

# AMC-MDBOX controller v1.4 - MBOX

Interface for connection to Simtools or other motion software



The AMC-MDBOX controller allows seamless and fast interface between the PC and the MDBOX servo drives. Using the AMC-MDBOX controller you can interface your linear servomotors to [Simtools](#), [X-sim](#) and [Ian's 6DOF BFF motion software](#). The connection to PC is a simple USB connection and the connection to the MDBOX is via a 25pin to 44pin cable that carries the control signals with zero latency.

There are no settings needed for the AMC-MDBOX controller unit, comes fully setup. The four button on the panel can be used to manually move the actuators to 15% and 85% for testing when the controller is not receiving motion data from the PC.

The AMC-MDBOX controller is powered from the USB cable. All voltages to control the MBOX servos are internally, no external PSU connection is necessary. The internal PSU has adjustable voltage with trimpot that has to be set to 15.5v.



To increase the output voltage turn the trimpot screw counter-clockwise.

The USB Data connection requires FTDI driver that can be downloaded from the FTDI website:

<http://www.ftdichip.com/Drivers/VCP.htm>

The device appears in the PC Device manager as COM Serial interface device that then can be defined for use with Simtools or any other motion software that provides interface support for the AMC-MDBOX.

## 1. Ian's BFF 6DOF:

For Ian's BFF 6DOF motion software you will have to use the latest "BFF\_6DOF\_Background\_v102.exe" available here:

<http://bfffsimulation.com/Manual-6DOF/Introduction.php>

Copy the "**BFF\_6DOF\_Background\_v102.exe**" into the BFF motion driver folder and remove the existing "BFF\_6DOF\_Background\_v100.exe"

And set the following parameters in the \*.BFF config file:

Port=**COM7** (or any other COM port number your AMC has taken, **MUST be COM1 to COM9**)

Baud=**250000**

Mode=**BIN2TH**

## 2. Simtools:

Simply drag and drop the "AMC1280USB\_InterfacePlugin.dll" into the Simtools PluginUpdater Start Simtools, you should see 8axis available now for the AMC1280USB interface plugin.

The data packet string now is 20 bytes long and includes additional spare motion data slots for up to 8axis

The ID is byte values 0xFF + 0xFF

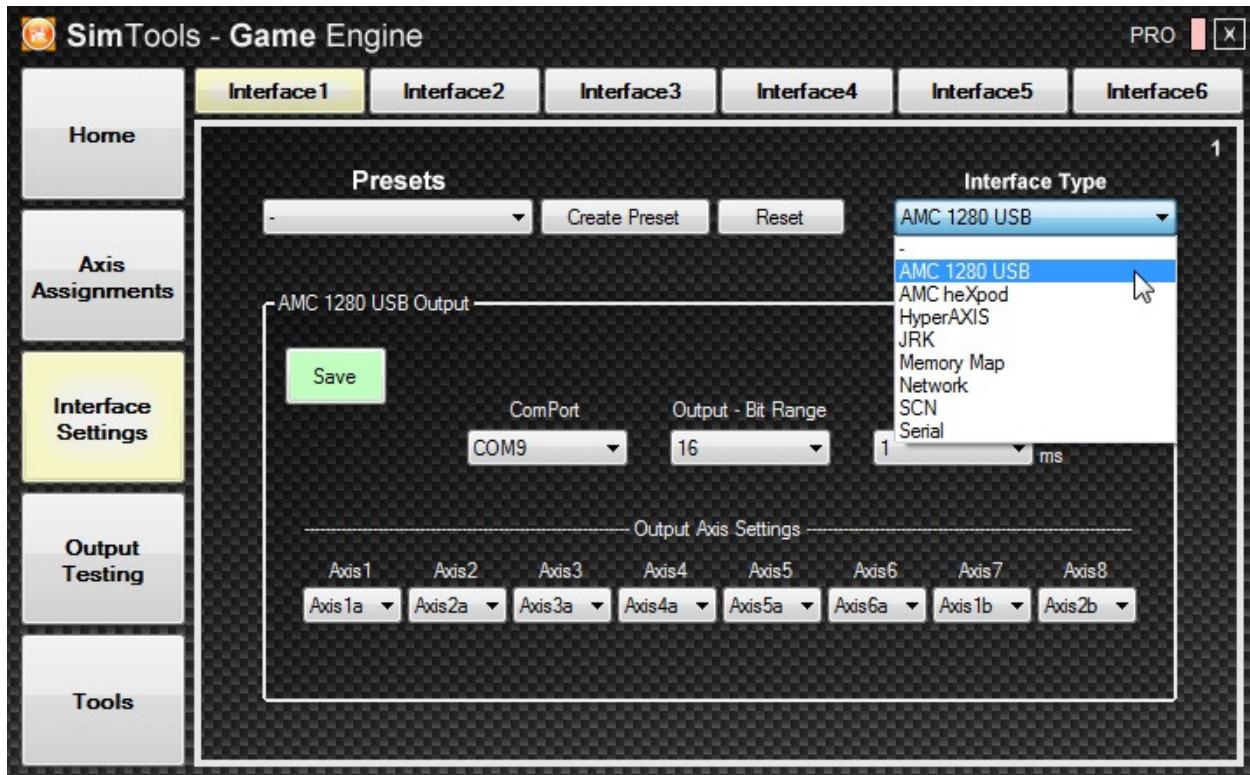
Each Axis is 16bit wide.

LF+CR is required in the end (0x0A + 0x0D)

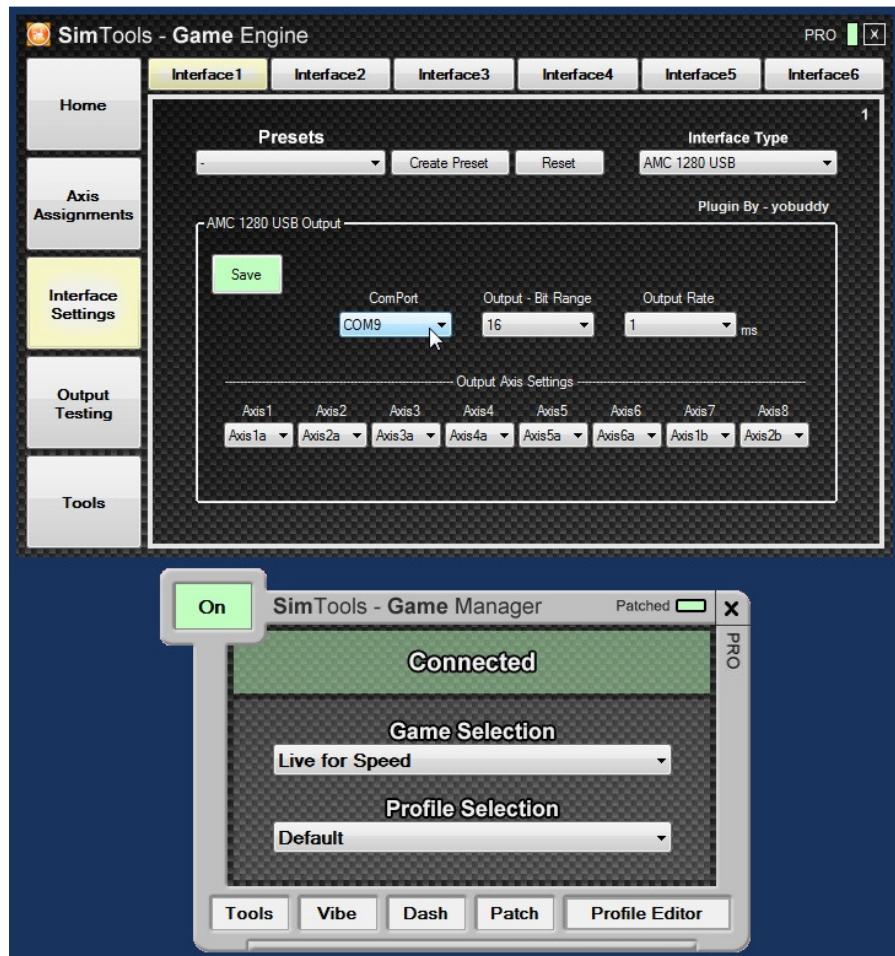
ID AXIS1 AXIS2 AXIS3 AXIS4 AXIS5 AXIS6 AXIS7 AXIS8 LF/CR

## 3. Hexpod Driver:

Copy and paste over the "6DOF.exe" into the Hexpod driver directory. Drag and drop the "AMCHexpod\_InterfacePlugin.dll" into the Simtools PluginUpdater. Start Simtools, you should see the Axis7 and Axis8 to also appear in the interface page.



Interfacing the Simtools with direct axis is simple as seen on the below capture. It only requires selecting the AMC1280USB interface and selecting the COM Port that is assigned to the AMC-MDBOX in the PC device manager.



The axis assignments for each DOF provided is up to the use to mix and use as needed. The AMC-MDBOX can be configured to use any of the 6axis available or be reconfigured for 2axis, 3axis or 4axis output.

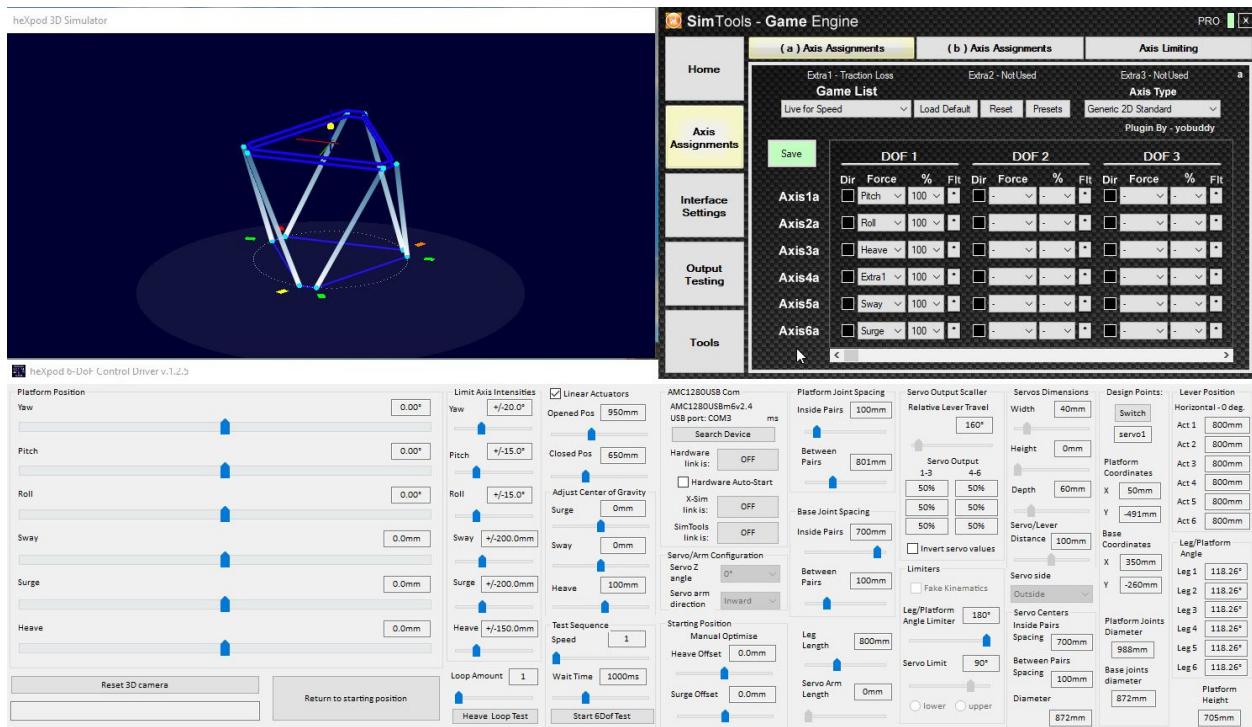
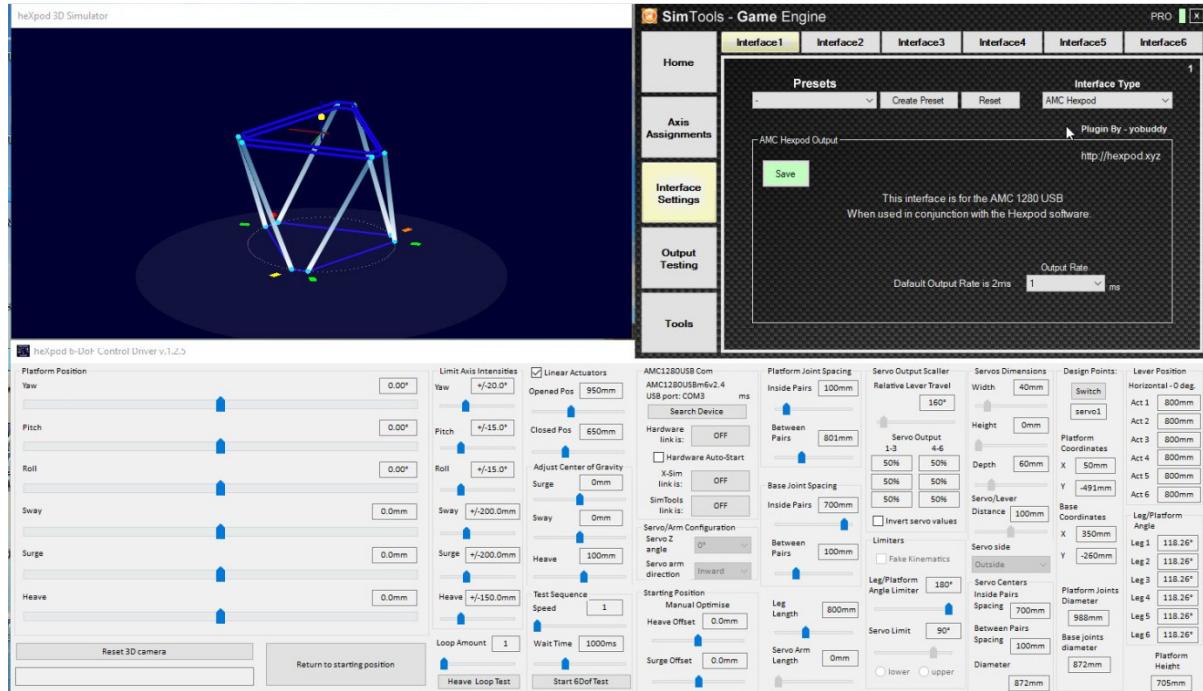


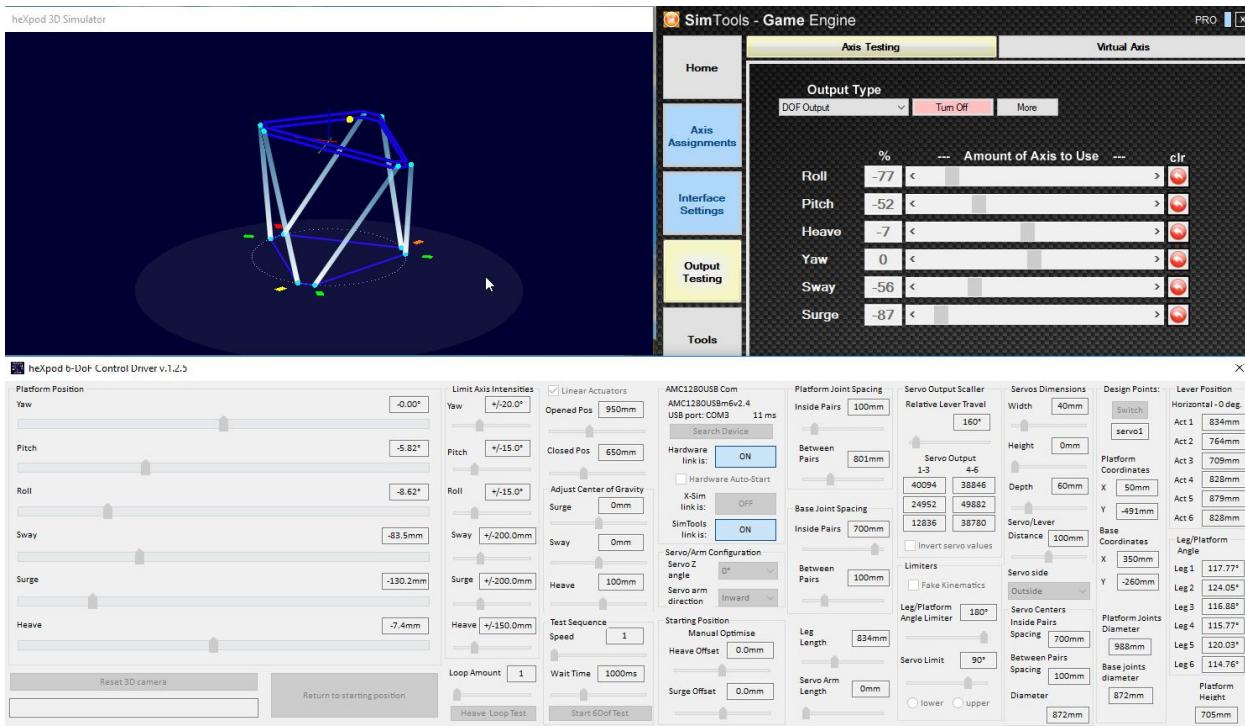
Simtools now supports the AMC-MDBOX for use in 6DOF Stewart platforms as well using the Hexpod Driver interface. Complete control panel is available to define the 6DOF dimensions as well intensities and range of motion



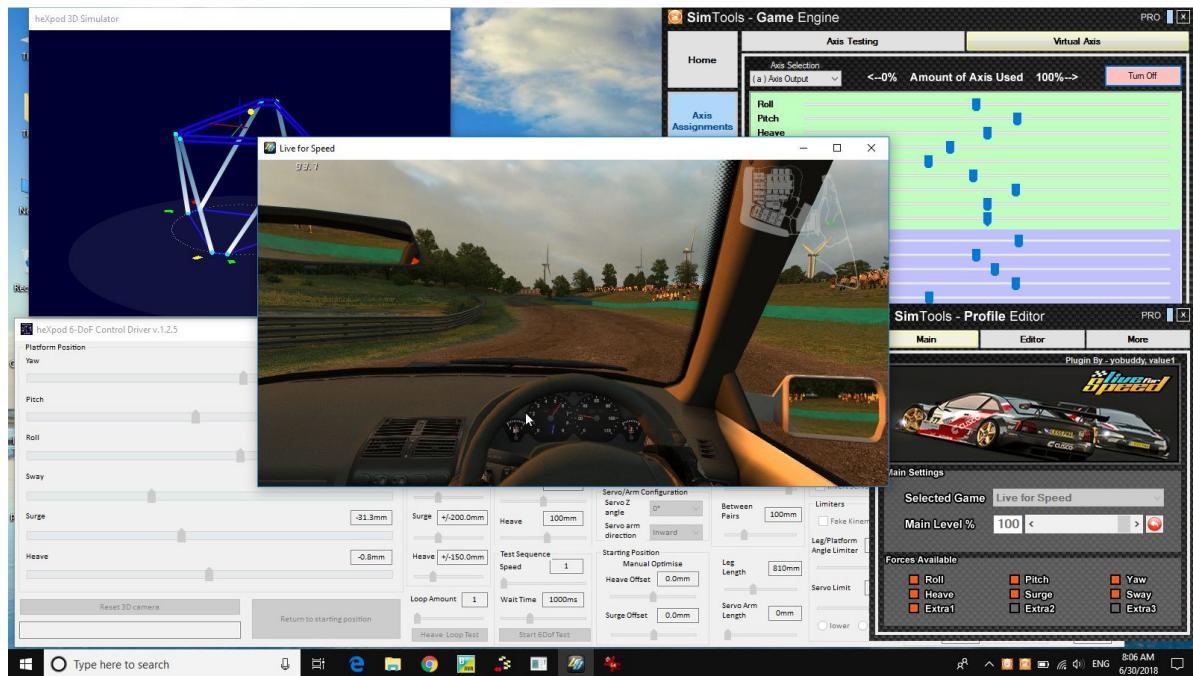
The Hexpod driver that uses Inverse kinematics math for real-time positioning of the platform is separate software that is newly added in Simtools and can be found here: <http://hexpod.xyz>

The Hexpod driver is also working with X-sim. It was developed to support only the AMC-MDBOX controller.

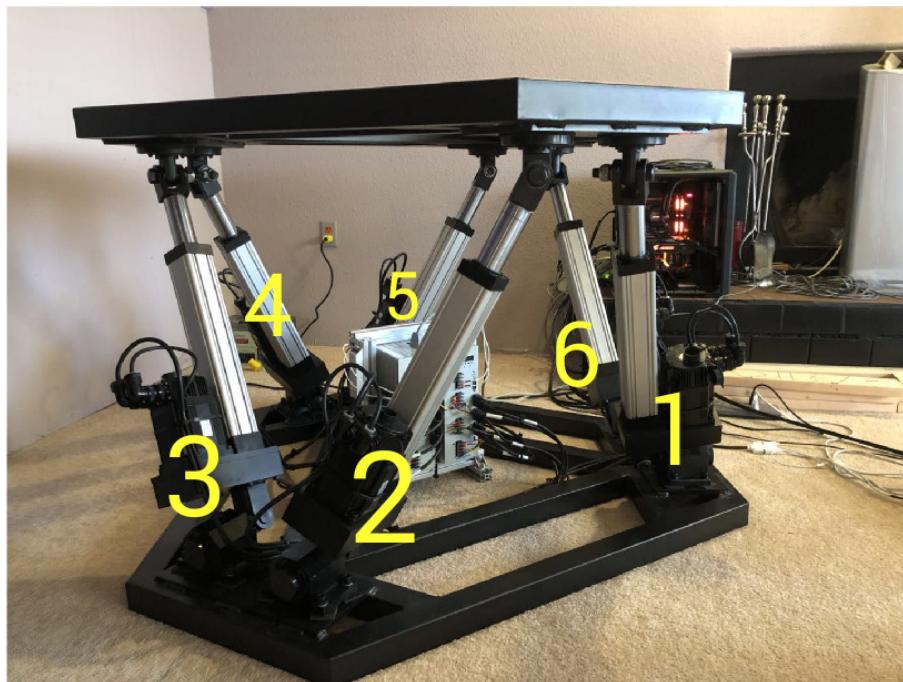
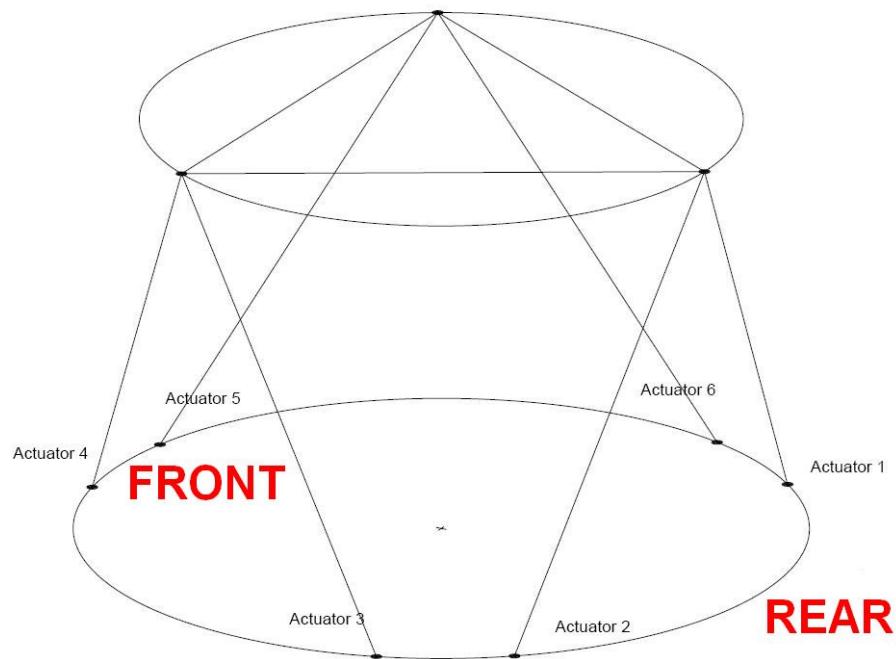


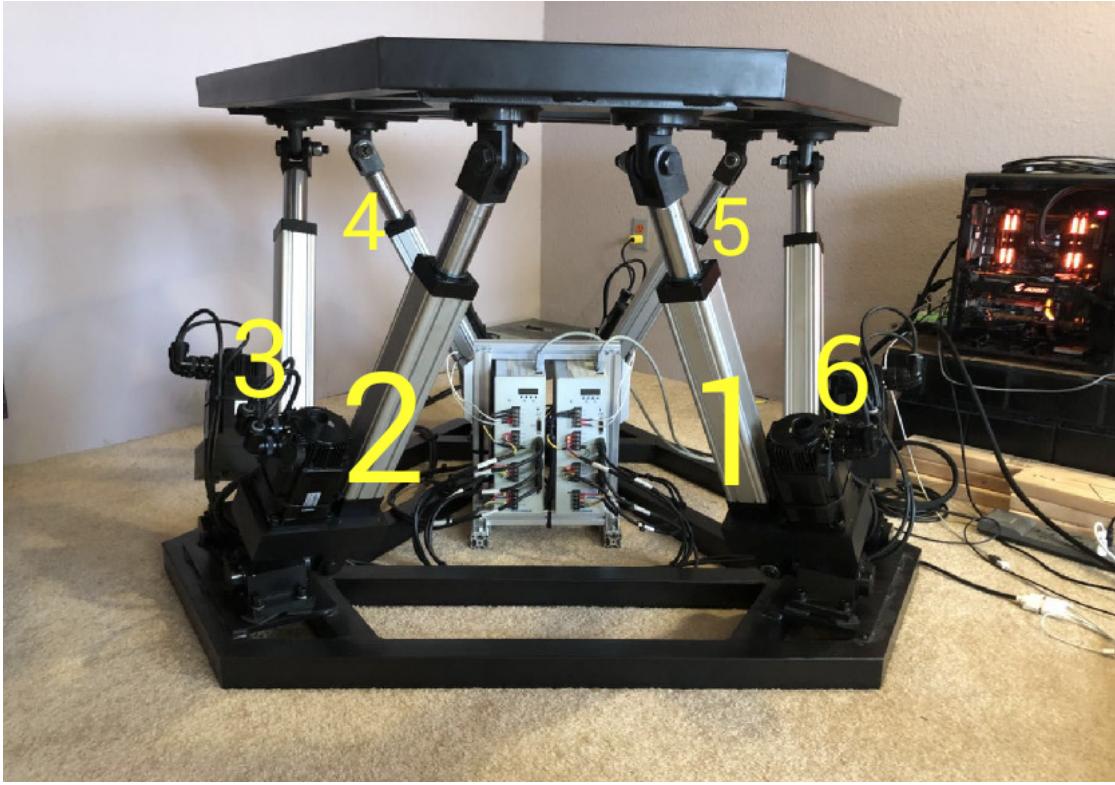


The Hexpod driver works with any game that is supported by Simtools. Below screenshot of LFS.



The recommended actuator order and orientation, for compatibility with the Hexpod driver software, is the following:





Actuator1: MBOX HS #1 – Motor

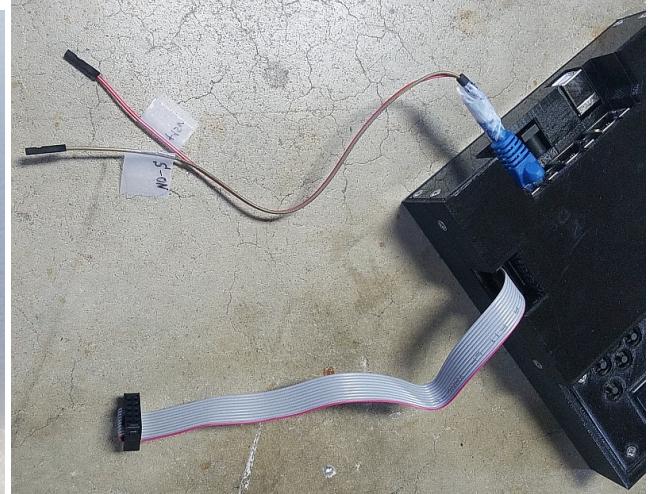
Actuator2: MBOX HS #2 – Motor

Actuator3: MBOX HS #3 – Motor

Actuator4: MBOX HS #4 – Motor

Actuator5: MBOX HS #5 – Motor

Actuator6: MBOX HS #6 – Motor



The AMC-MDBOX controller interfaces to the MBOX unit using a 10pin ribbon cable on **AD port** that carries the position information for all six actuators, and the S-ON (Servo enable signal) is connected on **IO1 port** pin22 and pin14 as shown above.

## AMC-MDBOX to 6-in-1 MBOX

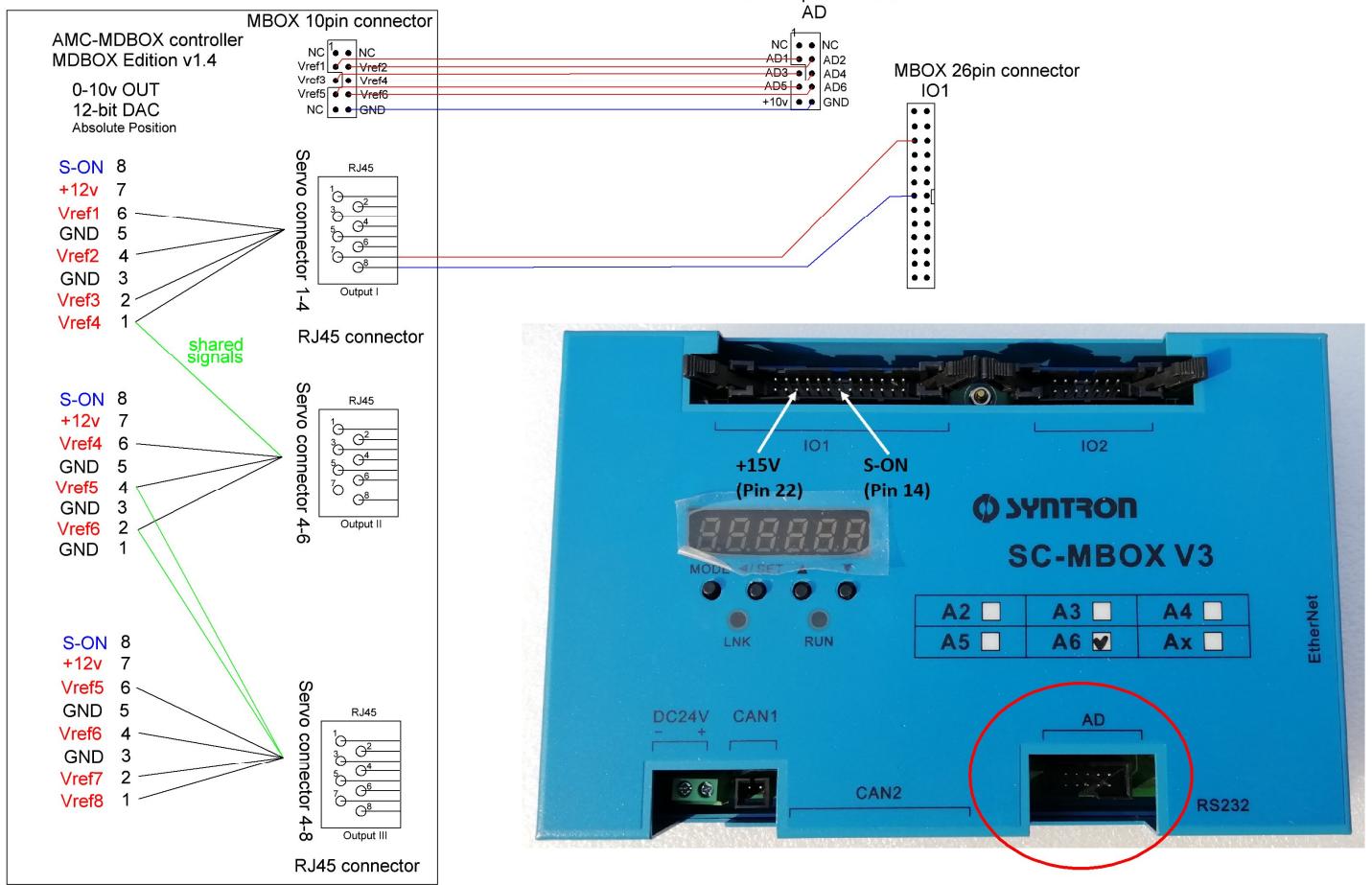
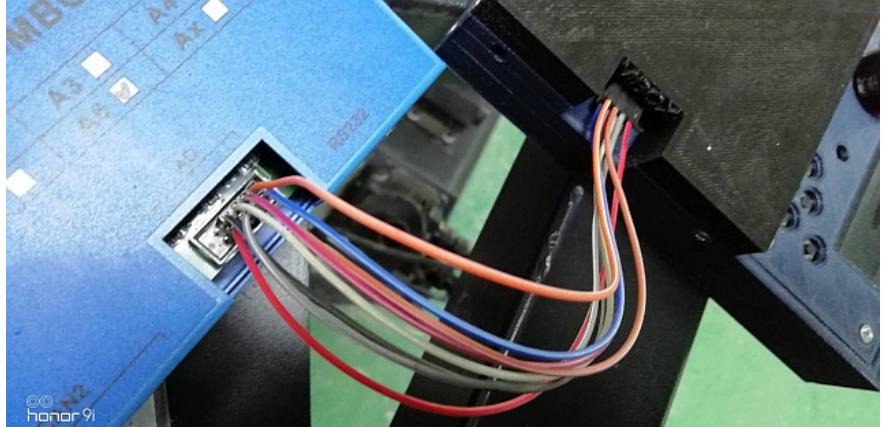
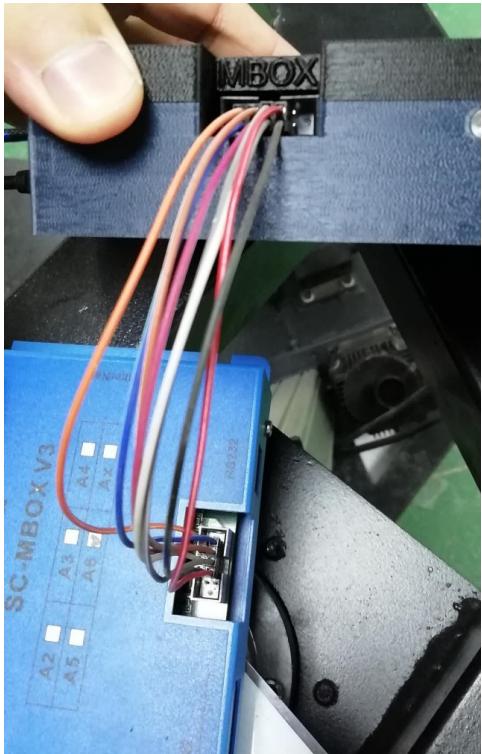
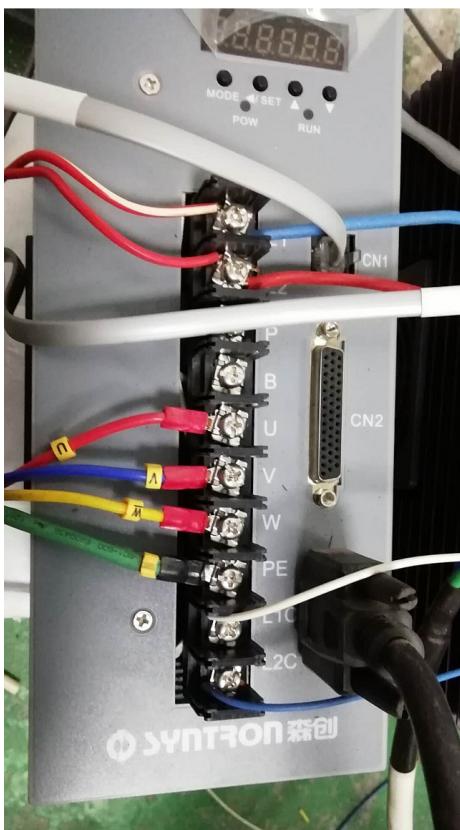
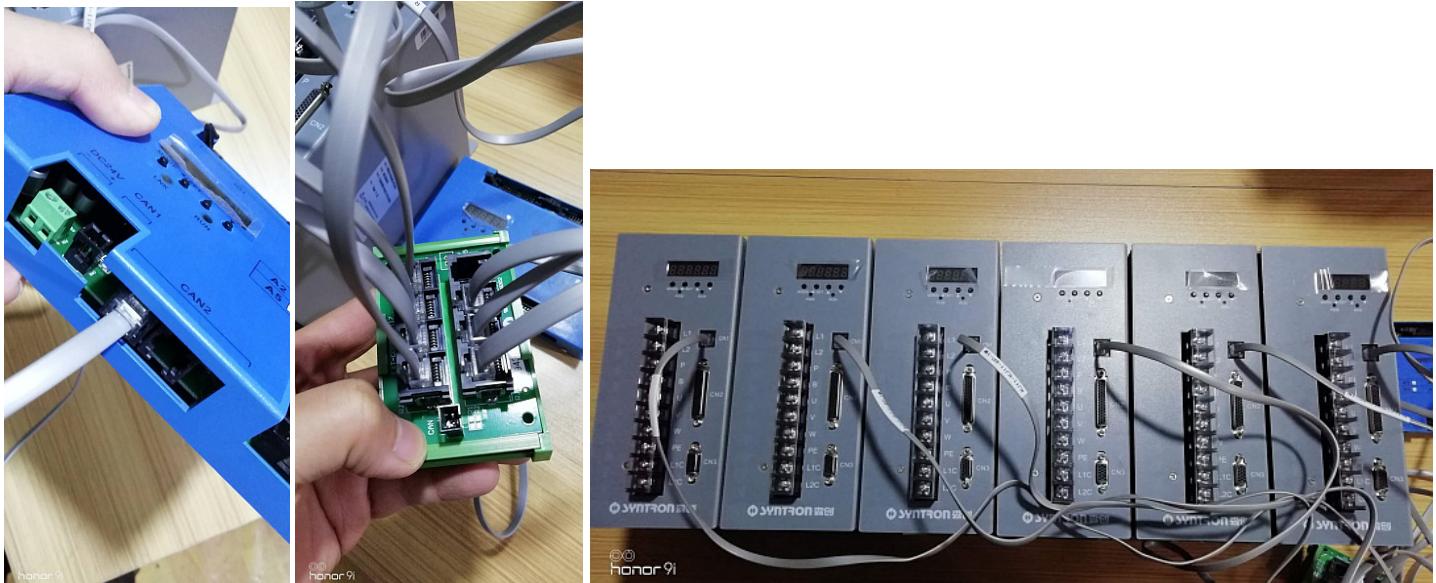


Diagram that shows the Pinout of the AMC-MDBOX RJ45 ports.

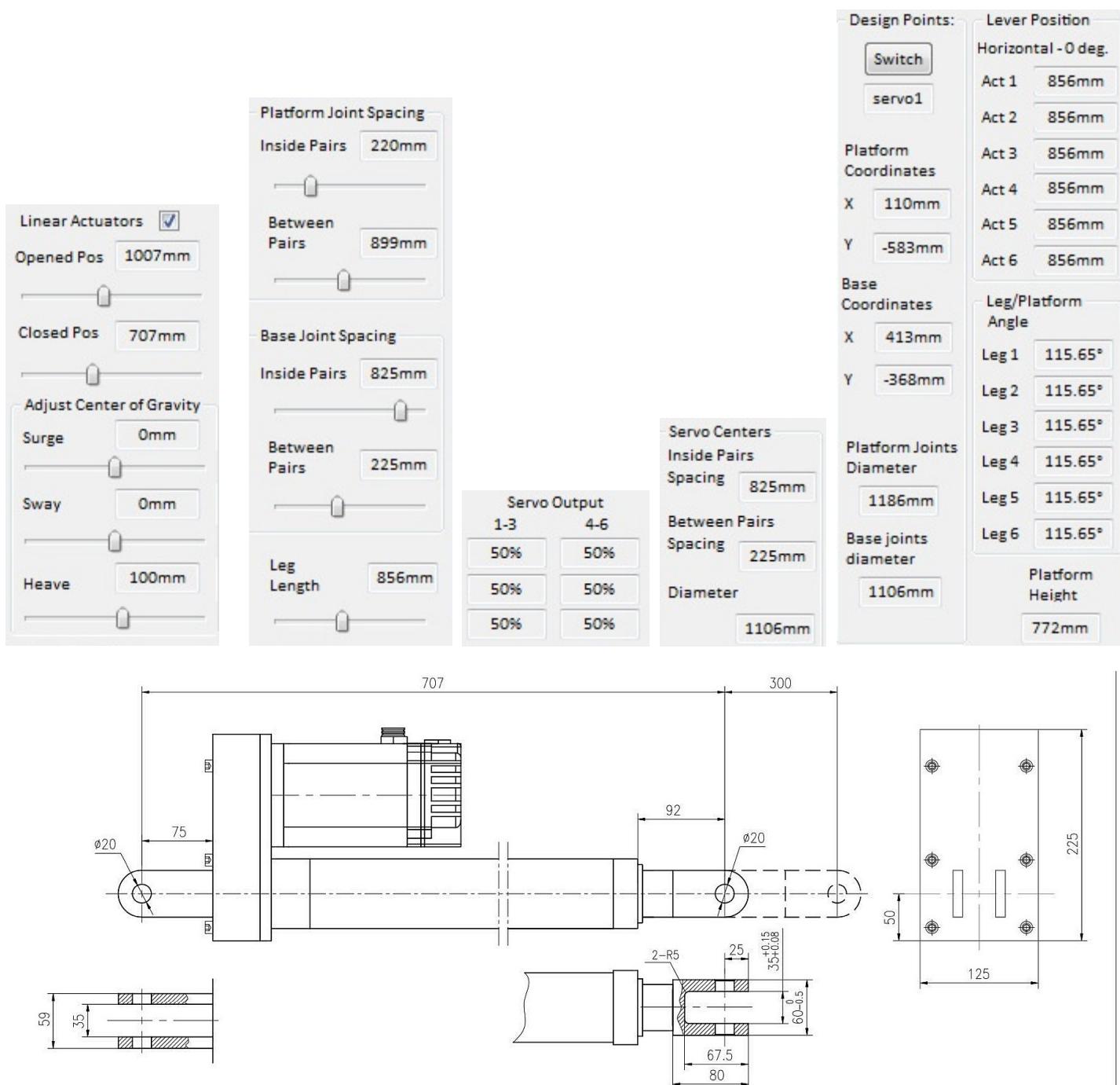


The six HS servo drives connect to the MBOX unit using RJ11 cables (CAN interface) as shown below:





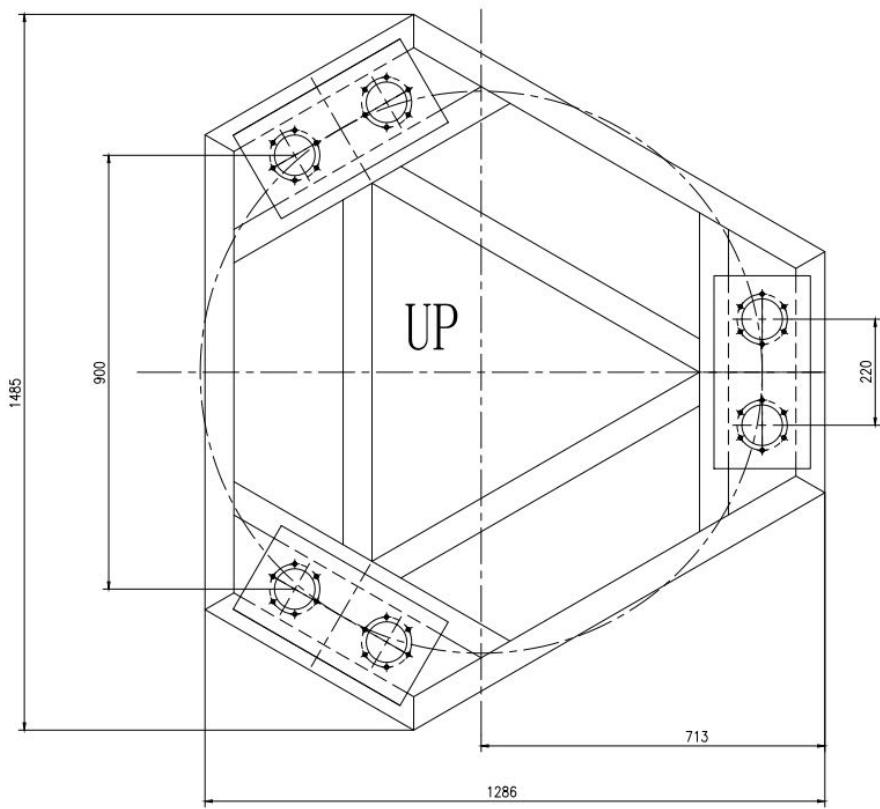
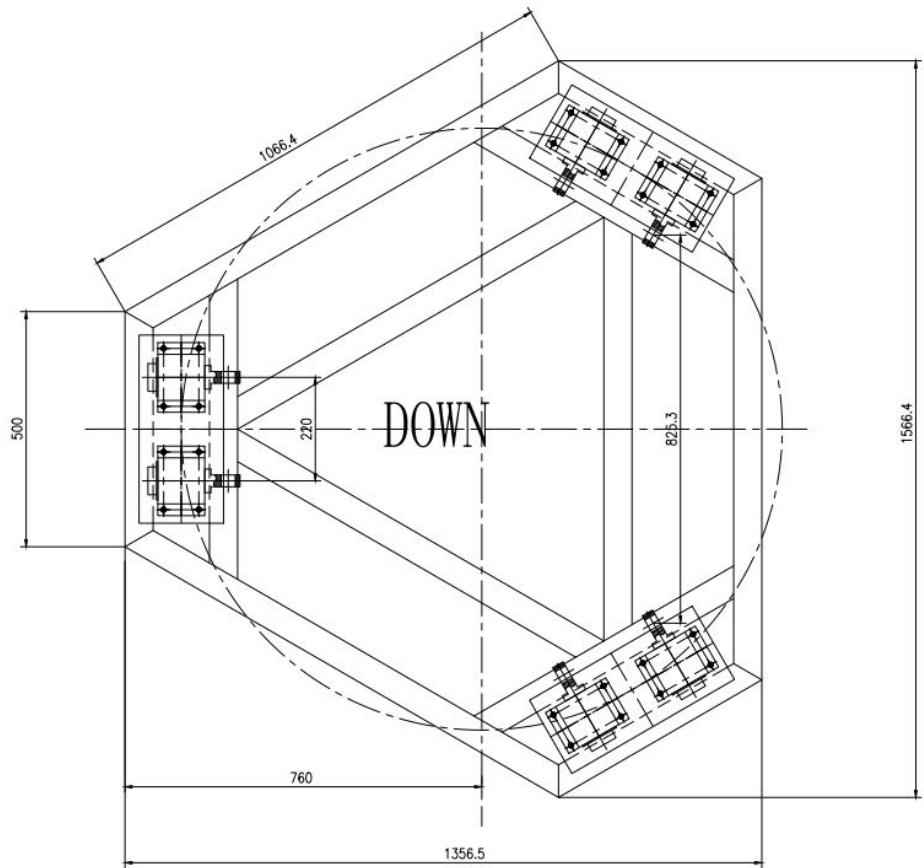
The dimensions of the platform will have to be entered in the HexPod driver to properly calculate the inverse kinematics positions of the top platform according to the motion cues. The dimensions can be taken from the drawings of the platform. Below is example for 300mm stroke actuators.



#### 参数说明:

- 行程: 300mm;
- 推力: 2500N;
- 速度: 250mm/s;
- 滚珠丝杠: 2510mm;
- 同步带速比1:1;
- 配110法兰750W伺服电机, 1500转, 5NM;

标记	处数	更改文件号	签字	日期	外形图	徐州普拓机械科技有限公司
设计			审核		图样标记	电动缸
					重量	比例



### hexPod 6-DOF Control Driver for SimTools v1.4

hexPod 3D Simulator

**Platform Position**

- Yaw: 0.00°
- Pitch: 0.00°
- Roll: 0.00°
- Sway: 0.00mm
- Surge: 0.00mm
- Heave: 0.00mm

**Limit Axis Intensities**

- Yaw: +/-40.6°
- Pitch: +/-15.5°
- Roll: +/-15.5°
- Sway: +/-200.0mm
- Surge: +/-200.0mm
- Heave: +/-150.0mm

**Linear Actuators**

- Opened Pos: 1007mm
- Closed Pos: 707mm
- Adjust Center of Gravity: 0mm
- Base Joint Spacing: 825mm
- Inside Pairs: 220mm
- Relative Lever Travel: 150°
- Servo Dimensions: 40mm
- Design Points: Switch
- Lever Position: Horizontal -0deg
- Act 1: 856mm
- servo1
- Act 2: 856mm
- Act 3: 856mm
- Act 4: 856mm
- Act 5: 856mm
- Act 6: 856mm
- Leg/Platform Angle: 43.3mm
- Base Coordinates: X: 110mm Y: -533mm Z: 413mm
- Leg/Platform Angle: Leg 1: 115.65° Leg 2: 115.65° Leg 3: 115.65° Leg 4: 115.65° Leg 5: 115.65° Leg 6: 115.65°
- Platform.Joints: Diameter: 1186mm
- Legs: Base Joints diameter: 1106mm
- Platform Height: 772mm

**Hardware**

- Link(s): OFF
- Hardware Auto-Start:

**SimTools**

- link(s): OFF
- Servo/Jim Configuration
- Servo Z angle: 0°
- Servo arm direction: Inward
- Test Sequence: 1
- Speed: 100mm
- Starting Position: Manual Optimize
- Heave Offset: 0.00mm
- Leg Length: 856mm
- Angle Limiter: 180°
- Servo Limit: 90°
- Surge Offset: 0.00mm
- Servo Arm Length: 0mm
- Servo Limit: lower  upper

**Buttons**

- Open 3D Simulator
- Reset 3D camera
- Run Single Core
- Run High Priority
- Return to drive position
- Loop Amount: 1
- Wait Time: 1000ms
- Heave Loop Test
- Start 6DOF Test

## Some additional information on the RJ45 ports on the AMC-MDBOX:

The AMC- MDBOX controller has total of 8 outputs that are arranged between three RJ45 output connectors as:

RJ45 Output1 – Axis 1,2,3,4: MDBOX 3-in-1 (3 actuators) or MDBOX 4-in1 (4 actuators)

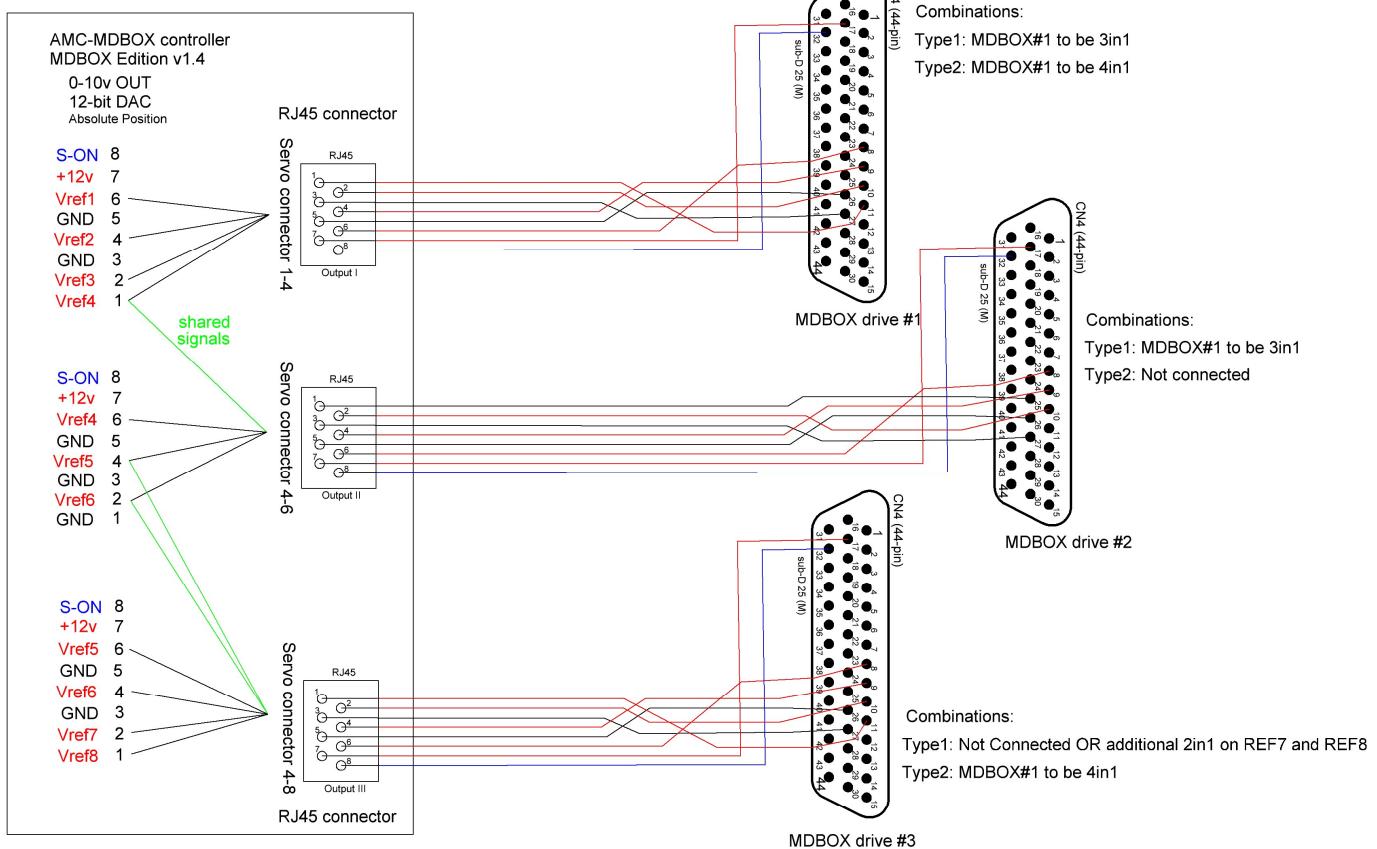
RJ45 Output2 – Axis 4,5,6: MDBOX 3-in-1 (3 actuators)

RJ45 Output3 – Axis 5,6,7,8: MDBOX 4-in1 (4 actuators)

Combinations of the above can be used as long axis outputs do not overlap.

The connections between the AMC- MDBOX controller and the MDBOX 4-in-1 or 3-in1- Servo drives as detailed in the following connection schematic:

AMC-MDBOX to 4-in-1 MDBOX Servo Drive



The controller cables that allow connection to the MDBOX come in two versions of the cable with only difference the 4-in-1 version has an additional signal for the extra axis in the on the connector. Combinations allow interfacing of up to two 4-in-1 MDBOX servo drives for total 8DOF.

The cables used are CAT7 SSTP patch cables with provided adapters from RJ45 to 44pin. Lengths is the CAT7 SSTP cables can be 6 feet or less to avoid signal quality loss.

Contact for inquiries or questions: [Tronicgr@gmail.com](mailto:Tronicgr@gmail.com)

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