

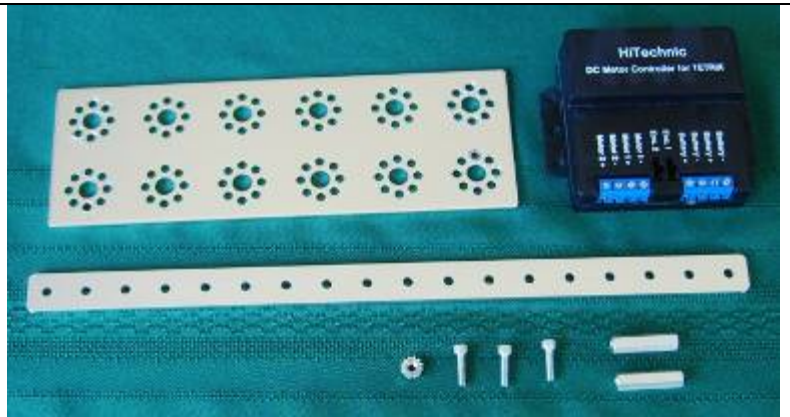
# ORTOP Modular Robot v2.1

## Control Module Assembly

### Motor Controller Assembly

**Parts Needed:**

- 1 – Flat Building Plate
- 1 – DC Motor Controller
- 1 – 288mm Flat Bar
- 2 – 1" Stand-Off Posts
- 3 – Socket head cap screw, 1/2"
- 1 – 6-32 Nut



### Assembly

A photograph showing the white flat building plate being placed on top of the long white flat bar. The holes in the plate are aligned with the holes in the bar.	<ol style="list-style-type: none"> <li>1. Stack the plate on top of the flat bar so that the holes line up as shown.</li> </ol>
A photograph showing the black HiTechnic DC Motor Controller being placed on top of the white flat building plate. The rear mounting holes of the controller are aligned with the holes in the plate.	<ol style="list-style-type: none"> <li>2. Place the DC Motor Controller so that the rear mounting holes line up with the plate and bar as shown.</li> </ol>
A photograph showing the final assembly. The black HiTechnic DC Motor Controller is secured to the white flat building plate and the long white flat bar. Three 1/2" socket head cap screws are visible, passing through the plate and bar. Two 1" stand-off posts are also visible, supporting the controller from underneath.	<ol style="list-style-type: none"> <li>3. Attach the controller to the plate using the cap screws from underneath and the stand-offs as nuts. Make sure the screws go through both the plate and the flat bar.</li> </ol>



4. Attach the remaining cap screw and nut as shown.

### Completed Motor Controller Assembly



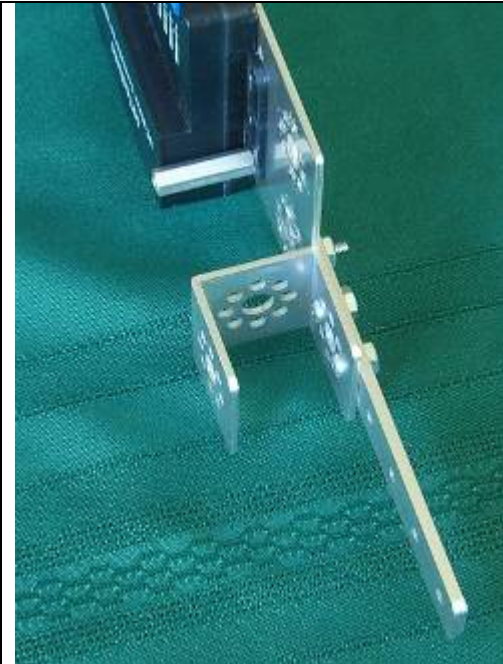
### Switch Bracket Attachment

**Parts Needed:**

- 1 – Motor Controller Assembly
- 1 – 32mm Channel
- 2 – 3/8" Button Head Screws
- 2 – Nuts



## Assembly

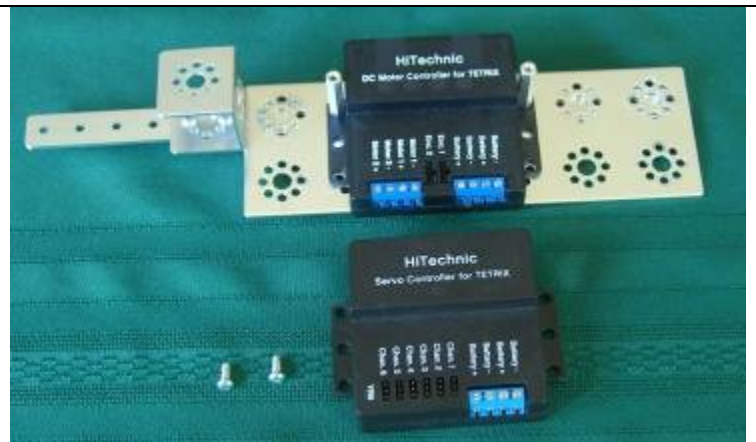


1. Attach the 32mm channel to the motor control assembly using the button head screws as shown.

## Controller Assembly

### Parts Needed:

- 1 – Motor Controller Assembly
- 1 – Servo Controller
- 2 – Button Head Screws



## Assembly



2. Stack the servo controller on top of the motor controller so that the center holes line up on top of the hex standoffs as shown.
3. Attach the servo controller using the button head screws.

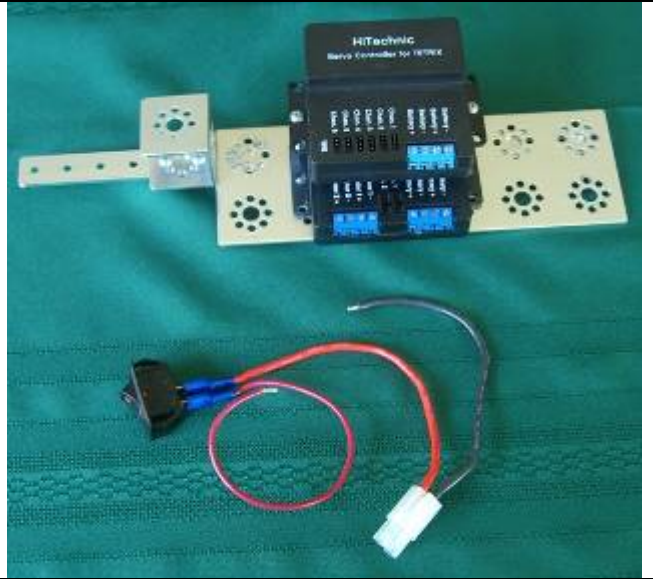
## Completed Controller Assembly



# Power Switch Attachment

**Parts Needed:**

- 1 – Controller Assembly
- 1 – On/Off Switch



## Assembly

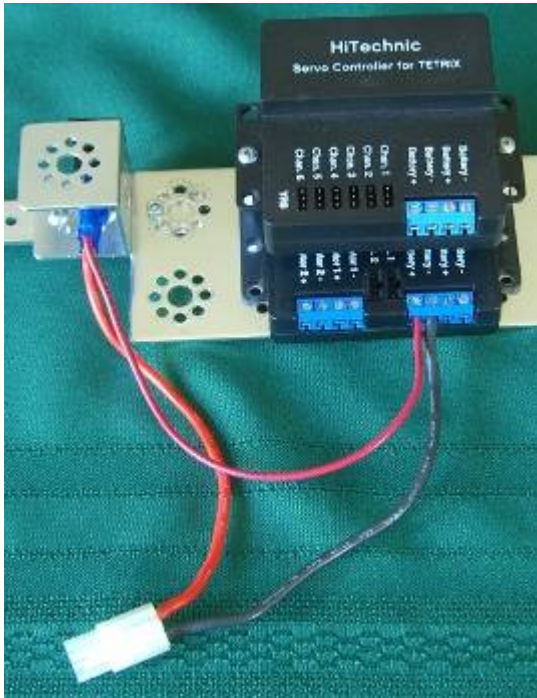


1. Slide the power switch into the 32mm channel as shown.



2. Connect the red wire to the positive + battery terminal of the motor controller (the controller on the bottom).
3. Connect the black wire to the negative battery terminal of the motor controller.
4. Tighten the set-screws with the small flat blade screwdriver. Make sure the wires are tightly connected.

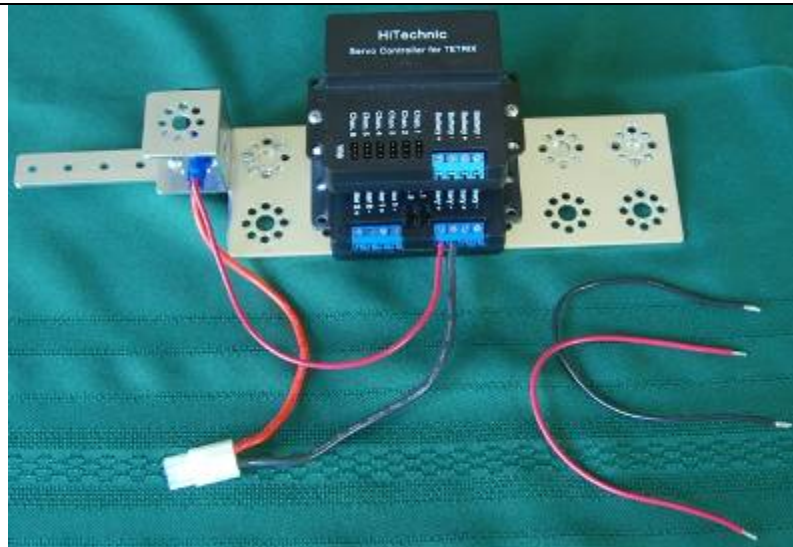
## Completed On/Off Switch Attachment



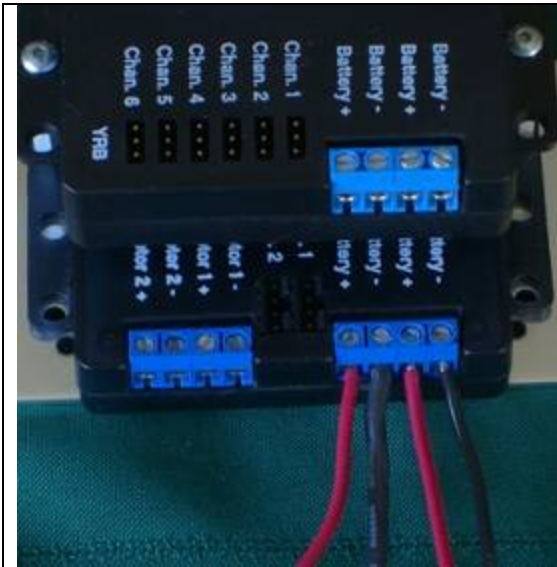
## Power Wiring Attachment

### Parts Needed:

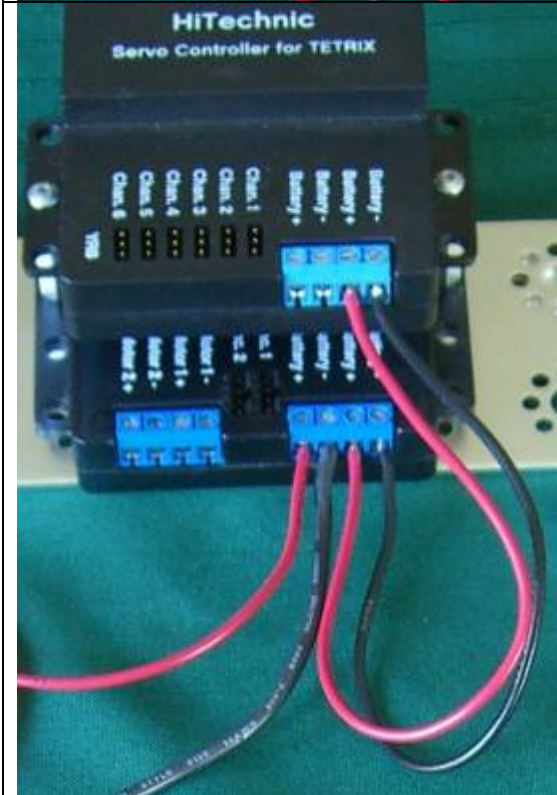
- 1 – Controller Assembly
- 1 – Black power wire
- 1 – Red power wire



## Assembly



1. Attach one end of the red and black wires to the second set of battery terminals on the motor controller.
2. Make sure that the red wire is attached to the positive + terminal and the black wire is attached to the negative - terminal.
3. Tighten the set screws.

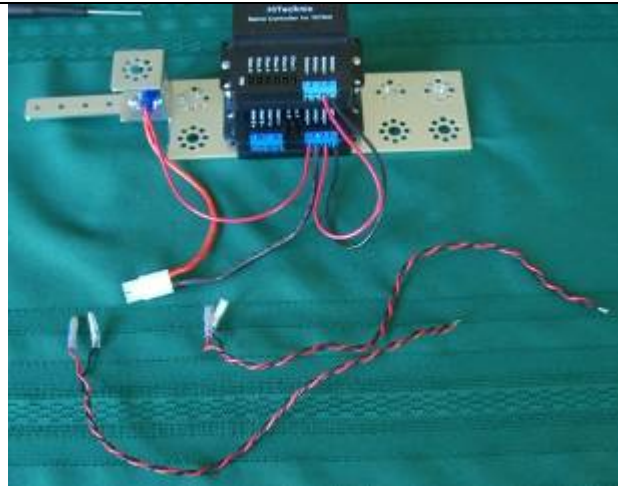


4. Attach the other end of each wire to the battery terminals of the servo controller as shown.
5. Ensure that the red wire is going to the positive + terminal and the black wire is going to the negative - terminal.
6. Tighten the set screws.

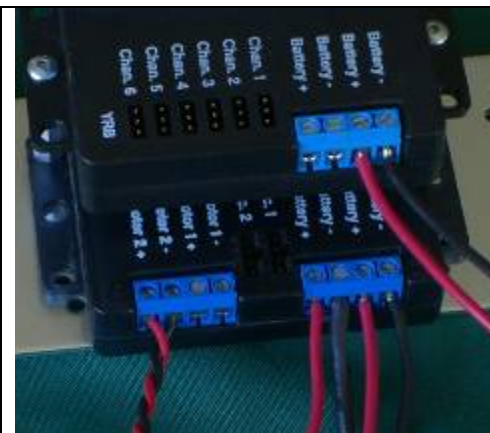
## Motor Wire Attachment

### Parts Needed:

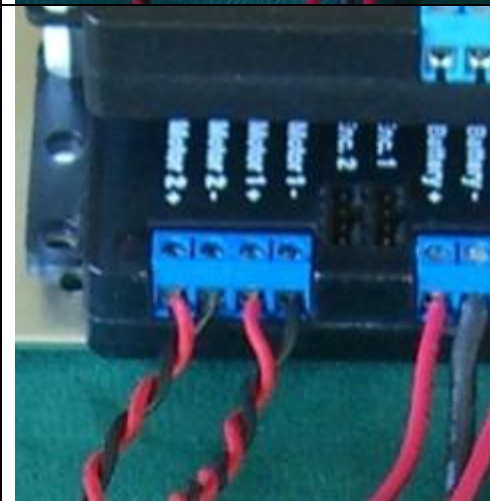
- 1 – Controller Assembly
- 2 – Motor wire pairs



### Assembly



1. Attach the bare wire ends of one motor wire pair to the Motor 2 terminals of the motor controller.
2. Make sure that the red wire is attached to the positive + terminal and the black wire is attached to the negative - terminal.
3. Tighten the set screws.

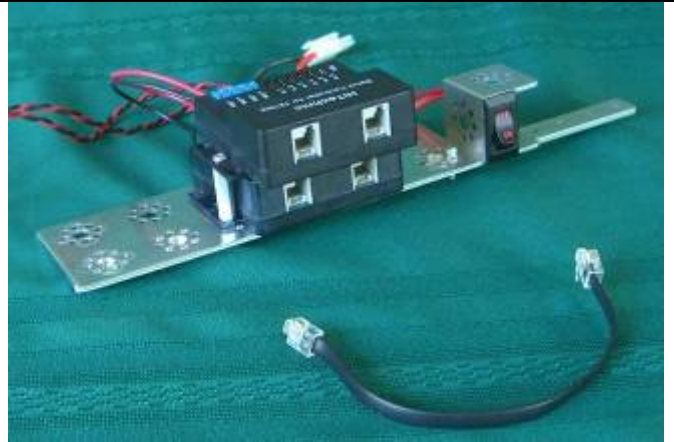


4. Attach the second motor wire pair to the Motor 1 terminals of the motor controller.
5. Tighten the set screws.

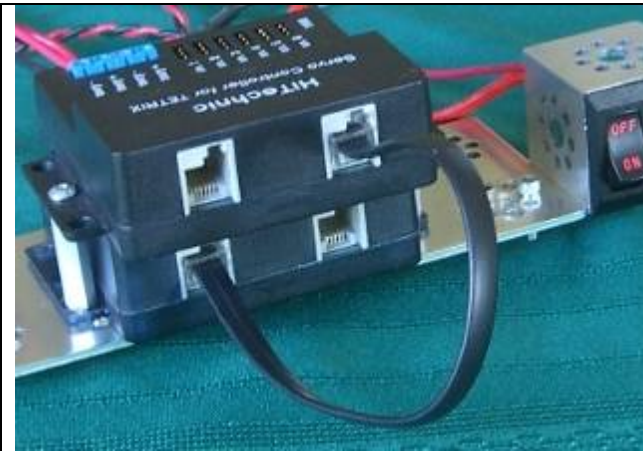
## Controller Wiring Attachment

### Parts Needed:

- 1 – Controller Assembly
- 1 – 0.2 M NXT Connector Cable



### Assembly

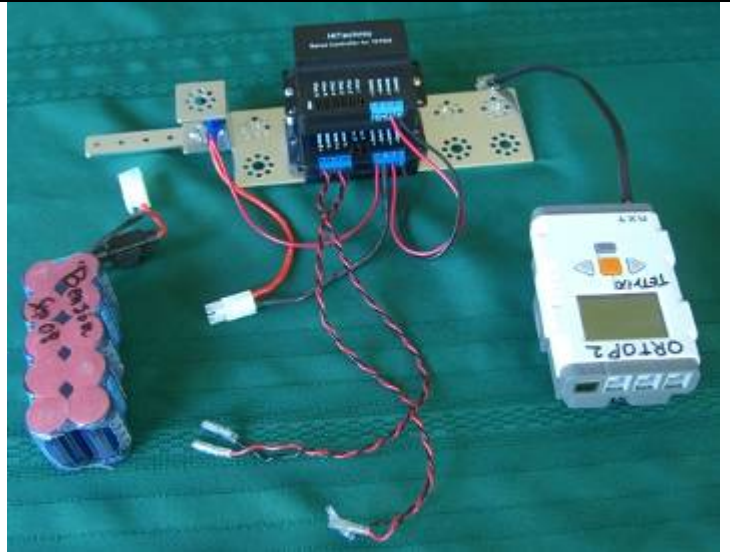


7. Connect the left hand jack of the motor controller to the right hand jack of the servo (upper) controller with the connector cable as shown.

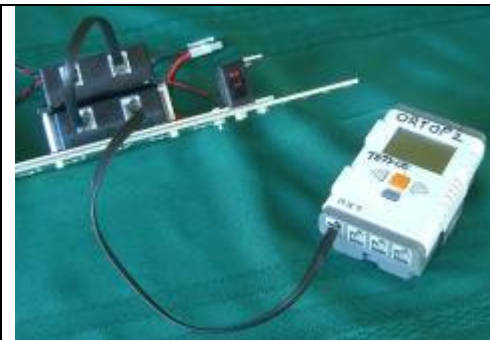
## Final Assembly of Control Module

### Parts Needed:

- 1 – Controller Assembly
- 1 – NXT Intelligent Brick
  - 1 – 0.2 M NXT Connector Cable
- 1 – 12 V Battery Pack



### Assembly



1. Attach the NXT connector cable between port S1 on the NXT and the right hand jack of the motor controller as shown.



2. Connect the battery to the jack on the On/Off switch.

## Completed Control Module

