How to Access the UI](#)).
3. On the *Row* page, select the *A1* (or *A2*, *A3*) level of complexity for the User Interface. In *A1-A3 (Advanced)* modes, you will see more controls than in *S1-S3 (Simple)* modes.



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



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



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

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

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

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



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



Next time you need to shoot this type of panorama:

- either 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 of 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), that consists in:

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 settles 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, and depending on the differences, some of the recently added features might not work.



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

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

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

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

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

If you notice that instead of a 90° rotation, MECHA seems to rotate more or less, the cause could be a wrong setting regarding the type of the 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 which case **Z** can be replaced with **Zx2**, for example, which will produce **2** Zeniths **180°** apart ($360^\circ/2$):

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

For **2** Zeniths **90°** apart, the **ZZ** convention can be used, or **^90**, which tells to use **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°**, **90x1** will do the same as **Z**, thus **80x1** is what you need for a Zenith at a tilt of **80°** instead.

For **2** Zeniths at a tilt of **80°** and **180°** apart, **80x2**, and for **2** Zeniths **90°** apart, we can use **80x2^90**, thus we will end with this 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 apply for Nadirs as well, in which case the **N, NN, -90x1, -80x1, -80x2^90** can be used.

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

Focus and Extra Shot Positions



<https://youtu.be/AohURKO5Jbg>

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

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

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


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

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

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

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

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

MECHA will go to the focus position and wait for you to press either the  or

[PAUSE] button to continue, next 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 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 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, to the above, we need a pause, say, before the horizontal row, or before Nadir, to be sure 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, while

P0x12 will mean the same, but with a pause before, and MECHA will wait for the

▶ button to be pressed, or for the UI *[PAUSE]* button to be pressed, or for the

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



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

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

If you want a pause before each row, for focus, for example, 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 WB or even for focus; it will be a kind of image you need to take again, without the extra elements in it, and the second one to be used in 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 pause or not. For example, if starting from **level**, we may not need a pause, as we can launch the preset after the clapboard preparations are done, and we will have the pause only before the actual row of 12 to start, time to remove, say, the gray card.

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

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

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

A **pause lenght** 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, 1p0x12, 2p-45x12, 3p45x12, 4pZ, 5pN
```

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

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

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

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

The same for the negative tilts:

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

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

Now, suppose we want only a vertical slice of it, 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° degrees 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 pause(s) before row(s), or extra 1 position row for clapboard, so on.

We can also add 1 Nadir and 1 Zenith with pause, and even use that pause to replace the lens with a fish eye, or change the focal length to the 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 positions (HDR), ending up with the full 360° around and 180° tall panorama:

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

Rewind After Each ROW

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

For example, for 50mm (FF equivalent):

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

Shooting in Horizontal Zigzag Pattern

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

MECHA will change the sense of rotation after each row.

For example, for 50mm (FF equivalent):

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

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

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


Script for 2 Focal Lengths – Dual Axis MECHA


Script for shooting a spherical panorama using 50 mm and 24 mm 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 *[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 2 Focal Lengths – Dual Axis MECHA

Absolute Positions in Pitch and Yaw Conventions

As you have already 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 compact, 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
```

RT in the second script, below, means return to the starting position on the shortest path:

```
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
```

RW can be used in the same way as RT when cables to a power bank are used. **RW** means rewind or return to the starting position on the same path.


WO stands for *without optimization* and can be used when no optimization is needed for the shortest path. Thus, **RTWO**, **RWWO**, **WORW**... are valid as well.

We recommend that you test any script that contains RT, RW, WO... type specifications (without cables), to be sure that it works as expected.


A script can be even more complex*, like this:

```
SL y0 (p-75 -50..75) y20 [p35 0..-35] y40 {p-60 -  
30..60} 60..350
```

When the script has the above complex form, the simplest and most recommended order of parentheses is this: () [] {}, and note that this order matters.

 * If the script is very complicated and long, it might fill up the RAM. Please test any script, before using it, by downloading the MAP from the web User Interface, and check if it looks OK in PTGui/Hugin or other Stitching software that can open a .pts file.

Add **:** (colon) before y where a **pause** is needed, in discrete format scripts. **p**

stands for *pitch* in pitch and yaw conventions, which is why we cannot use it to specify a pause. After the pause, continue shooting as usual, for example by pressing the  button.

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

A **pause lenght** 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 Server

In short, to download presets from server, make sure MECHA is connected to the Internet, then select the option *More from server* from the *Presets* list on the *Row* page. If the option *More from server* is not displayed in the list, it means that 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 after connecting, refresh the page. Please see [User Interface – Connect to Wi-Fi](#) for more details.

Step by step:

- On *Row* page, select the option *More from server* from the *Presets* list.
- Provide a keyword if you want to get only certain presets, and click/tap the *[OK]* button. The names of the presets found on the server are added to the *Presets* list.

- The preset name describes what the preset does, and over time you will know 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 saved yet on MECHA.
- Save the presets you find useful, as showed in 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.

Launch a Preset by Scanning a QR Code

A complete list of preset qr codes can be found on this web page:

MECHA QR Codes

<https://www.fanotec.com/mecha-qr-codes>

-
- To be able to launch a preset by scanning a qr code, your phone needs to be connected to the MECHA's SSID first (see Access the User Interface (UI) with a Smartphone).
 - Click to enlarge, then scan the preset qr code you want to launch.

With MECHA DAC and C1, by scanning a qr code in the table on the page mentioned above, you 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.

How to Set Both MECHA and Smartphone to Have Internet Access

In this chapter, we will explain how to set both MECHA and smartphone to have Internet access, and also how to enable the update and use your device for usual Internet browsing at the same time.

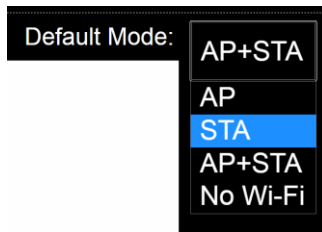
First, set up a hot-spot on your device, in 2.4 GHz band, and name it **MECHA-PHONE**. Please refer to your device documentation about how to set up a hot-spot.

Suppose the hot-spot is disabled for the moment.

That hot-spot gives 192.168.43.xxx address to its clients.

6. Start paired MECHAs, MECHA-H first.

7. Connect to MECHA-H */config* with your device, then set it in STA mode, choosing the STA option from the Default Mode select list.



Scroll to the STA Mode and enter the following values:

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

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

1. Scroll to the bottom of the page and tap the *[Apply]* button.
2. Switch to */config* of MECHA-V (at the bottom of the page).
3. Set it in STA mode and enter the following values in STA Mode fields:
 - Static IP: 192.168.43.102
 - Subnet: 255.255.255.0
 - Gateway: 192.168.43.1
 - DNS: 8.8.8.8
4. Tap the *[Apply]* button.
5. 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.

6. Switch to */config* of MECHA-H, tapping the *[H MECHA / config]* button, which should be visible at the bottom of the page.
7. Tap the *[Connect to Wi-Fi]* button at the bottom of the page, then enter **MECHA-PHONE** and the required password.
8. Start MECHA-PHONE hot-spot.

MECHAs should connect to **MECHA-PHONE** after a little while.

As a result:

- We have the MECHAs connected to a SSID with Internet access, provided 3g, 4g, so on, is available.
- This enables downloads of presets from server, updates and the use of your phone for Internet browsing as usual.
- MECHA-H-DAC will be accessible always at 192.168.43.101, and
- MECHA-V-DAC will be accessible always at 192.168.43.102

All you have to do is turn **MECHA-PHONE** hot-spot on when powering up MECHAs, and to maintain it on while using MECHAs, for example disable any automatic turn-OFF of hot-spot on phone/device.

Now your device is connected to the Internet and to MECHAs, and you can download presets from 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 some codes. We use the power button,

, to enter 0 (zero) on the MECHA unit. Therefore, a code that starts with zero, we call it a power code.

In the **zLM** method of pairing, the first step is to create a code – a power code, and the second, 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**, so that two identical digits are not 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 code, because you will also use it as a password.


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

Step 2

1. Power off both MECHA units in case they are running. To do that, hold down the power button, , for 3 to 5 seconds.
2. Power on the horizontal MECHA (hold down the power button, , for 3 to 5 seconds). Wait until the splitting lights () end and all LEDs are off. The unit powered up first **rotates horizontally**, so we name it **MECHA-H**.

3. Enter the **power code** on the MECHA-H using the MECHA-H buttons. After entering the code, MECHA-H gives 5 beeps, if not muted in settings. That means *"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 () end and all LEDs are off. The second powered up unit **rotates vertically**, so we name it **MECHA-V**.



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

5. Enter the same **power code** on the MECHA-V using the buttons of MECHA-V. After entering the code, MECHA-V gives 2 beeps, if not muted in settings. That 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 power on the MECHA-H first.

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

Pairing PIN for more than 2 MECHAs

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 extra option you can use when the pairing method is **zLM** or **zLM 2** to pair automatically at start more than 2 MECHAs connected to the same network or to the same hot-spot.

To set a pairing PIN number:

- Access the MECHA-H web interface, as shown in the chapter [DAC test using the UI](#), and go to `/config` page.

- Create a four-digit number – the pairing PIN – and enter this number in the field *Pairing PIN*.
- Then click the *[Apply]* button at the bottom of the page.

All 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 be automatically set the same on MECHA-V.

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

Temporary Pairing

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

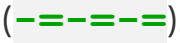
- Power on both MECHAs.
- Start team building by entering the code **1212<** on the horizontal MECHA. In other words, the unit on which you enter this code, will rotate horizontally.
- Confirm the participation in the team by entering the code **12<** on the vertical MECHA. This unit will rotate vertically.

Automatic Pairing Using the UI

Power on horizontal MECHA and press **1** when LEDs shows splitting lights ().

1. Connect to horizontal MECHA with MECHA SSID and password. Refer to [MECHA Controller C1 Manual](#) if needed. 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 vertical MECHA and press **1** when LEDs shows splitting lights ().
6. Connect to vertical MECHA with 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 SSID and password for horizontal MECHA.
11. Connect to horizontal MECHA again using MECHA SSID.
12. Access *192.168.8.1/row*
13. If pairing is successful, UI will show *[H]* at the upper left corner and *[Team .x]* near the bottom of page, where x is the last part of the IP in *192.168.8.x*. The vertical MECHA can be accessed by selecting the *[H]* icon or by typing *192.168.8.x* on browser address. Vertical MECHA UI will show *[V]* at the upper left corner and *[Team]* near the bottom of page. Select *[V]* to go back to horizontal MECHA. Use 2 Tabs with MECHA IPs in browser to access both MECHAs quickly.



14. To get presets from server, click the *[Connect to Wi-Fi]* button and enter SSID and password for the Wi-Fi network with Internet access.
15. Select *[Presets]*, load *[More from Server]* to get some presets to test. You can ask for presets for your specific setup at
16. forum.nodalininja.com
17. Note that MECHA (accessed by *192.168.8.1*) is in AP mode. If you use the hot-spot/ Wi-Fi Tethering function on the same device to provide the 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 [MECHA Controller C1 Manual](#) on STA mode for details.

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 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.

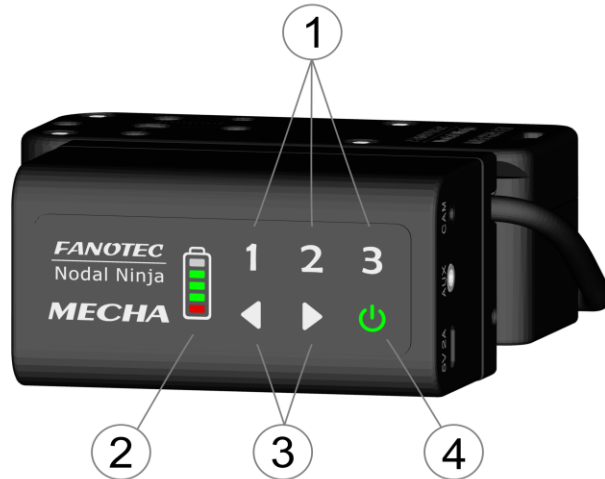
Re-Pairing after Unpairing

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 up, 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 5 LEDs which show you the result of the performed operation.



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

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



See below the equivalence of buttons and characters:



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

1< or 1>

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

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

2< or 2>

Executes the *Preset 2* to the left or to the right.

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

3< or 3>

Executes the *Preset 3* to the left or to the right.

By default, the *Preset 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.

1313< or 1313>

The same as 1312, but with MECHA-V in the **level** position. First time, please test the codes without 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 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 1212< code is entered, or after first tap/click the *[Team]* button in UI, the LEDs will show scanning for any MECHA willing to join the team and be controlled.

The MECHA where Team was started in UI, or 1212< code was entered, becomes the main MECHA and will have control over other MECHAs. To join any other MECHA in the team, enter the 12< code 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 *[Team]* button in UI or press the power button, , on the main MECHA.

Regardless of being in a team or not, each MECHA still have its UI functional, furthermore, each MECHA can start its own team: for example, with 5 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<, the dual-axis control itself will be extended further. Soon, the control will be extended to as many axes as MECHA team consists of.

As a note, the goal is to assemble and save a team by MECHA IDs, independent of the IP addresses, and that will be achieved at some point.

12<

Confirms the 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 1st MECHA, there is no need to enter the IP manually, except when you want to use a different 2nd MECHA in the network.

Team build started on one MECHA with *[Team]* or **1212<** code will automatically exit from the 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, 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 3 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 (say, to enable Wi-Fi, or change the AP-STA mode), without disengaging the motors. Thus, the camera will not move due to gravity or other causes.

21<

Switches MECHA **to** or **off** 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 blinks also 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 **31<** code, MECHA waits for two quick presses of the  button, first is in order to trigger the camera, and the second is 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 P button, right after the sheet of paper is out of the camera's frame.

Then MECHA will go back in the 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 the pause

mode and the vertical axis should be tilted manually to continue to a full spherical panorama. If only a cylindrical is needed, or no manual tilt is possible, press the  button.

32<

Similar with **31<** code, but fish-eye lenses can be used as well.

Also, **32<** uses for reference a small feature centered in the frame, say, below the central focus point.

231<

Everything OFF, for faster battery charge. First, plug the charger cable, then enter the code.

Press the power button, , to show/hide battery **level** on LEDs when charging.

If it's no power on charging cable, the code will be ignored.

If the code is executed, the LEDs will show charging, then the cable has to be unplugged and MECHA has to be powered-up again to go back to normal use.

Pressing other buttons than  will have no effect.

As an alternative, in UI */config* page, *When Charging* option should be *Turn OFF*. This reduces the charging time to 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 when charging.

232<

Disables/Enables all LEDs, useful during night photography.

As the power LED is off, don't forget the device turned on.


The LEDs will light however if buttons are pressed for entering a code, to show the result of a code, or for battery check.

It enhances the performance of MECHA DAC by using less RAM for communication.

12321<

Backlash compensation calibration.



After the code is entered, MECHA will turn slowly to the right, then power LED will start flashing.

After that, you have to press  when you see/feel that MECHA starts moving very slightly to the left.

You can use the viewfinder, LIVE view with zoom, or other devices attached, like a laser pointer, and so on, or simply feel by hand when that small movement begins.

At the end, the LEDs will show, say, ":24", where 24 is the new calibration factor (it should be around this value).

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

You can cancel the procedure with any other button when the power button, , flashes, or press the  button right after it starts flashing to have no compensation at all, or it will time-out in 5 minutes if no buttons are pressed.



TIP: If you have an R1 with camera in portrait mode, with the grip up and no Live view, and you have to look through viewfinder to see when the small movement begins, you can look with your left eye, and there is no need to close the right eye.

If the grip is mounted to the bottom of the camera, you can look with your right eye, and there is no need to close the left one.

This will make the process more bearable.

123123<

Speed calibration.

The procedure takes **1 hour** and is silent, the motor is not moving.

Please wait until MECHA turns OFF automatically, and don't use the web interface during this time.

This is a one-time procedure, which you can omit if you wish, as 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 the results automatically.

The **speed calibration** makes the RPM value set in the interface as close as possible to the same calculated RPM value.

Backlash compensation is to compensate the backlash of the gear assembly, to have a better precision for left-right movements, like rewind to the initial position for cable protection, or in case of partial panoramas and time-lapse.

The procedure can be repeated after a longer period of time, after gear wears. If you hear or see 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 **32123<** code can be used to update the firmware, provided MECHA has Internet access, or the Wi-Fi with Internet that MECHA was connected to before is on.

32123<

Updates the firmware, if possible. To update the firmware using the **32123<** code, MECHA must be in *STA* or *AP+STA* mode and connected to a Wi-Fi with Internet access, before entering the code. Depending on *Default Mode*, it may be necessary to enable temporarily *STA* or *AP+STA* at start via buttons, then enter the **32123<** code. 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 there is a new one.

312123<

Update the firmware using a hot-spot with the name **MECHA-UPDATE** and the password **87654321**, which needs to be created and active before entering the code.


31212<

The code must be entered in the horizontal unit, and 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 it is 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 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 **4** 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 *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 */config* of MECHA-H.

3123<

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

2313<

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

,  buttons.

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

23131<

Sets E1 as preferred rotator.

23132<



Sets E2 as preferred rotator.

23121<

Sets P1 as preferred rotator.

231231<



Resets the configuration settings to their default values, for example: SSID password → **12345678**, Password for *Configuration* page → **Mecha**, Hot-Spot password for firmware update → **87654321**, Default Mode → **AP**. This code needs to be entered twice, as follows:

- 1) enter **231231<** and, after 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, after 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

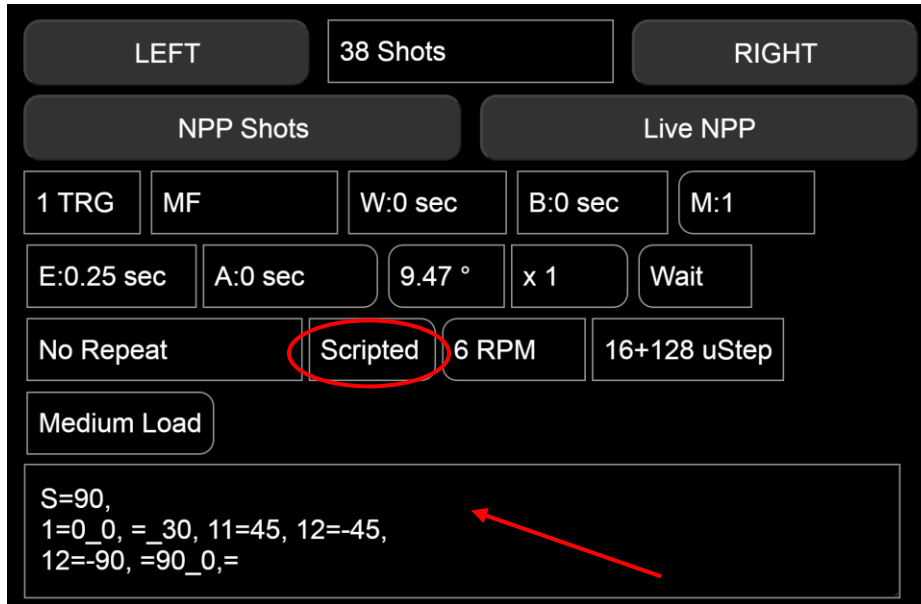
MECHA's S (Shots) Language

The S Language requires the firmware *02054* or newer.

In this chapter we will explain how to make a script for your desired pattern of shooting.

The S language is Shots oriented, and it can be used for both Single MECHA and MECHA Dual Axis Combo, abbreviated MECHA DAC.

Access Row page of MECHA-H using the Uset Interface, and select Scripted. As a result, a blank text area is displayed in which you will write the script.



LEFT 38 Shots RIGHT

NPP Shots Live NPP

1 TRG MF W:0 sec B:0 sec M:1

E:0.25 sec A:0 sec 9.47 ° x 1 Wait

No Repeat **Scripted** 6 RPM 16+128 uStep

Medium Load

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

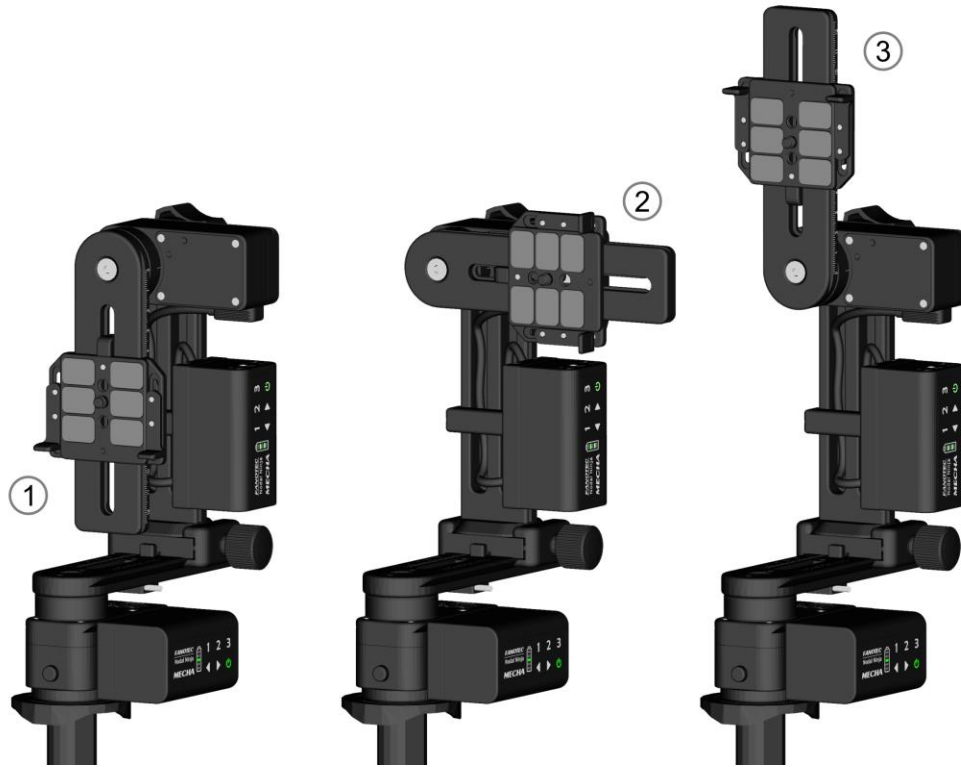
The script starts with the initial position of MECHA, as follows:

S={position in degrees}



! Please note that usually MECHA's position refers to the position/orientation of the rail/device controlled by MECHA.

In the case of DAC, we commonly have 3 possible starting positions: (1) **level**, (2) **parked**, and (3) **raised**. To go from a position to another, please see the [Simple Rotations](#) and [Parked, Level and Raised Positions](#) sections at the beginning of Part 2.

For example, use the **▼3** or **▲3** buttons to go 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 S language, and the most important are the following:

-	<i>Underscore</i> refers to the lower rotator.
=	<i>Equal sign</i> refers to the upper rotator.
::	<i>Double colon</i> is the equivalent of 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 more easy input from phones.

This is an example similar to the previous one. Suppose we want to script a

panorama starting, again, from the **parked** position, made of 12 photos around, 3 rows in total, at 0° and at +/- 45°, + zenith and nadir. In this case, we want **zenith and nadir to be taken at the end**.



This way of scripting is more complex, but allows more flexibility for a particular shooting pattern.

In the **parked** position, the camera – mounted on the upper rail – is facing up, as in the image above, and MECHA has to rotate the upper rail 90° to photograph the first row, as required in our example. So, we specify the **parked starting position for MECHA-V** as follows: **S=90**.

If the starting 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 MECHAs to move so that we have 12 photos around, 30° apart.

For the next position, 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 in every position) will continue by changing only the rotation of MECHA-H, then at 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 11 positions will continue in the same manner, and 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 for the previous row, things go the same for another 11 photos, and 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 one 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. And 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 to have 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 *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, 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,
- and 12 shots around for the horizontal. 36 shots in total.
- Start in the **parked** position (zenith), and end in the **raised** position (nadir).

```
S=90, 1=0_0, =_30, 11=-45, =_36, 9=45, 10=90, =_90,
=-90_0, =_-90, =
```

S=90, — The start 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°** and

=_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°**, and

-10=90, — then, at the **10th** shot from the previous change, the tilt becomes **90°**

for zenith, and

=_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, and

=_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, in order 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 of 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, and now there is the Raw Interface, which allows third-party applications and any user to control MECHA through a series of parameters and commands that we present 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, which is disabled by default, then 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 static or dynamic IP, 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 by 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)

```

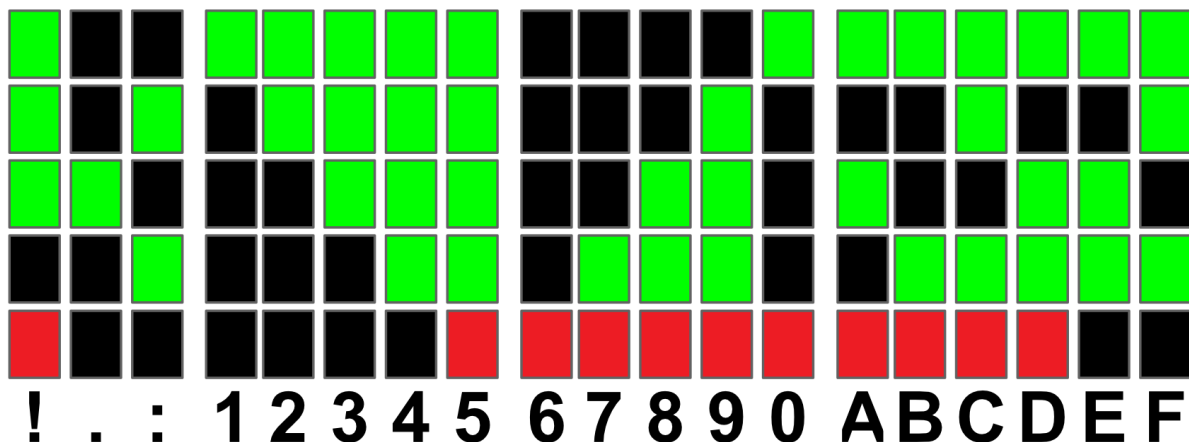
```
"r2":7536, /number of full steps per revolution for rotator
2 (upper rotator)
"d1":0.00, /yaw
"d2":0.00, /tilt
"d3":0, /position (in degrees) along the axis 3
"d4":0, /position (in degrees) along the axis 4
"i1":090000 /a feature in development at the moment
}
```

The positions along the 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 a text on C1 controller LEDs. Provide the actual text as in the following example, but note that you can only use the characters in the table below, including lowercase letters.



```
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 4 rotators.

***sp** — rotational speed

sd1 .. sd4 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 applies to the regions where the movement is accelerated (*mcstep*), and the rest of the digits applies 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 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: from 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: from 0 to 32767 (ms).

```
http://192.168.8.1/i?shutter=2000 /2000 ms
```

Other Commands

synch — ignoring commands while moving

If you send commands while MECHA is performing moves, they will be ignored. However, the browser may put them in a queue and therefore be executed 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 the 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 comand 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, 115200 baud. Power on MECHA and wait until the boot sequence ends

successfully, then insert the USB cable in the 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:

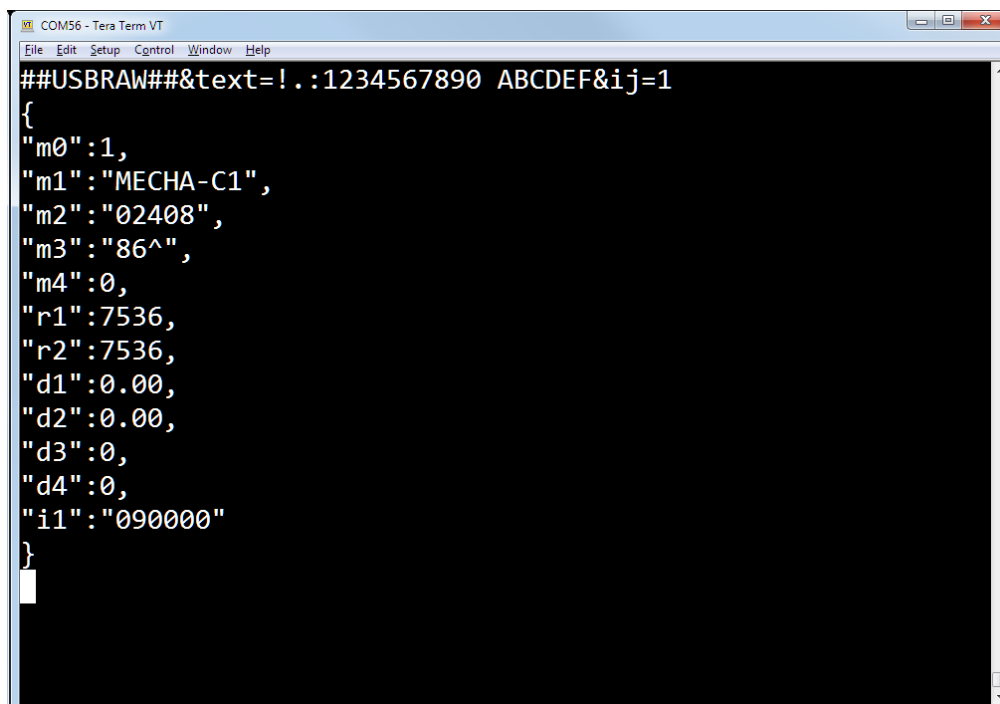
```
##USBRAW##&pr1=medium&ms1=32&fs1=7536&fs2=7536&sp1=6.0&rd1=30&rd2=45&synch=true
```

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 output is a JSON object with the following fields:

```
{
  "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 the parameters for USB must have a value.

ij=1 added to a USB command is valid, but ***ij*** is not valid as it has no value.



For multi-parameter commands, keep in mind that the execution order is as follows, regardless of the order of the parameters in the command: 1) okgo, 2) text, 3) nb, 4) focus, 5) shutter, 6) pause, 7) rotation, 8) beep, 9) nx.

Please see some usage examples at

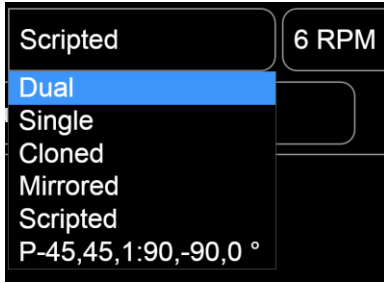
<http://192.168.8.1/i-example>

Chain of Cloned MECHAs

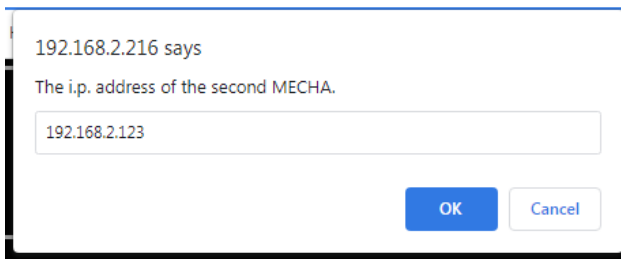
Imagine a series of MECHAs in which one MECHA knows the IP of another MECHA, and the latter knows the IP of a third MECHA, and so on. This is a chain of MECHAs. If the first MECHA in the chain – the master – receives a command to execute a certain preset, it can transmit the command to the second, the second – to the third, and so on. Therefore, all the MECHAs in the chain can execute the same preset simultaneously, which, for example, can greatly reduce the time required to perform certain tasks, but can also have other interesting applications.

Here is how you create a chain of MECHAs.

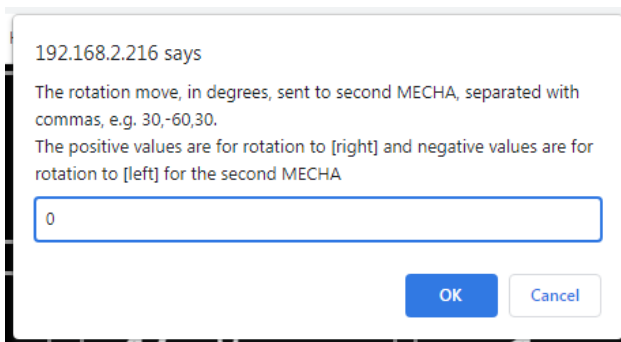
- Access the User Interface of the master, then:
 - Select *Dual* from the *Single/Dual...* list.



- Enter the IP of the second MECHA in the displayed dialog box, then click OK.



- Another dialog box is displayed, in which you 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 of the third MECHA in the displayed dialog box, then click OK. Another dialog box is displayed, in which you enter 0 (zero), as before.

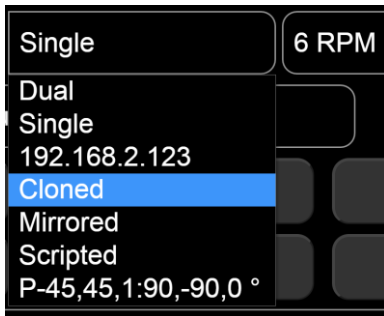
So the master knows the IP of the second MECHA, and the second MECHA knows the IP of the third MECHA. If you need to add another MECHA to this chain, proceed in the same way.

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

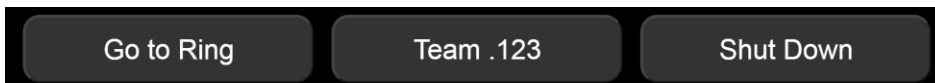
Select a preset from the *Presets* list, or create a new preset, if needed. Set a long

enough *B* (*Before* – delay before each triggering sequence) to allow command propagation in the chain of MECHAs and avoid desynchronization in the 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 of the second MECHA is displayed in the selection list, and the last part of the IP 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 – in the opposite direction to the second (that is, the same as the first, or master), and so on.

Launch the preset with either the *[RIGHT]* or *[LEFT]* button.

What is New

- **Version 7.2.7 – 2023.09.13:**
 - Use of *delay* instead of *pause* for time setting.
- **Version 7.2.6 – 2023.07.17:**
 - Added - link to video: MECHA's Splitting Lights – Dual Axis Combo (DAC).

- New url parameters: *bf* (before), *pf* (profile), *lb* (label).
- **Version 7.2.5 – 2023.04.03:**
 - Added: *Wi-Fi Test*.
 - Added: *USBRAW — commands for USB*.
 - Added: *Chain of Cloned MECHAs*.
- **Version 7.2.4 – 2023.02.10:**
 - Updated: *Wait/Rewind* and *Repeat*.
 - Updated: *Wi-Fi Reset*.
 - Updated: *Absolute Positions in Pitch and Yaw Conventions*.
 - Updated: *How to Unpair MECHAs*.
- **Version 7.2.3 – 2022.12.21:**
 - Updated: *[Import]* button, *Fixed settings*, *Use Nodal Ninja IR Remote*, *Factory Reset* code description.
 - Added: code 3232.
 - Links added to videos: *IR Remote Test*, *Factory Reset*.
- **Version 7.2.2 – 2022.10.04:**
 - New slider buttons: *[Corner 1]*, *[Corner 2]*.
 - Updated: *E:SHT C.*, *E:SHT C1* (shutter release confirmation options).
 - Added: a note about the *Demo* option (*Degree of rotation* select list).
 - *Pause length* – allowed in scripts.
 - *Code 2112<* added to *Current Codes List*.
 - New in Raw Interface: *sim* – Simulation Only parameter, link to a video about the Raw Interface.
 - Updated: some preset images and slider images.

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



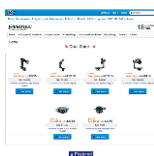
<https://www.youtube.com/user/NodalNinja>

Nodal Ninja YouTube Channel



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

Nodal Ninja's Panoramic Photography Forum



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

Fanotec International Limited official website

Developed and manufactured by **Fanotec International Limited**.
Address: Flat 2, 4/F, Kar Wah Indl. Bldg. 8 Leung Yip Street Yuen Long, Hong Kong.