



PiQuad™ Kit Instructions

Version -
2021 November

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VERSION HISTORY

This is the initial release of the PiQuad Kit Assembly Instructions Guide, Rev. -.

Version #	Authored By	Revision Date	Approved By	Approval Date	Reason
-	D. Haessig	11/6/21			Initial draft release

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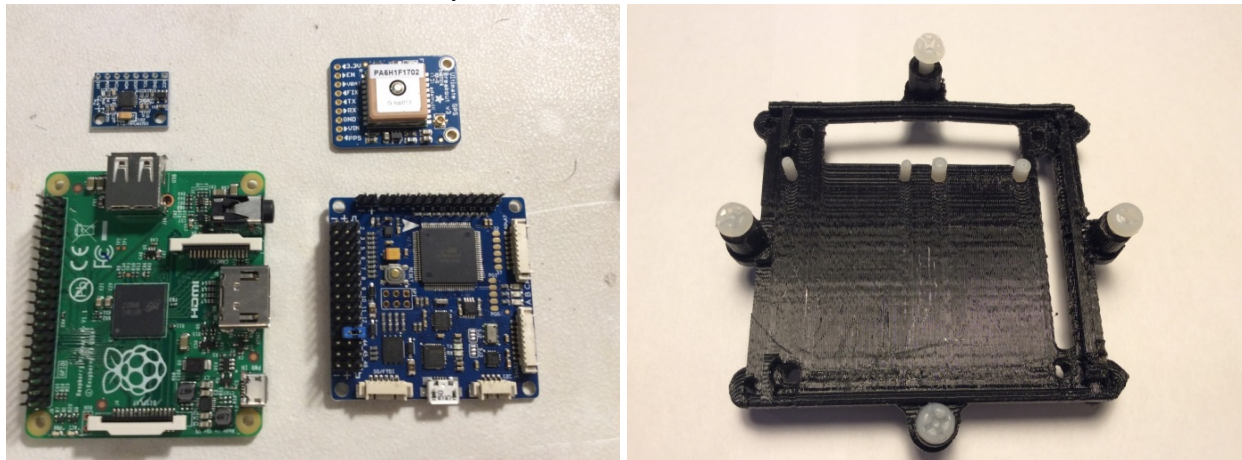
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Introduction

All of the steps required to assembly the PiQuad™ hardware are provided in this document. Harness that are already constructed are provided as part of this kit. There are 4 wiring harnesses: the power distribution assembly, the radio controller (RC) receiver cable, the Raspberry Pi (RPI) main harness assembly, and the GPS module harness. This guide covers the construction of the following assemblies that make up the PiQuad: the RPiLoT electronics assembly, the airframe and motors, and the radio controller hardware.

Electronics Stack and Harness Assembly

This section covers the assembly of the Raspberry Pi, CRIUS, IMU and GPS (all shown at left) onto the Electronics Carrier structure (right). Use lock-tite on all of the bolts used in this assembly.

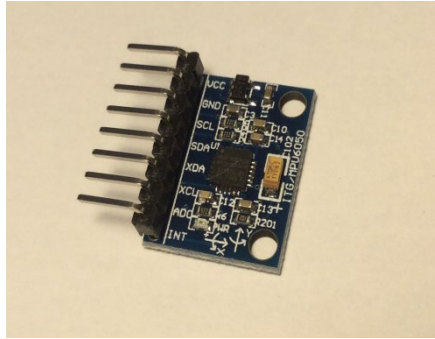


Gather Material:

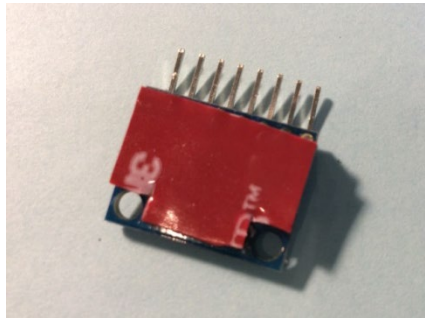
- Raspberry Pi A+
- MP6050 IMU and L connector
- GPS unit
- Electronics Carrier Structure
- 2 M3 x 4 mm nylon bolts (IMU)
- 2 M2 x 4 mm nylon bolts (GPS)
- 4 M3 x 8 mm nylon bolts (CRIUS)
- 4 M3 nuts nylon (Assembly)
- 4 M3 x 12 mm nylon bolts (Assembly)
- 4 M2 x 12 mm steel bolts (Pi)

IMU and GPS

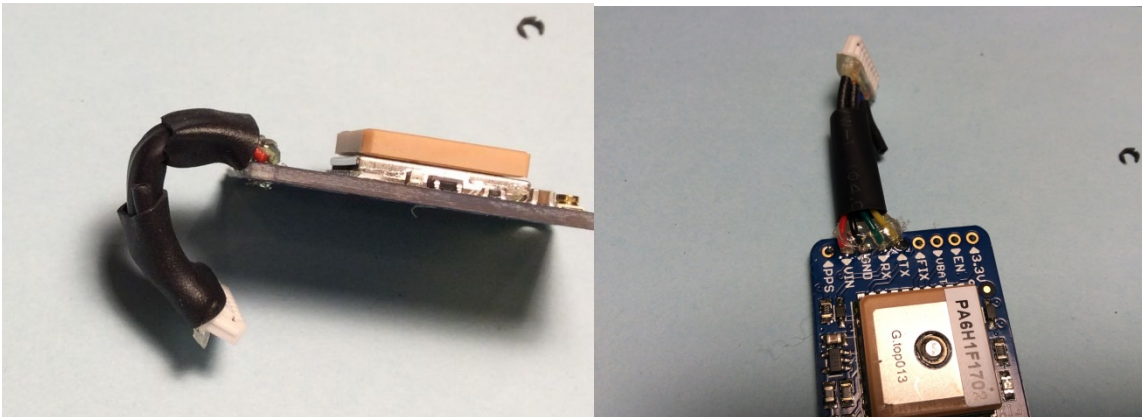
1. Install and solder L-shaped connector header to IMU.

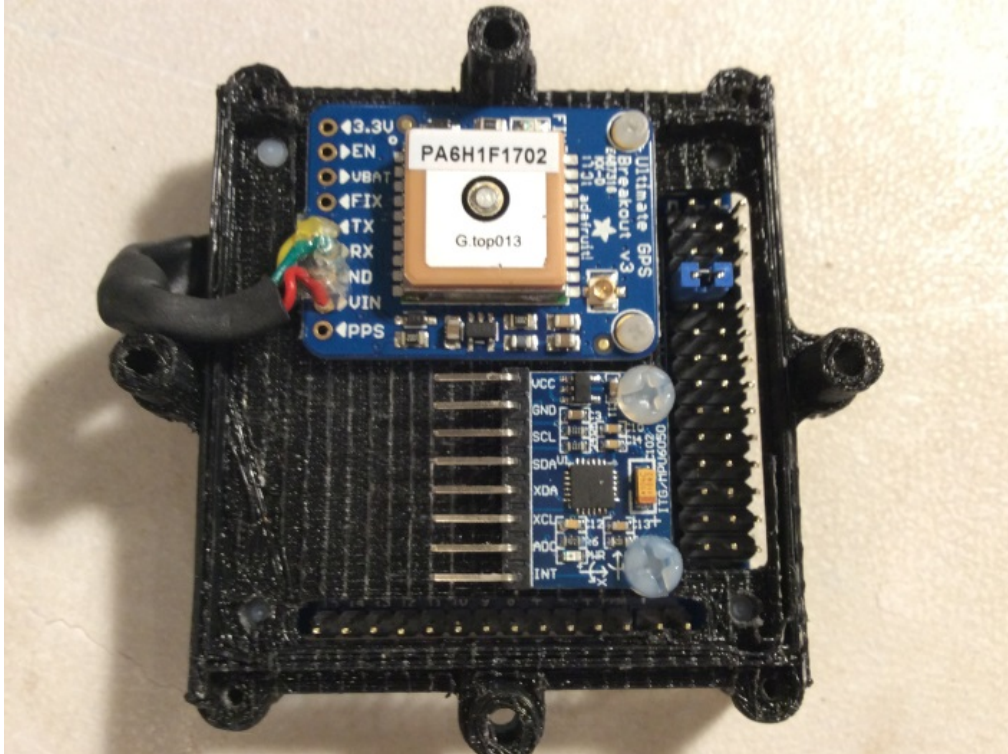


2. Add double sided tape/vib damper to underside of IMU:



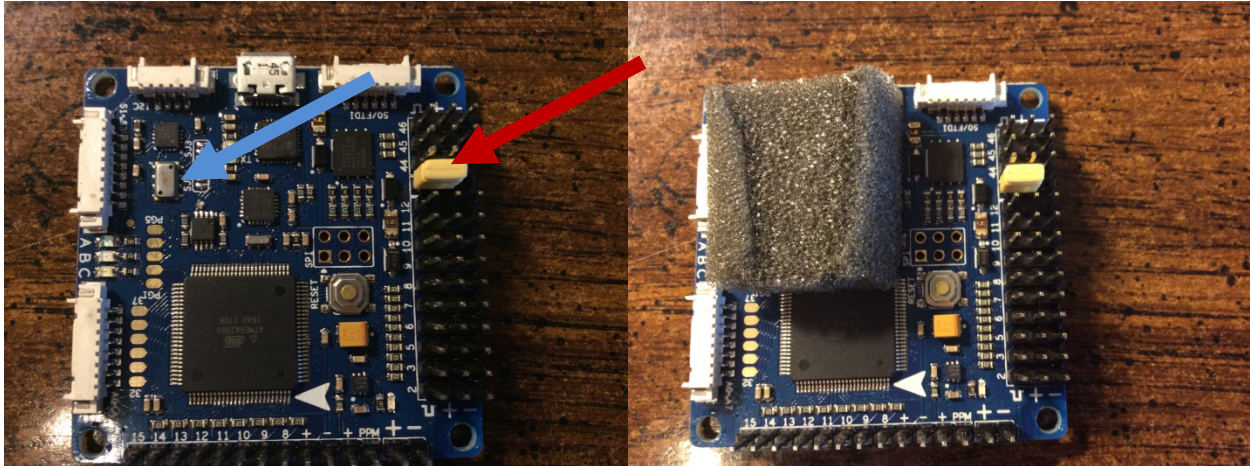
3. Attach GPS-cable assembly and IMU and to underside of black Electronics Carrier. Attach IMU with two M3 x 4 mm plastic bolts. Attach GPS to mounting block with two M2 x 4 mm plastic bolts.



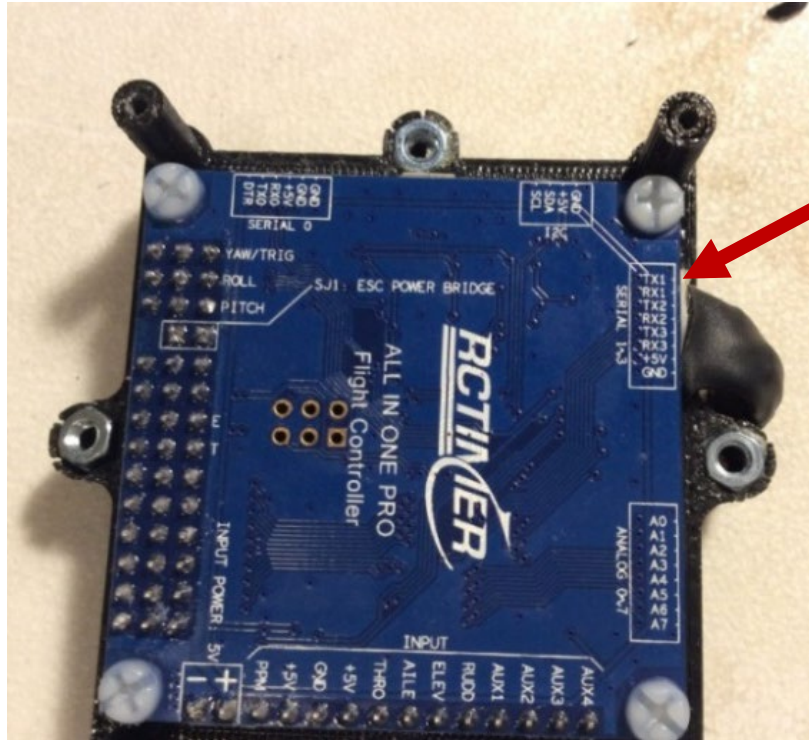


CRIUS

Remove the yellow jumper shown here with red arrow. Prior to installing, cut an 1/8" thick piece of foam to cover the barometer when installed on the carrier:



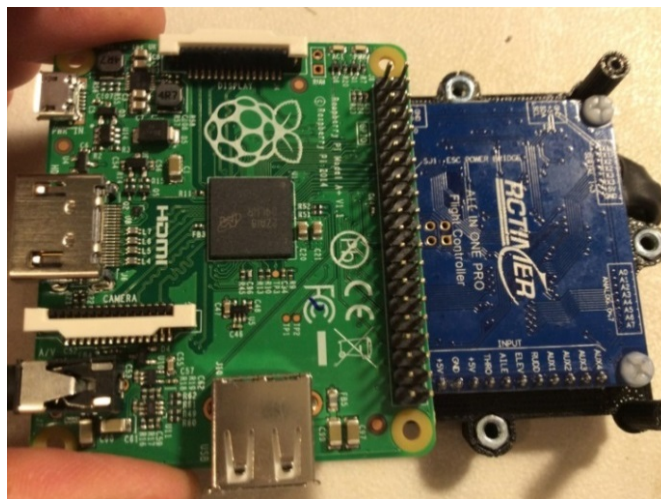
Install the CRIUS with four plastic M3 x 8mm bolts with the foam between the board and carrier, oriented with the I³ positioned to receive the GPS harness connector:

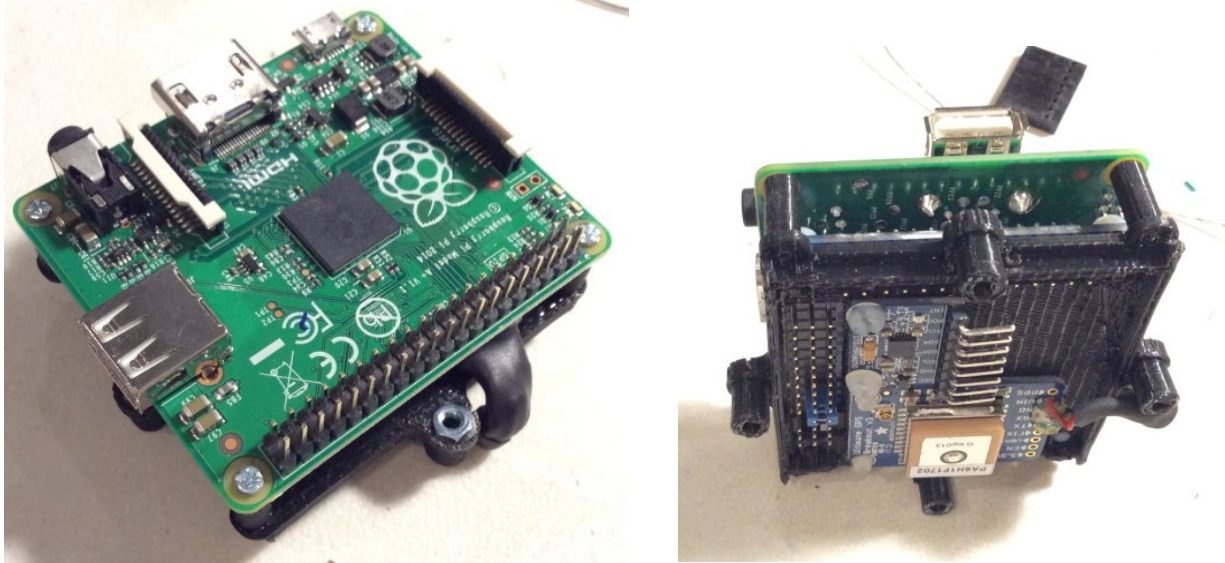


Insert the GPS connector into Serial I~3 (red arrow) as shown.

Raspberry Pi

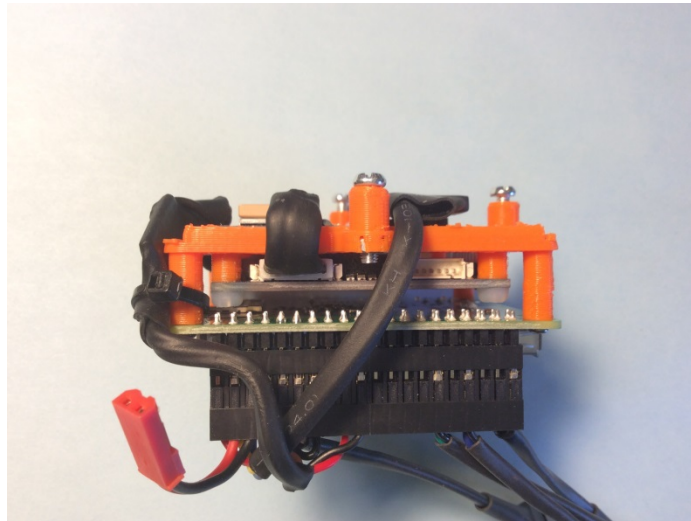
Trim all pins sticking down below the underside of the Pi that might contact the CRIUS underneath when attached. Attach Pi A+ to top of mount with four M2 x 12 mm steel or plastic bolts.





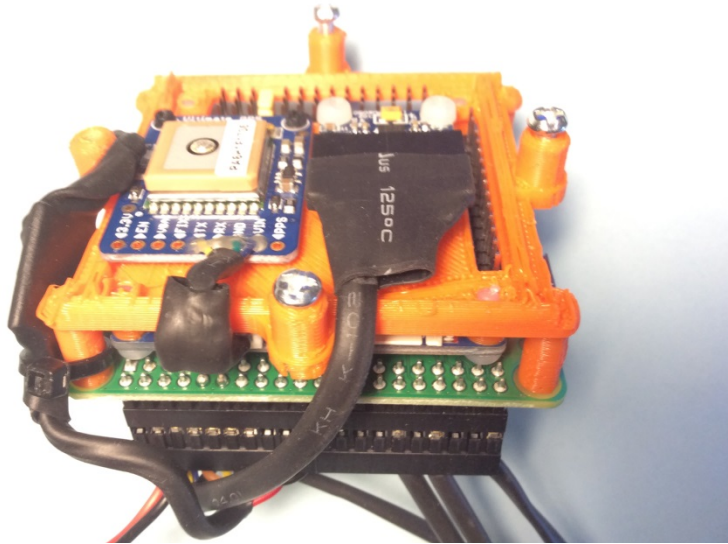
Main Harness Attachment

To the Rpi attach and insert the 2x20 connector to the 2x20 Rpi header, with the power input connector at the upper right corner when viewing the bottom from above.



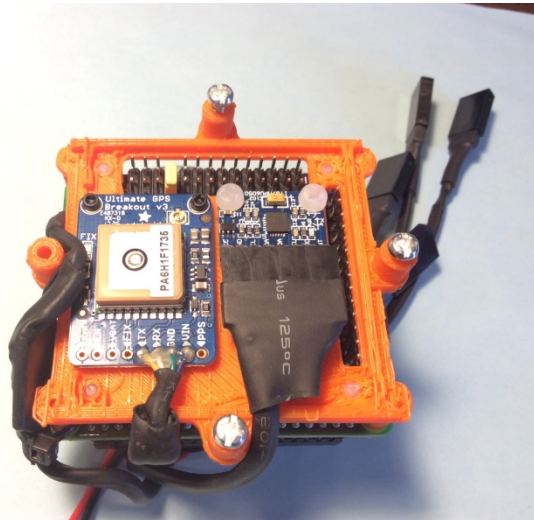
IMU:

Route the IMU cable and connect to the IMU making sure of the orientation with V_{CC} correctly connected. Heat the shrink tubing as needed to form the bends in the harness:



Serial Link:

Route the Serial cable around the corner RPi post, around the assembly mounting post near the GPS, and to the CRIUS. Tie wrap to the corner post as shown below. Insert the Serial-2-Pi connector into the 'Serial 0' connector on the CRIUS. Heat tubing with heat gun and route around vertical post as shown here:



This completes construction of the RPiLoT Electronics Assembly.

Airframe Assembly

Topside – Turnigy Receiver Harness and GPS Antenna

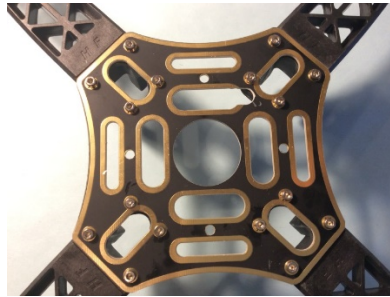
Material:

- 4 M2 x 10 stainless bolts and nuts
- Top plate airframe
- Electronics Assembly
- Turnigy receiver harness
- GPS antenna and shrink tube

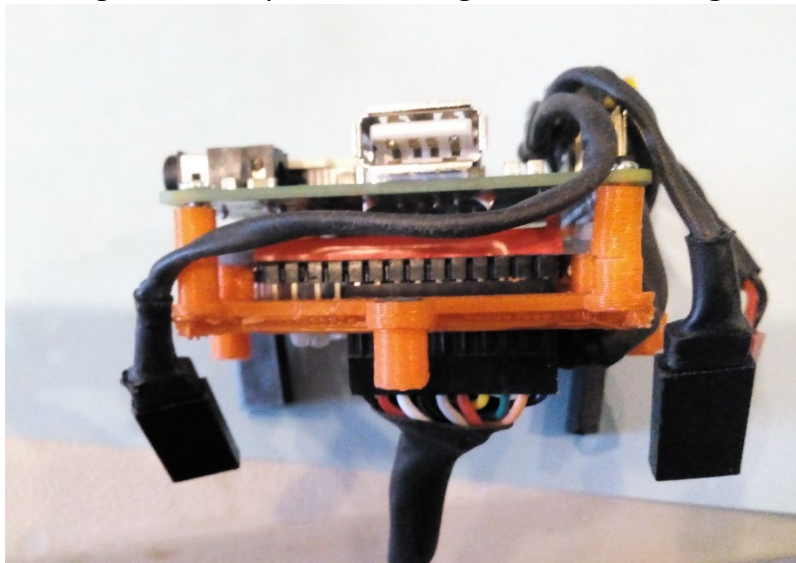
Top Plate preparation: Increase the diameter of the 4 holes that will accept the M2x10 bolts that will attach the Electronics Assembly, increasing their diameter to 2mm+. Drill a ~1/4" hole to extend slot through which the Turnigy Receiver Harness will pass.



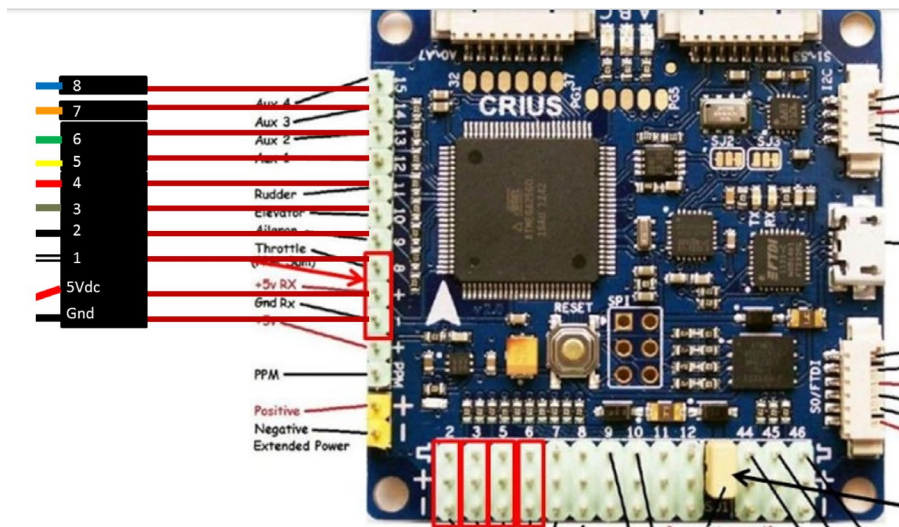
Assemble the top plate with the 4 airframe arms using bolts provided and locktite:



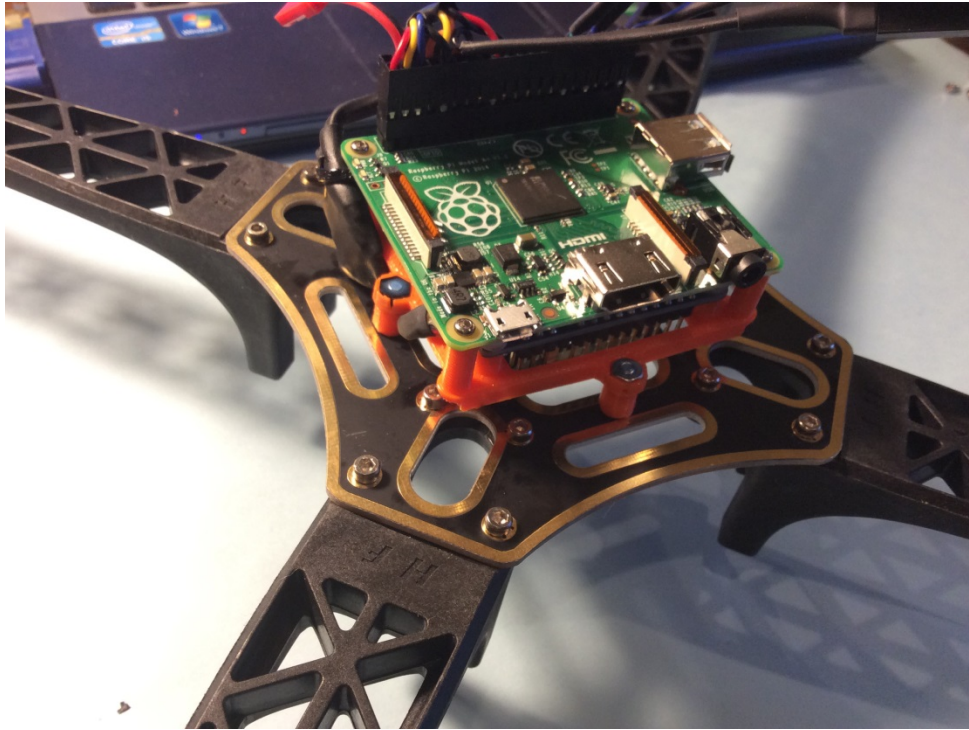
Insert the Turnigy Receiver connector into the CRIUS as shown here, with the connector connecting to the 10 pins to the right when viewing from below:



You are attaching the Turnigy Harness to pins 15 through the '+' and '-' pins as shown here:



Attach Electronics Assembly: Using four M2 x 10 bolts and nuts attach the assembly to the top plate with the RC receiver connector aligned with the widened slot:

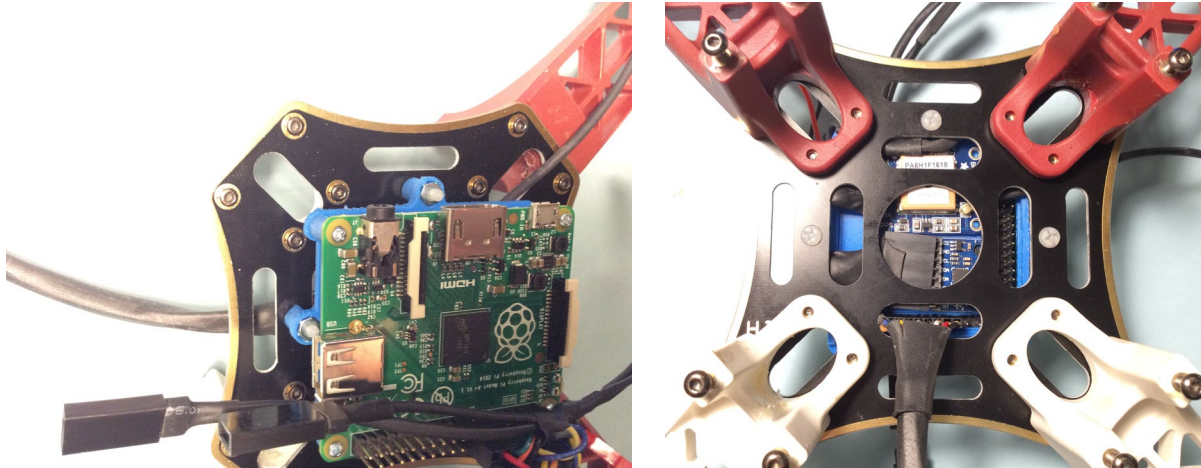


GPS Antenna Preparation: Place shrink tubing on GPS antenna wire running it up to the connector and shrink. Enclose GPS antenna with GPS Antenna plastic housing. Add 3M double sided tape to underside of GPS antenna housing. Don't remove tape cover and stick to arm yet.



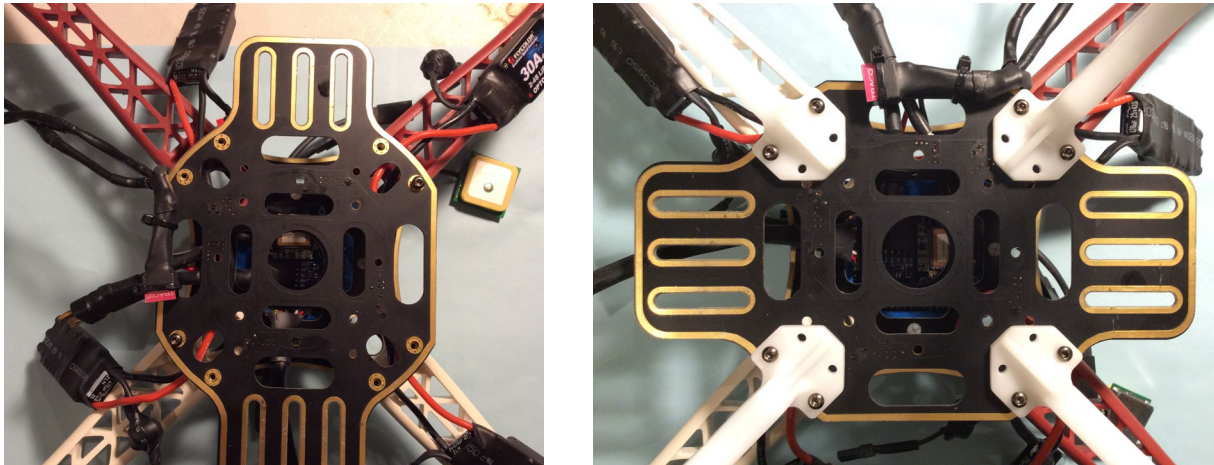
Slip the GPS cable between the top plate and assembly carrier and attach to the GPS antenna connector under the Electronics Assembly. Run cable so that the GPS antenna will be on the back left arm.

Insert the Turnigy Receiver connector through the top plate slot as shown, when viewing from the back with the blue wire on the left:



Bottom Plate, Motors, Turnigy Receiver and GPS Antenna Attachment

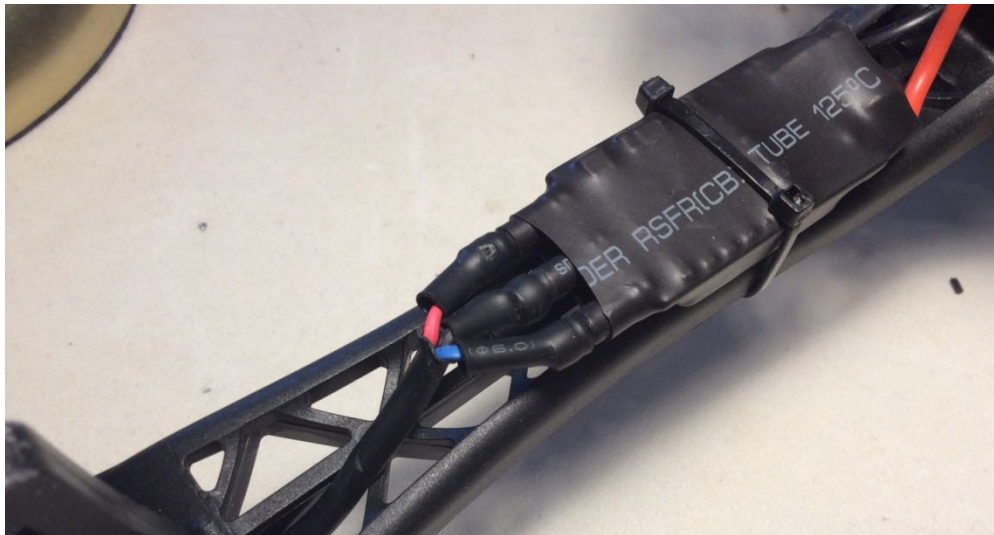
Bottom Plate: Attach the Power Distribution Assembly (bottom plate) to the arms with the bolts provided, adding Loctite. Attach with these same bolts the legs as shown here, running the bolts through the 2 holes and into the plastic frame.



Motors: Attach motors using four M3x8 bolts, applying a small amount of Loctite before inserting, taking care not to get any locktite on the motor windings or rotor, only the threads. Have the motor wires running towards the center along the arms. Run the wires through the opening in the arm as shown.



ESCS: Afix ESC's to airframe arms as shown. Use two 4" tie wraps:



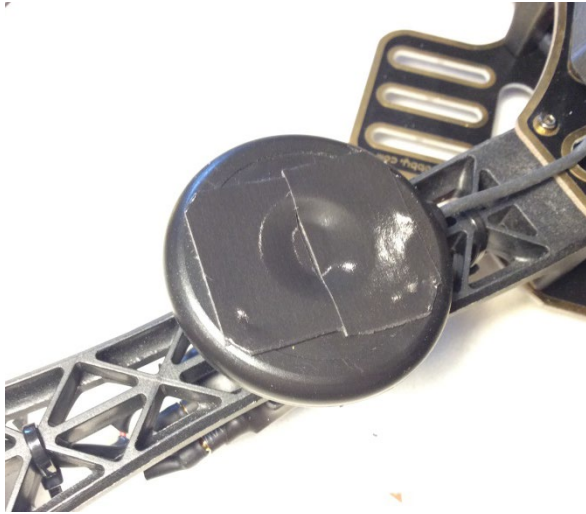
Insert motor wires into ESC with black in center.

Add 4" black tire wraps to affix motor control and power wires to airframe arms:

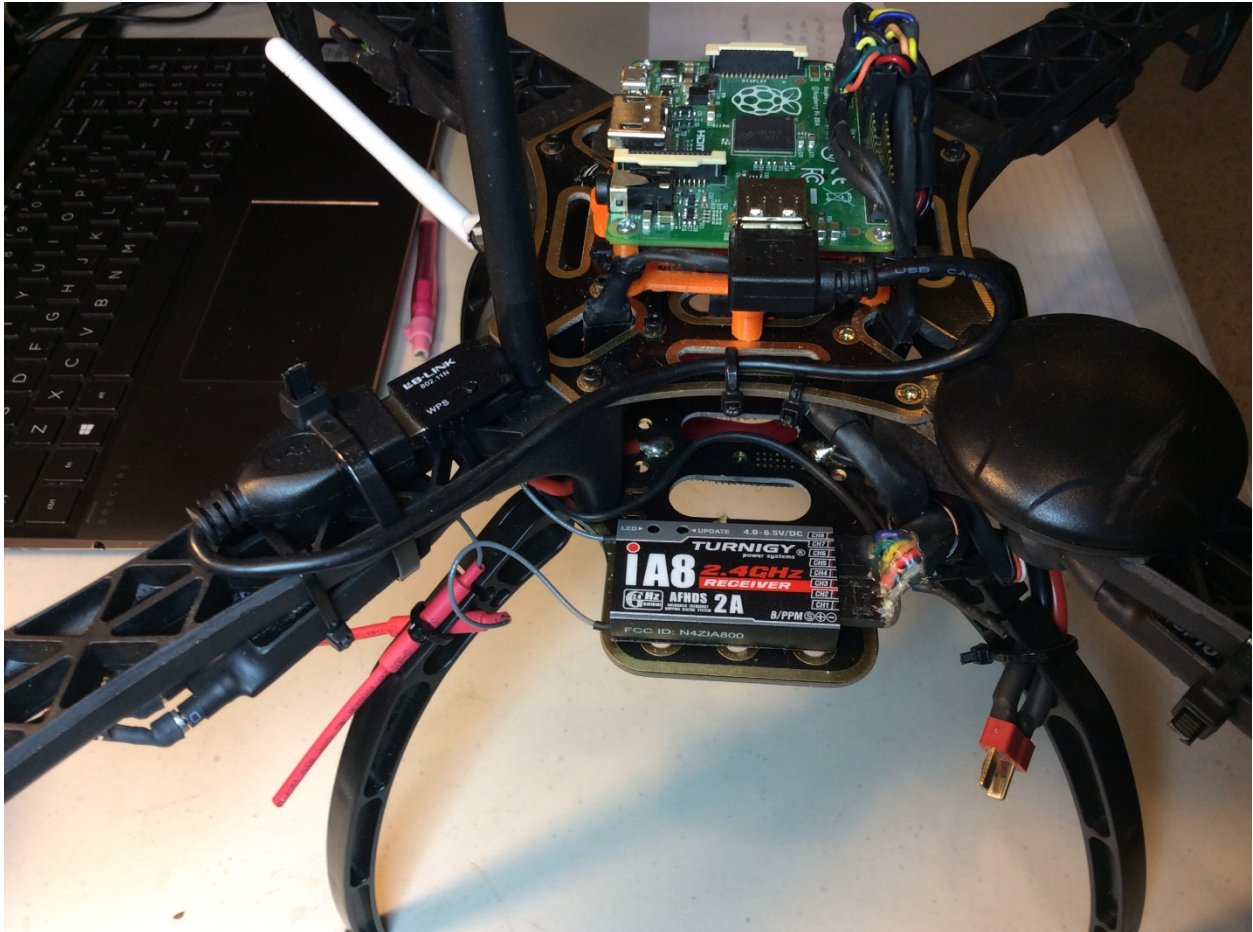


ESC Control Wires: Hook up ESC control wires to the motor control wires coming from the RPiLot main harness. Add tie wraps as shown above.

GPS Antenna: Remove backing and stick to upper side of back (not front – change picture) left arm:



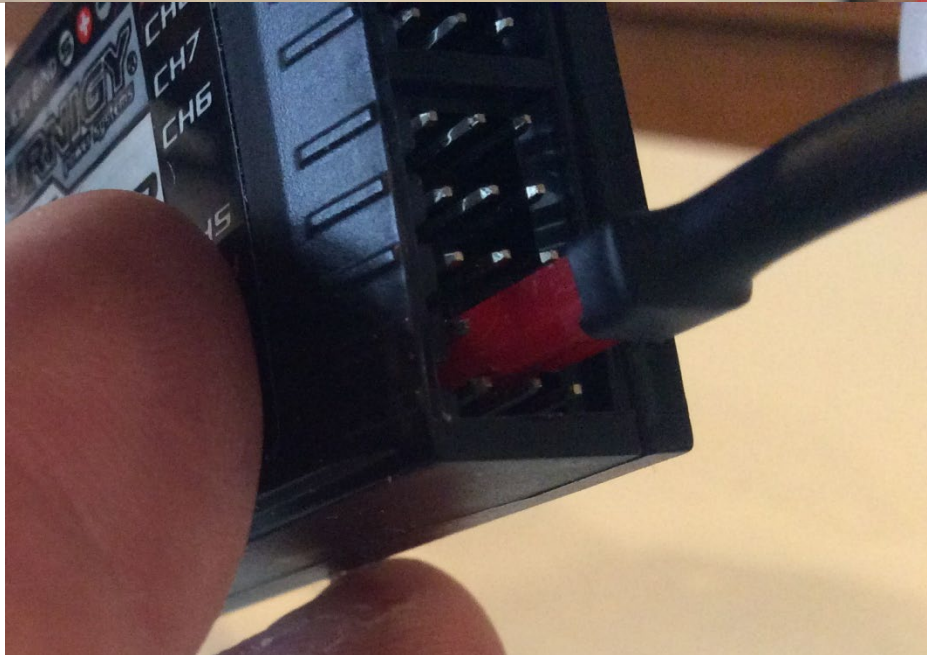
WiFi Antenna: Afix WiFi antenna and wire to back left airframe arm with black tie wraps:



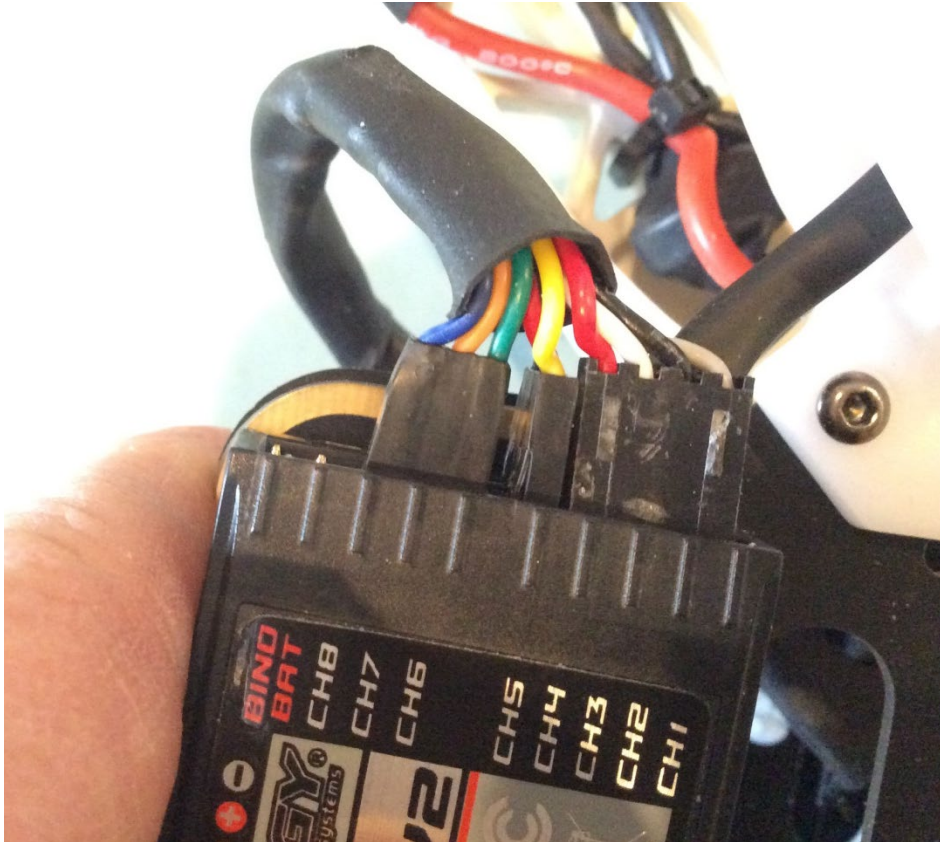
Turnigy Receiver: Place double sided sticky tape on the bottom of the receiver.



Insert the 5Vdc power wire in the middle (power) and bottom (ground) rows at the right end (when upside down). +5Vdc is here:



Insert the signal wires into pins 1 through 8 in the top row (bottom when upside down) as follows:



Remove double sided tape cover and affix to the topside of the bottom plate:

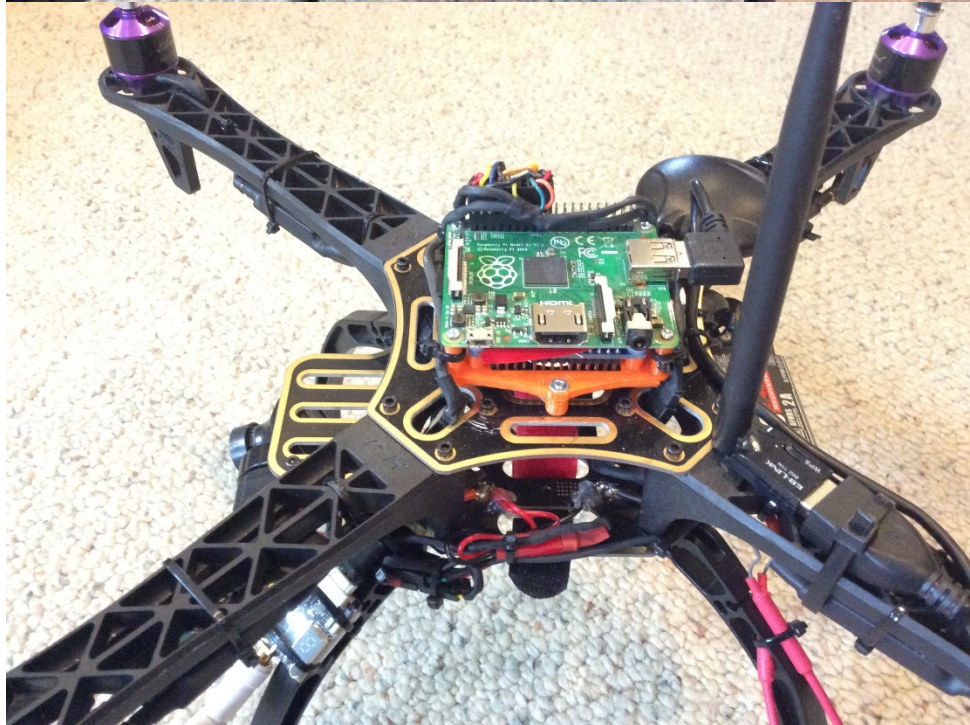
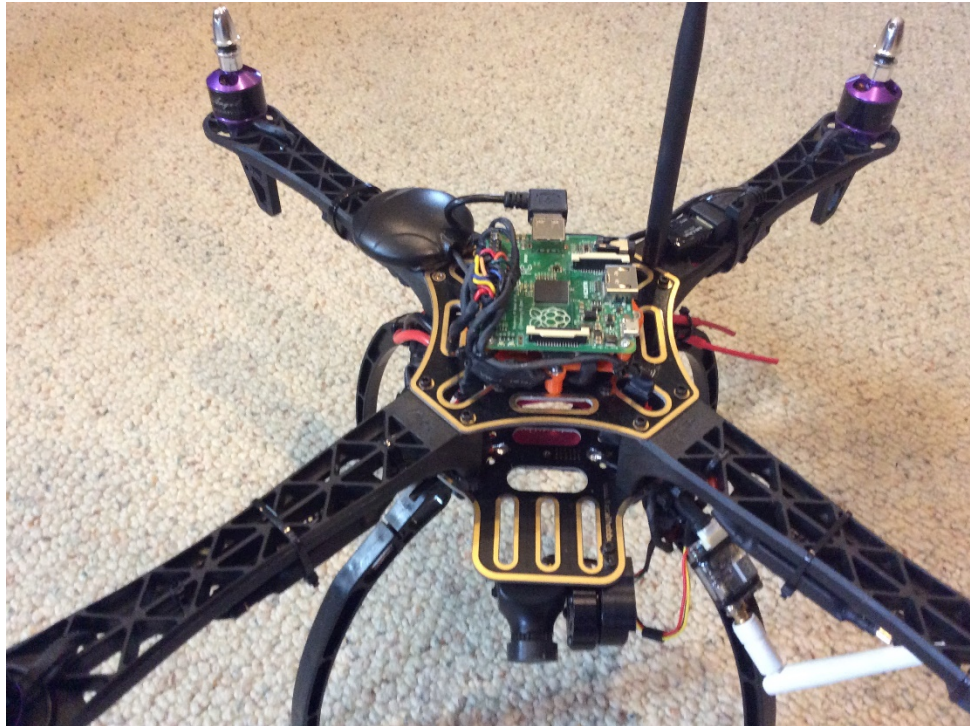
Add tie wraps to attach the Turnigy Harness to the airframe:



Alternatively, it can be attached to the underside of the bottom plate as shown here, however this may result in interference with the battery:



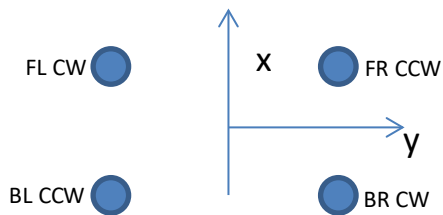
Other pictures from the remaining 3 sides:





Props

Prior to attaching propellers test the direction of spin which is shown here:



Power up and engage the throttle to spin motors to verify that these directions are occurring. If they are not then on the motor(s) that are incorrect, swap the red and blue ESC motor drive wires.

Turnigy Tx to Rx Binding

- 1) Hook up Turnigy Rx to 5Vdc
- 2) Have bind plug connected
- 3) Turn on Turnigy Tx with Bind button held down; now Rx is bound to Tx.
Note the blinking lite has stopped.

