

PhantomX Hexapod MK-III Metal Assembly Guide



This guide is for the newest version of the PhantomX Hexapod MK-III with Top Deck. Assembly for the previous model PhantomX Hexapod MK-II can be found here. If you have questions about upgrading your Hexapod with the new metal brackets, please contact us.

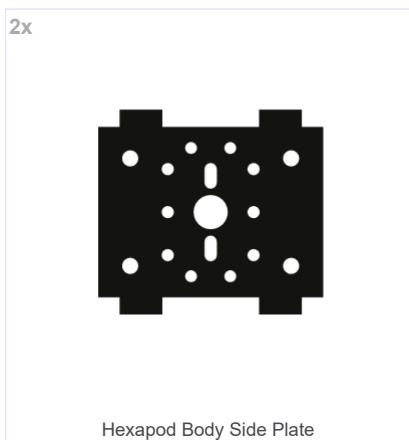
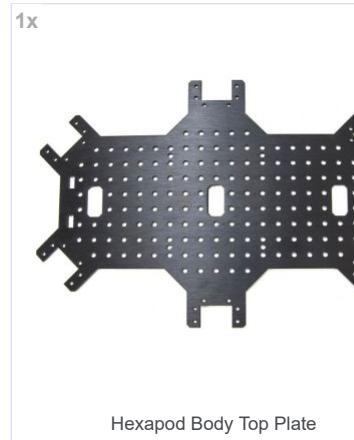
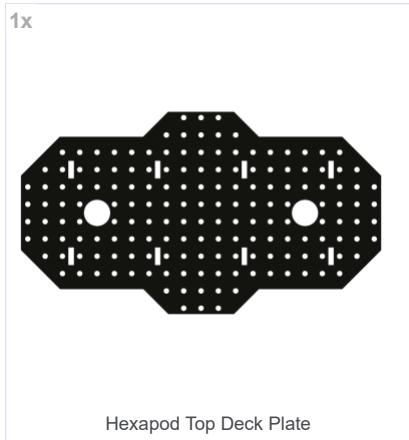
Before you use or charge this battery you must read the LiPo Battery Guide and Lithium Battery Safety Instructions and Warnings document.

1. Do not charge or use batteries if the battery ...
 - A. is punctured or damaged
 - B. is bloated, expanded, swelling or otherwise deformed
 - C. has any cell with a voltage of 3.3v. This means less than 9.9v for a 3-cell/11.1v battery.
2. Do not charge batteries unattended. Monitor batteries during charging for popping, hissing, smoke, sparks or fire. Also monitor the battery for any swelling or other deformities. Disconnect the battery from your charger immediately.
3. Do not charge batteries near flammable material. Charge batteries in a fireproof container. Do not charge batteries while they are in your robot.

Tools Needed

- 1.5 mm Hex Driver (Included)
- 2.5 mm Hex Driver (Included)
- Needle-Nose pliers for attaching power switch
- Small Flat Head Screw Driver
- Small Philips Head Screw Driver (For popping in nuts)

Kit Parts List



2x



XBee Radio

1x



11.1v 4500mAh LiPo Battery

1x



LiPo Battery Harness

1x



6 Port AX/MX Power Hub

1x



Thread Locker

1x



3-Pin DYNAMIXEL Cable - 65mm

6x



3-Pin DYNAMIXEL Cable - 100mm

8x

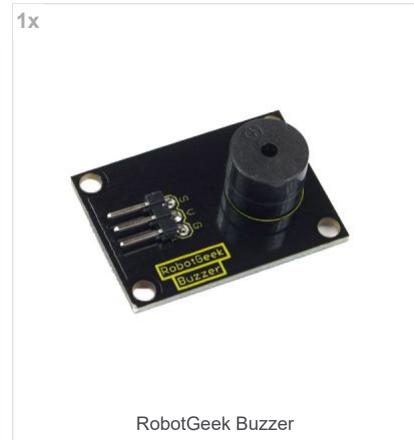


3-Pin DYNAMIXEL Cable - 150mm

4x



3-Pin DYNAMIXEL Cable - 200mm



The following hardware is required to build the kit. You may have received extra parts with your kit.

192x		80x		28x		4x		42x		168x	
	Hex Socket Head Bolt M2 x 6		Hex Socket Head Bolt M2 x 8		Hex Socket Head Bolt M3 x 6		Hex Socket Head Bolt M3 x 8		Hex Socket Head Bolt M3 x 10		Steel Nut M2
12x		18x		10x		10x		6x		18x	
	Steel Nut M3		AX Hub Assembly		Hex Standoff F/F M3 x 10		Hex Standoff F/F M3 x 30		Rubber Toe		Nylon Washer M3
2x		4x		2x							
	L-Bracket M3		Spacer M3 x 3		Double Sided Velcro Strips						

The following hardware is not used for the following build, but is included in your kit and included here as reference.

Your ArbotiX Commander does not come assembled. If you want to, at this point you can follow the ArbotiX Commander Assembly Guide to build your controller in advance.





USB A Male to Mini B Cable



Power Supply 12V - 5A (2.1mm Jack)



Imax B6 Multi-Function LiPo Balance Ch



1-8S LiPo Battery Voltage Tester/Monitor



2.1/5.5mm Jack to 2.5/5.5mm Plug Adapter

Build Steps

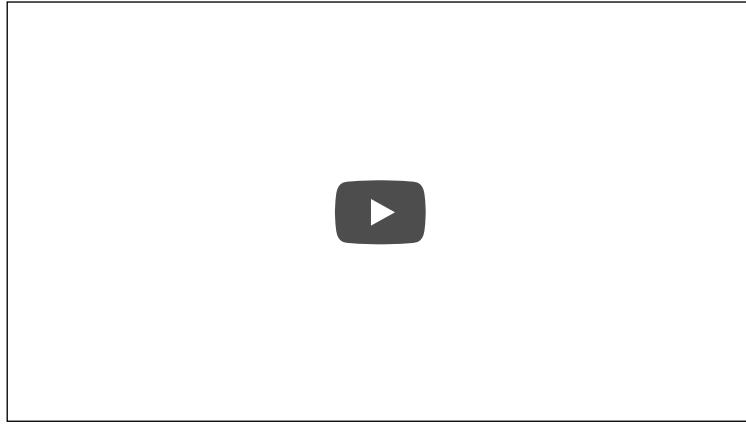
Pre Step: Peel Your Plastic

Some of your plastic pieces will have paper masking on one or both sides. Peel the masking paper off before getting started.

There also may be some dust on your parts. This is from the laser cutting manufacturing process. It is harmless and can be cleaned up by wiping with a rag or being washed with water.



Pre Step: Turbo Lock



Pre Step: Nuts for AX-12A

ASSEMBLY TIPS: Seating the Nuts into the Nut Sockets

Pro Tip #9612

A video player placeholder for a tip on seating nuts into nut sockets.

Pre Step: Servo Centering

AX-12/AX-18 DYNAMIXEL Servos can move up to 300°. When the servo is directly in the middle of this 300° range, it is considered to be 'centered'. You will be able to tell that the servo is centered when the single notch on the servo casing matches up with the single notch on the servo horn.

The instructions in this guide assume that all of your servos are 'centered'. If the servos are not centered when attached to the brackets as shown in this guide, your robot will not work correctly.

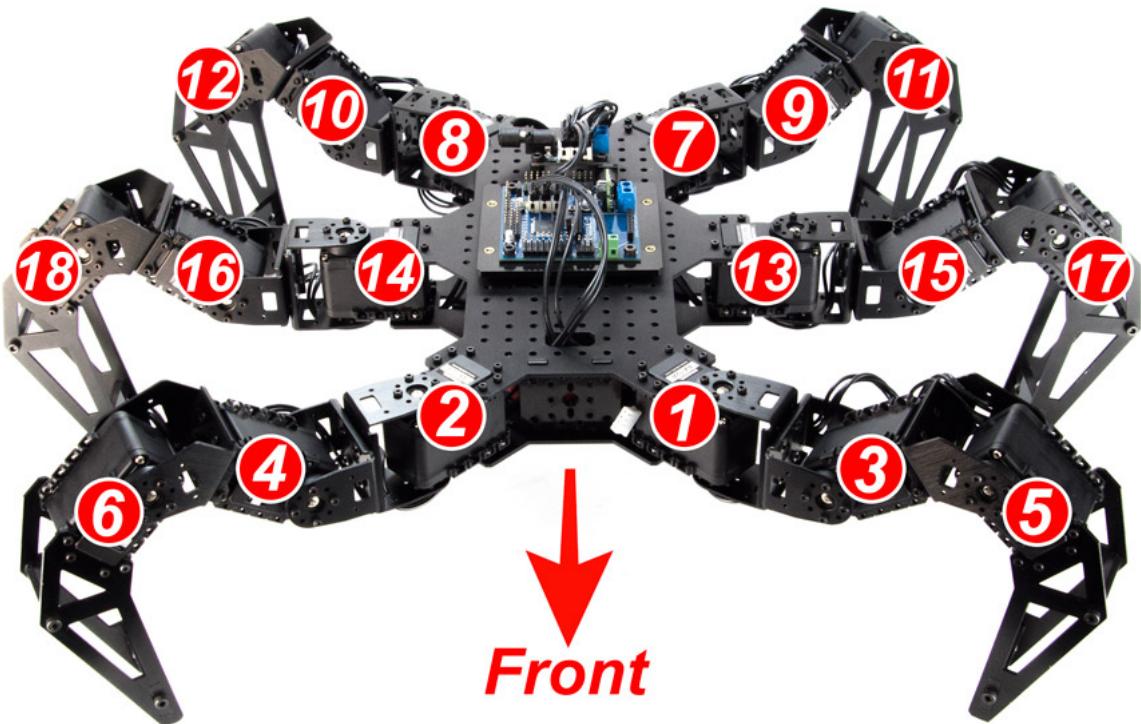
If your servo horn is not centered, you can move it by hand or use the [DynaManager](#) to center the servo.



Getting Started

Servo Orientation and Layout

In the [last step](#) you set the IDs of your 18 servos and labeled each one. It is important during assembly to pay close attention to assembling the correct servos into their correct places. I recommend IDing your servos in advance, and laying out your servos as shown below, pulling from them as you assemble parts and then putting them back in place.

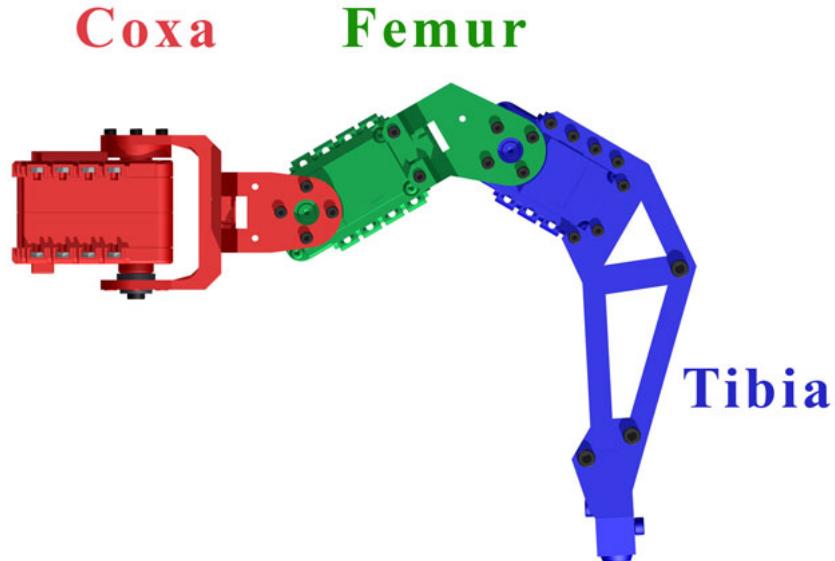


Plastic Plate Orientation

The matte side of the plastic components will always face outward, while the shiny side of the plastic will face inward.

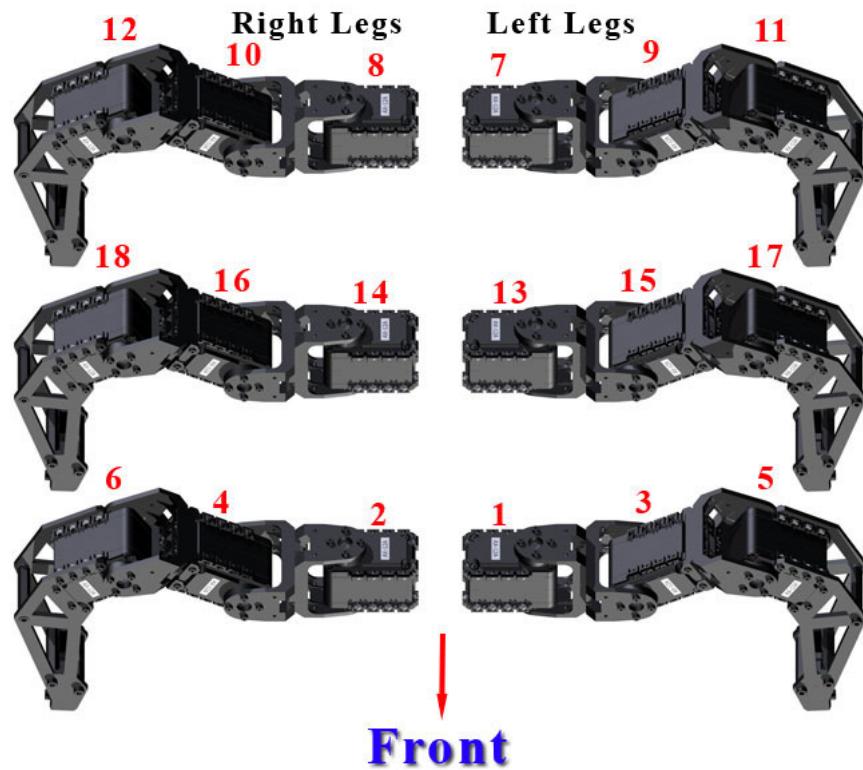
Leg Terminology

We refer to three main sections of the legs; **Coxa**, **Femur**, **Tibia**. The diagram below identifies these parts.



Leg Orientation

It is **VERY** important to pay attention to orientation as you build. To begin, you will be building two sets of mirrored legs. **Servo horns will always face forwards, or upwards, depending on which side of the robot they are mounted on.** Odd-numbered servo IDs are used on the left side of the robot, even-numbered servo IDs are used on the right side of the robot. The diagram below shows how the assembled legs will fit together.



Step 1: Assemble the Tibia X 6



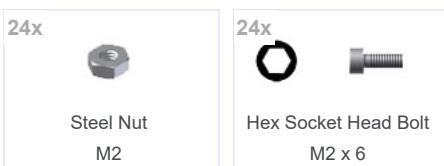
1. Take the rubber toe caps and cut off the excess material. You should be left with about a 2 centimeter cap.
2. Slide the rubber toe caps over the center post of each of the feet.
3. Slide M3 Nuts into the slots in the sides of each foot, as shown.
4. Place the two foot pegs into the [Tibia](#) slots on a [Tibia](#) Frame. Fasten the Foot to the [Tibia](#) through the hole in the [Tibia](#) using 1x M3*10 Bolt.
5. Attach a 30mm Standoff with 3x washers between the inside of the [Tibia](#) and the Standoff using 1x M3*10 Bolt.
6. Slot a second [Tibia](#) bracket on top of the current assembly as shown, and attach it using 2x M3*10 Bolts
7. Repeat until you have a total of 6 [Tibia](#) Bracket Assemblies.

Step 2: Assemble the Femur Bracket 6 X



1. Run 4x M2*6 Bolts through the F1 Bracket threading into the F3 Bracket for all 6 Femur Bracket Assemblies.

Step 3: Assemble the Coxa Bracket 6 X





1. Run 4x M2*6 Bolts through the F2 Bracket threading into 4x M2 Nuts on the opposing side of the other F2 bracket, as shown. If you have trouble holding the nut in place, use nut while you thread from the other side. Do this for all 6 Coxa Bracket Assemblies.

Step 4: Prep your Servos with Nuts

144x	
	Steel Nut M2





1. Insert 8 M2 Nuts each into the **Tibia** Servos where shown. (Servo ID #: 5, 6, 11, 12, 17, 18)
2. Insert 4 M2 Nuts each into the **Femur** Servos where shown. (Servo ID #: 3, 4, 9, 10, 15, 16)
3. Insert 12 M2 Nuts each into the **Coxa** Servos where shown. (Servo ID #: 1, 2, 7, 8, 13, 14)

Step 5: Build the Top Plate

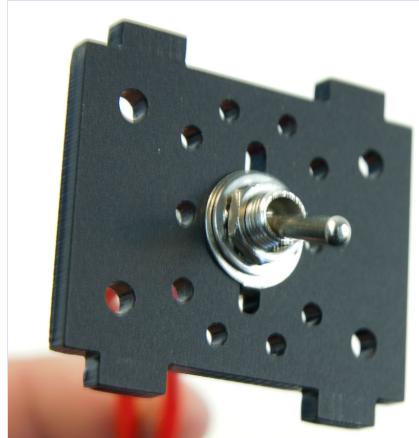
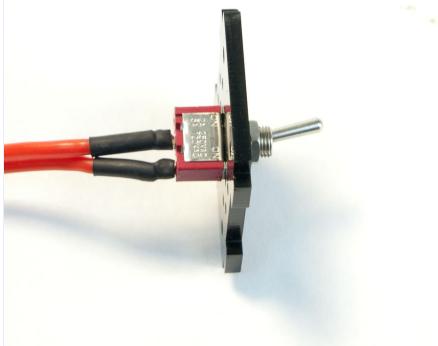




1. Attach **Coxa** Servos ID # **1**, **2**, **7**, **8**, **13**, and **14** to the bottom of the Top Plate, horn side up, using 6x M2*8 Bolts each.
2. Attach the ArbotiX-M Board to the ArbotiX Mount using 4x M3*6 Bolts
3. Attach the ArbotiX Mount to the top of the Top Plate using 4x M3*8 Bolts. Sandwich 4x M3 Spacers between the Mount and the Top Plate as shown.
4. Attach 4x 10mm Standoffs to the bottom of the Power Hub using 4x M3*6 Bolts.
5. Attach the Power Hub to the top of the Top Plate using 4x M3*6 Bolts.

Step 6: Mounting the Power Switch

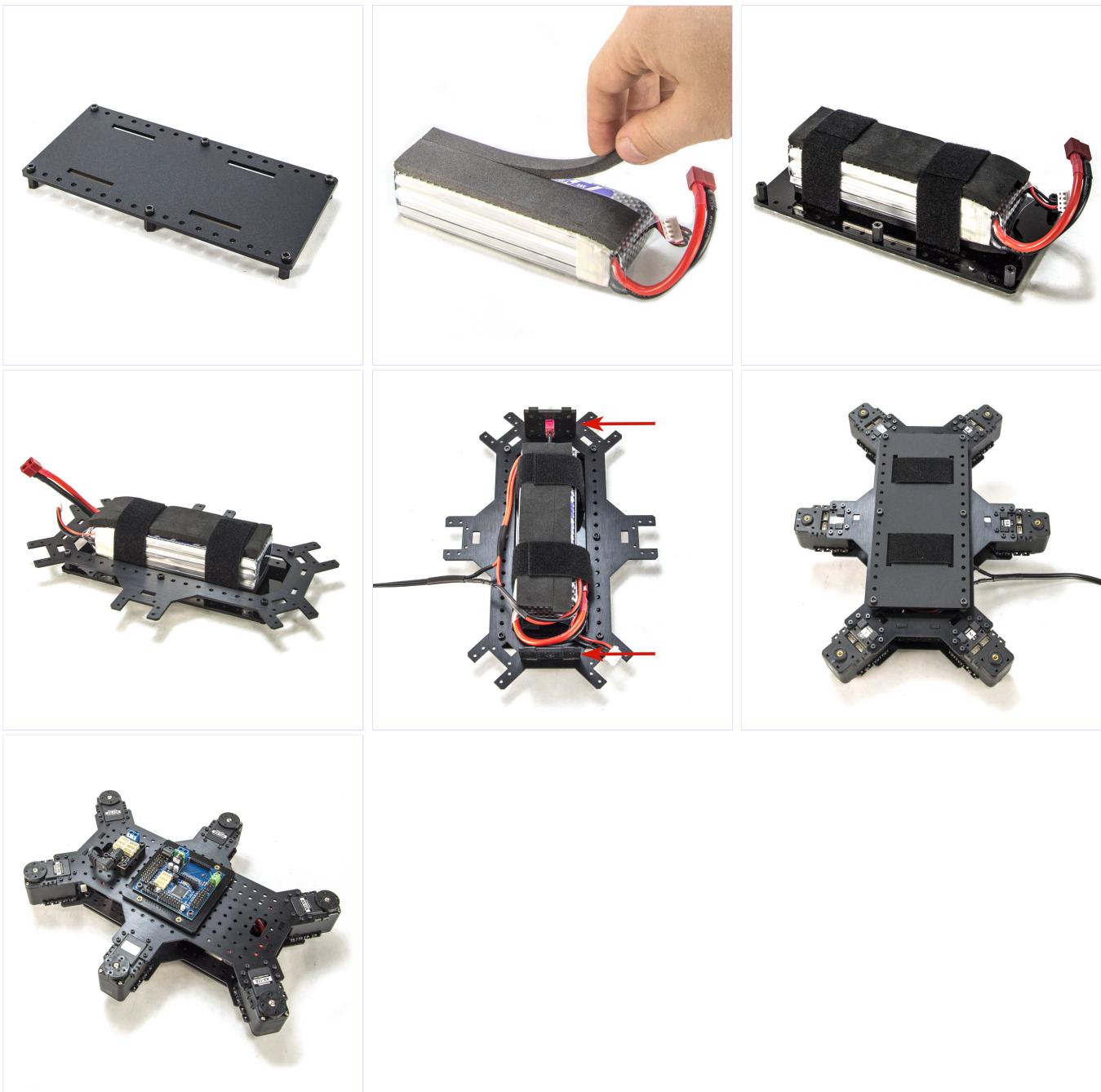


**Power Off****Power On**

1. Unscrew the nut and washers from the Lipo Mounting Harness
2. Fit the switch through the hole through the **Hexapod Body Side Plate**.
3. The locking washer will fit into a groove in the switch. The lock tab on the washer will fit into the slot on the Side Plate.
4. When you install the Side Plate/power switch we recommend that you the power switch is toggled up when the power is on and toggled down when the power is off.

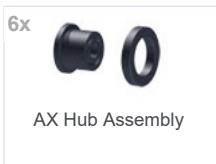
Step 7: Build the Bottom Plate





1. Attach 6x 10mm Standoffs to the Battery Plate using 6x M3*6 Bolts.
2. Apply foam strips to top and bottom of the battery. To cover the entire body for maximum stability, you can slice one of the foam strips in half lengthwise to apply next to a full : the image.
3. Using 2 strips of velcro, strap the battery to the standoffs side of the battery plate.
4. Attach the Battery Plate to the Bottom Plate using 6x M3*6 Bolts
5. Place the end plates in the slots at the front and back of the hexapod. We recommend plate that you prepped with the switch on the opposite end of the battery leads. This he wires tidy.
6. Attach the Bottom Plate to the Top Plate, lining up the end plates in the slots, and placing the Switch on the end nearest to the Power Hub, using 36x M2*6 Bolts through the E the bottom of the Servos.
7. Feed the Barrel Plug from the Switch's Wiring Harness to the Power Hub through the hole in the Top Plate, as shown.

Step 8: Assemble Right Legs X 3

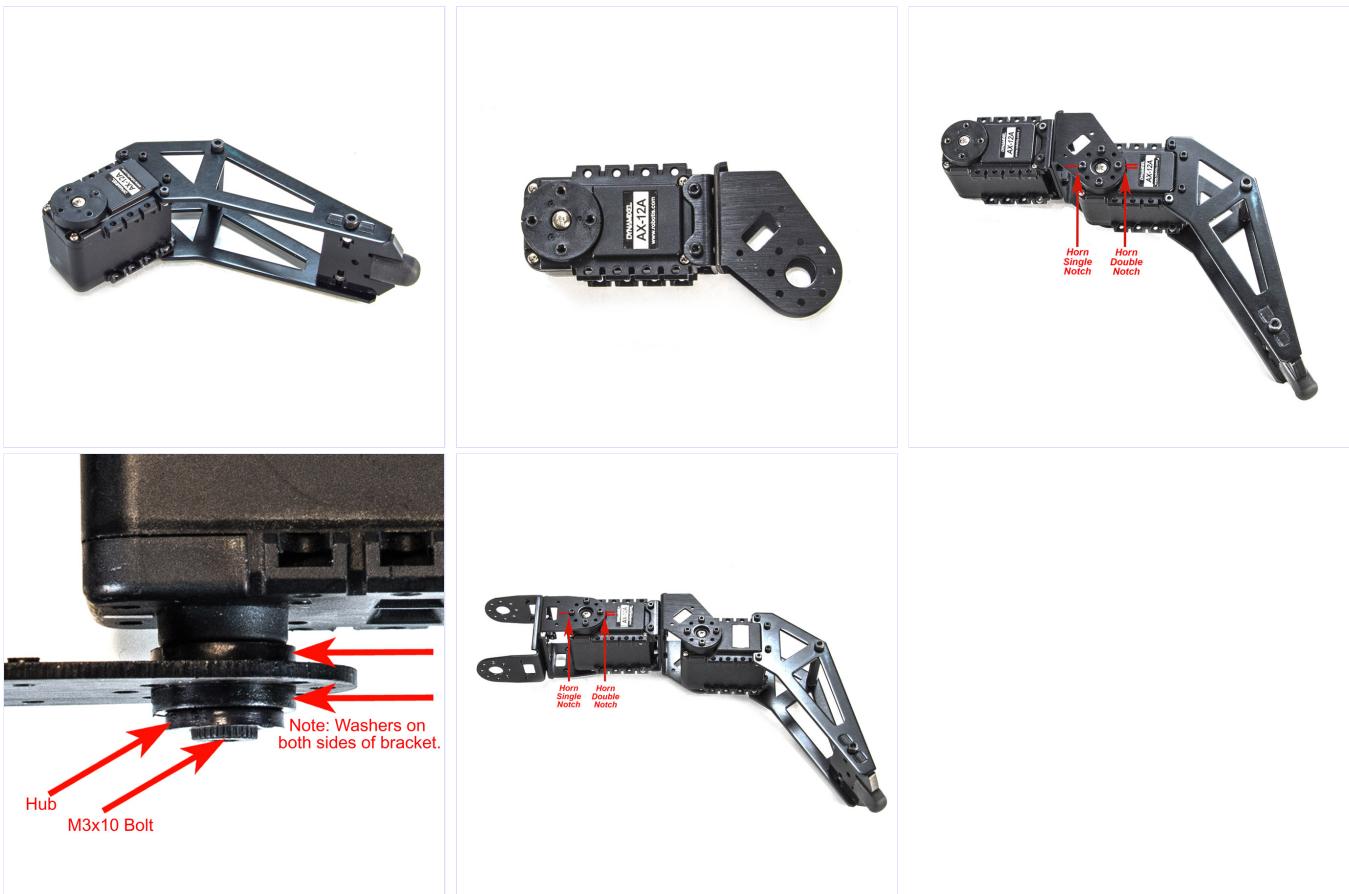




1. Attach the **Tibia** Bracket as shown, using 8x M2*6 Bolts, to Servos ID# **6**, **12**, and **18**
2. Attach the **Femur** Bracket as shown, using 4x M2*6 Bolts, to Servos ID# **4**, **10**, and **16**
3. Attach the **Tibia** Servos to the F2 Bracket on the **Femur**, pairing Servos ID# **6 & 4**, **12 & 10**, **18 & 16**, minding the Servo Alignment. This is done by attaching the **Tibia** S **Femur**'s F2 Bracket using 4x M2*6 Bolts, and the back of the Servo using the AX Hub with a washer on either side of the bracket, held in with 1x M3*10 Bolt. Mind the note fo positions.
4. Attach the **Femur** Servo to the **Coxa** Bracket as shown, attaching the **Femur** Servo Horn to the **Coxa** Bracket using 4x M2*6 Bolts, and the back of the Servo using the AX Hu on either side of the bracket, held in with 1x M3*10 Bolt. Mind the servo alignment, and make sure the horn is centered and that the servo is attached as shown in the picture.

Step 9: Assemble Left Legs X 3

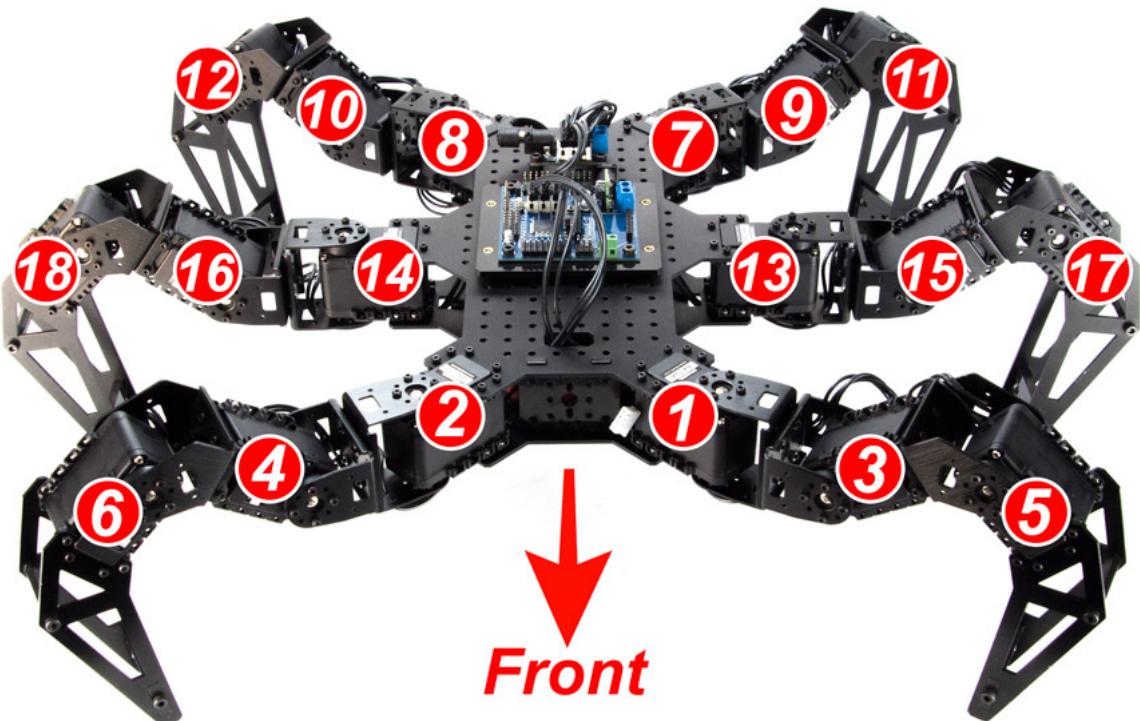




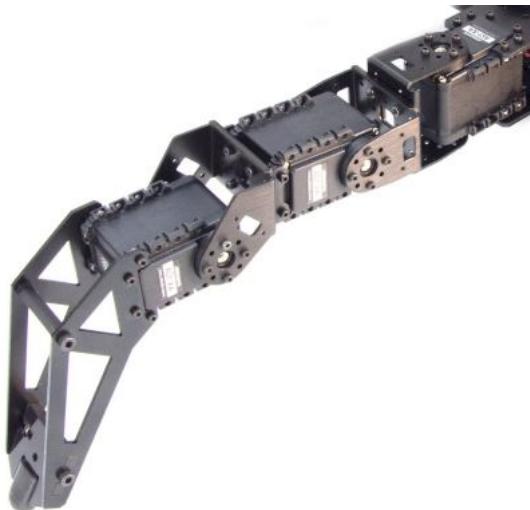
1. Attach the **Tibia** Bracket as shown, using 8x M2*6 Bolts, to Servos ID# 5, 11, and 17.
2. Attach the **Femur** Bracket as shown, using 4x M2*6 Bolts, to Servos ID# 3, 9, and 15.
3. Attach the **Tibia** Servos to the F2 Bracket on the **Femur**, pairing Servos ID# 5 & 3, 11 & 9, 17 & 15, minding the Servo Alignment. This is done by attaching the **Tibia** Servo's F2 Bracket using 4x M2*6 Bolts, and the back of the Servo using the AX Hub with a washer on either side of the bracket, held in with 1x M3*10 Bolt. Mind the note for positions.
4. Attach the **Femur** Servo to the **Coxa** Bracket as shown, attaching the **Femur** Servo Horn to the **Coxa** Bracket using 4x M2*6 Bolts, and the back of the Servo using the AX Hub on either side of the bracket, held in with 1x M3*10 Bolt. Mind the servo alignment, and make sure the horn is centered and that the servo is attached as shown in the picture.

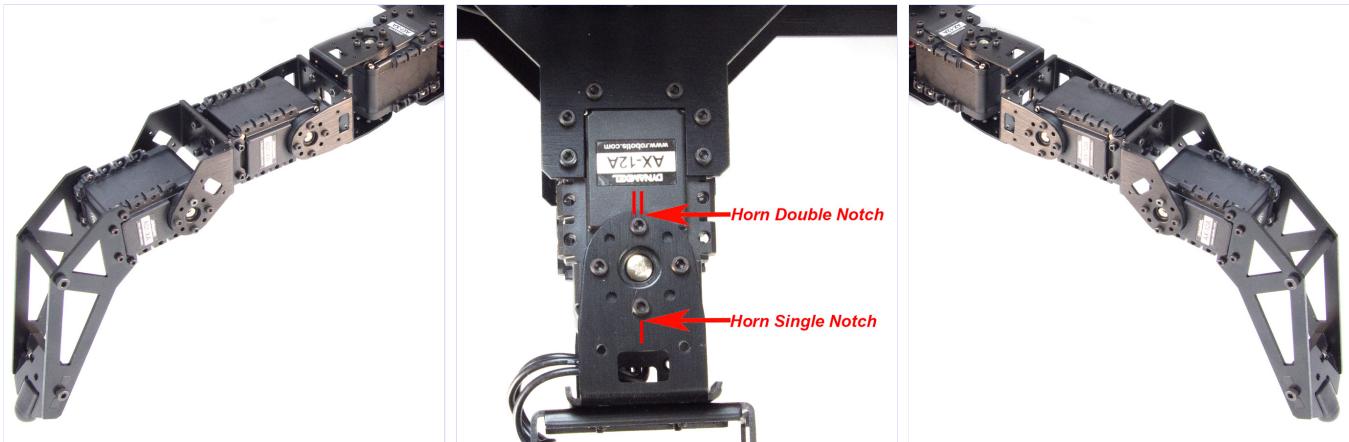
Mind your Servo Orientation and Layout

It is important in the next step to pay close attention to assembling the correct servos into their correct places. Please review the Servo orientation and layout, and make sure everything is correct.



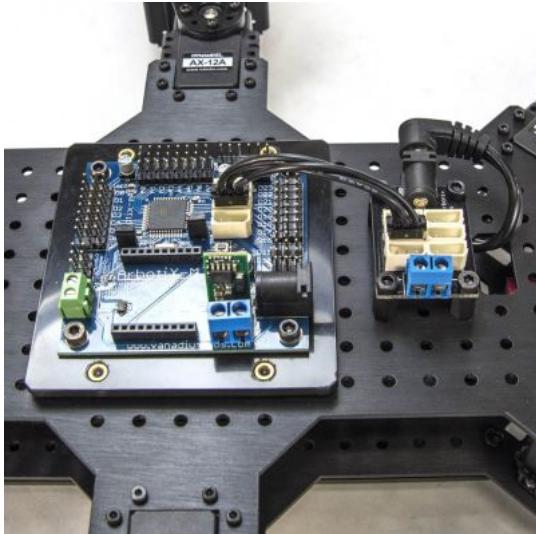
Step 10: Attach the Legs x6

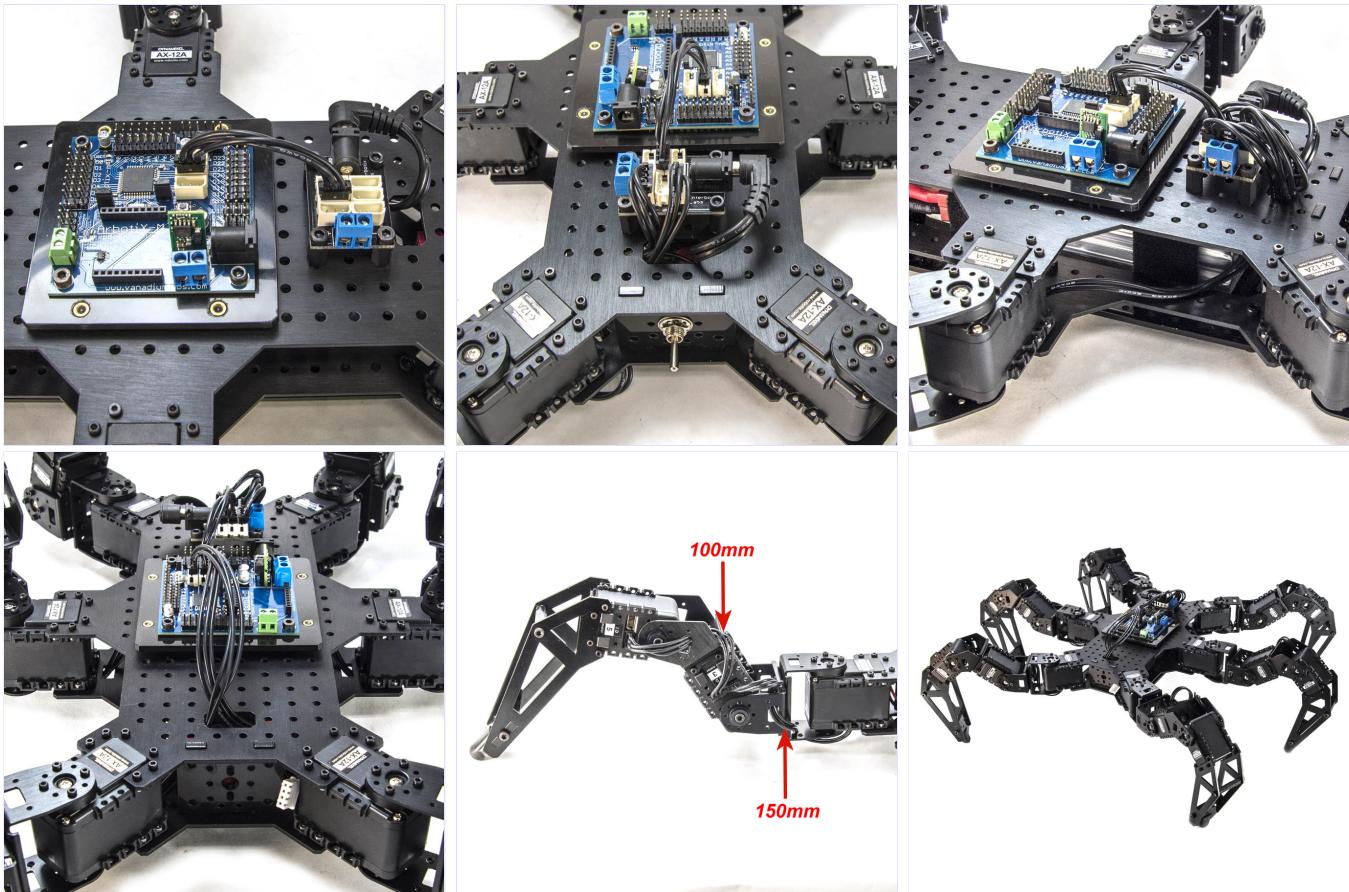




1. Mind that all of your servos are facing forward, Even numbered servos on the Right, Odd numbered servos on the Left, and that you are attaching the correct leg to the correct side.
Refer to the servo orientation and layout image above as you build, making sure each leg is in its proper place.
2. Attach each leg's **Coxa** Bracket to the **Coxa** Servo Horn using 4x M2*6 Bolts, and the back of the Servo using the AX Hub with a washer on either side of the bracket, held in by one Bolt.

Step 11: Wiring

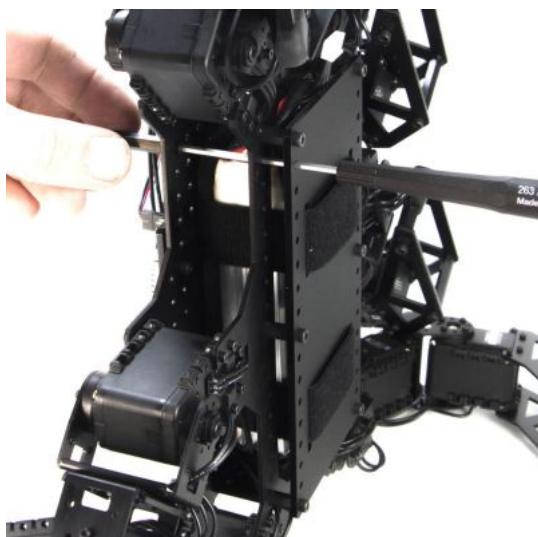


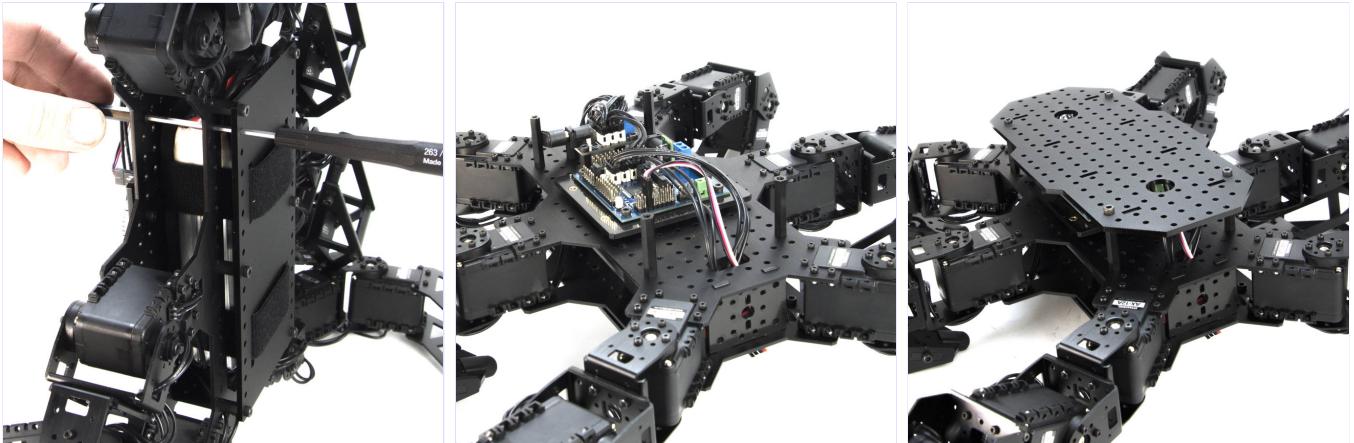


1. Connect the AX Power Hub to the ArbotiX-M using a 65mm Dynamixel Cable.
2. Connect the back legs (Servos ID# **7** & **8**) to the AX Power Hub using 2x 150mm Dynamixel Cables, running through the holes in the top and bottom plates.
3. Connect the center legs (Servos ID# **13** & **14**) to the AX Power Hub using 2x 200mm Dynamixel Cables, running through the holes in the top and bottom plates.
4. Connect the front legs (Servos ID# **1** & **2**) to the ArbotiX-M using 2x 200mm Dynamixel Cables, running through the holes in the top and bottom plates.
5. Wire all 6 legs, using a 150mm Dynamixel Cable from the **Coxa** to the **Femur** Servo, and a 100mm Dynamixel Cable from the **Femur** to the **Tibia** Servo.
6. Take a good hard look at that boss as heck robot you just built.

Optional Step 12: Upper Deck

4x	Hex Standoff F/F M3 x 30
8x	Hex Socket Head Bolt M2 x 8

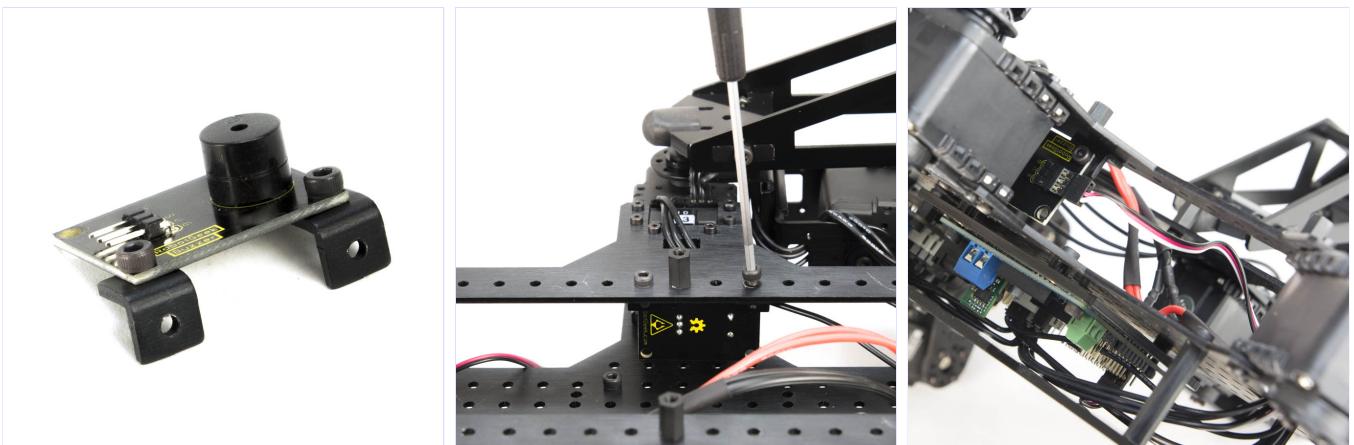




1. Place an M3*8 Bolt through the bottom of the Metal Top Plate. Hold in place with your 2.5mm Driver by sliding your driver through the holes that align with the bolt through the and the Bottom Plate. Screw on your Standoffs. We use 30mm Standoffs here, which is the shortest recommended standoff for this process if you have the ArbotiX-M Mount Top Plate.
2. Repeat 4x.
3. Place your Acrylic Top Plate on top of the standoffs and attach using 4x M3*8 Bolts.

Optional Step 13: Attach Buzzer

2x	L-Bracket M3	4x	Hex Socket Head Bolt M3 x 6
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1. Attach two L-Brackets to one side of the Buzzer using 2x M3*6 Bolts.
2. Remove the battery plate for easier access. Attach the L-Brackets to the top of the Bottom Plate using 2x M3*6 Bolts.
3. Attach your Sensor cable to the Buzzer. Run through the Top Plate to Pin D7 on the ArbotiX-M.

You are all finished! Continue on to the [PhantomX Hexapod Build Check](#) to test your robot.

Search ...

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