

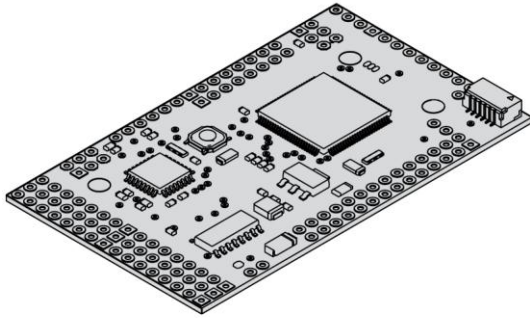
Setting-up Electronics

v.002

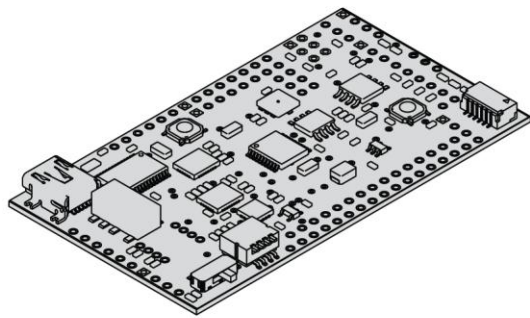
ArduCopter

The ArduPilot Mega and IMU shield provide the brains for your ArduCopter. Upon completion of this chapter, you will have your ArduPilot Mega and IMU connected to each other and ready to load code from your computer.

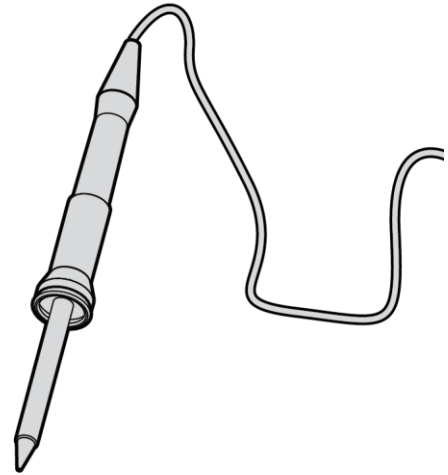
The Power Distribution Board (PDB) distributes power throughout your ArduCopter. Upon completion of this chapter, your PDB will be connected with your ESCs and your ArduPilot Mega.



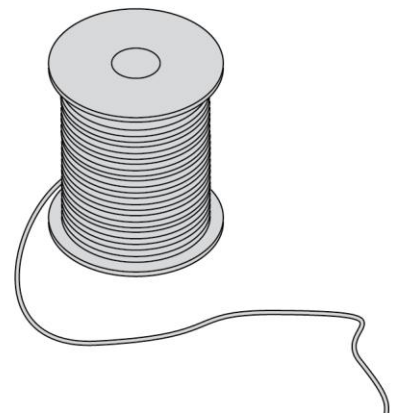
ArduPilot Mega Board



ArduPilot Mega IMU Shield



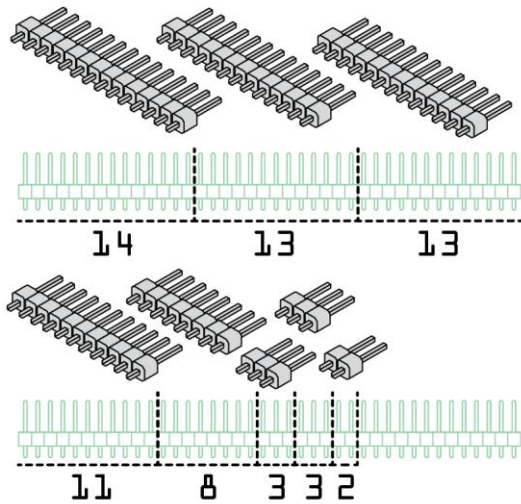
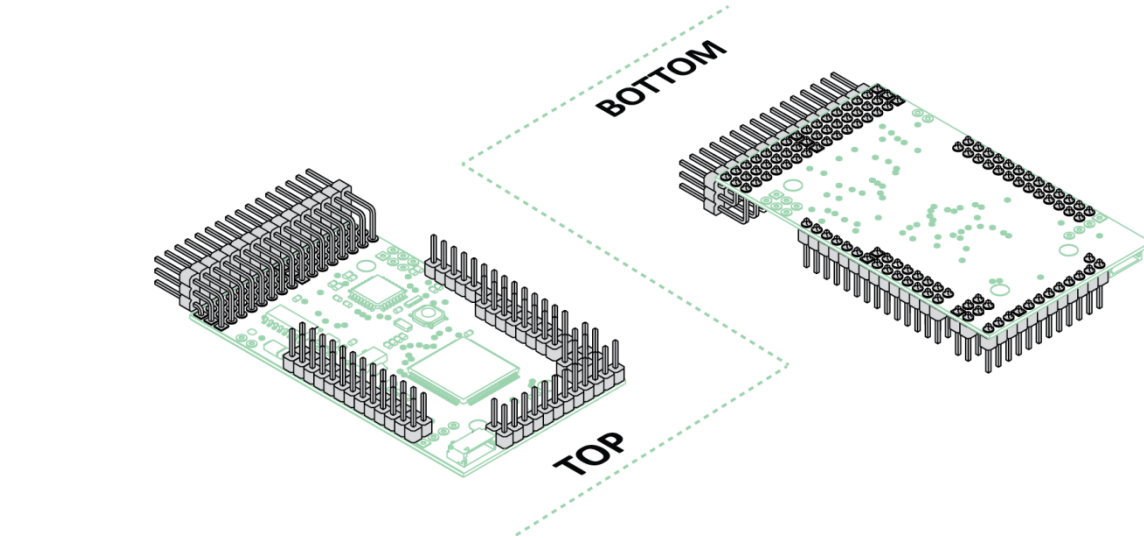
Fine-point soldering iron



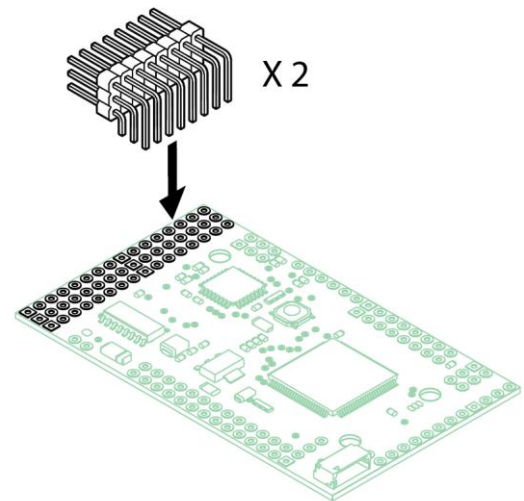
Solder

**When soldering make sure to have an open window for some fresh air!*

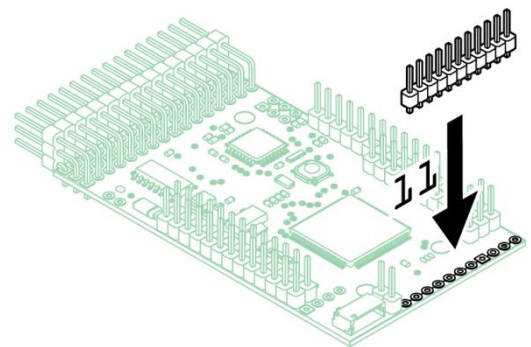
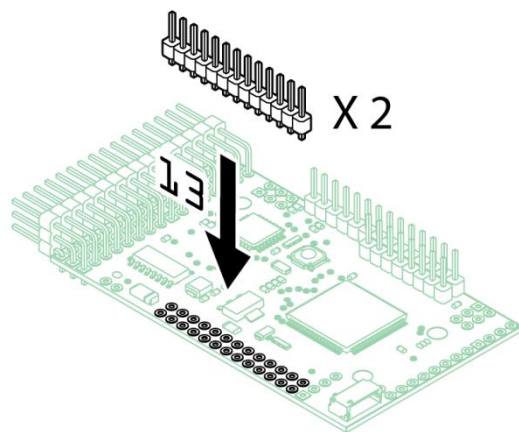
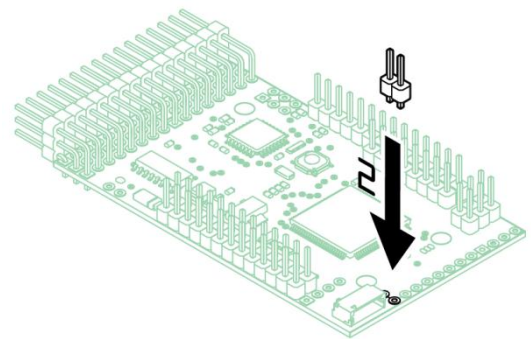
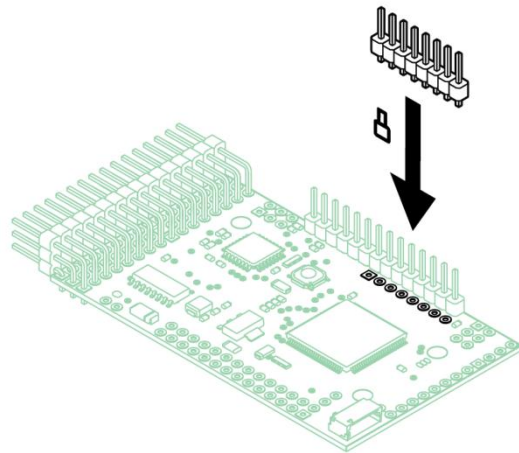
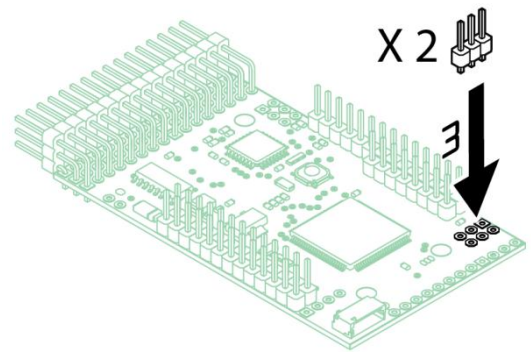
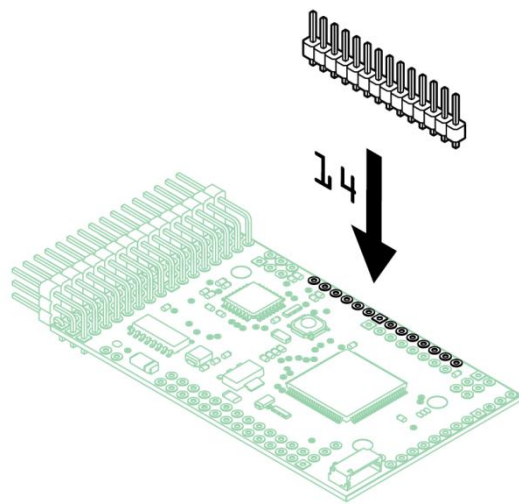
Assembling your APM board



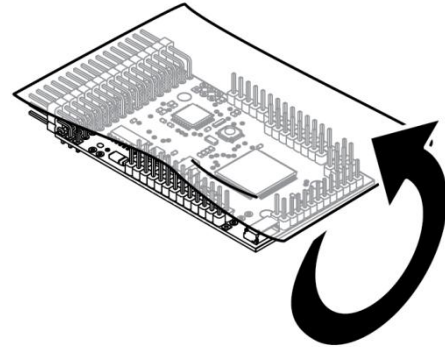
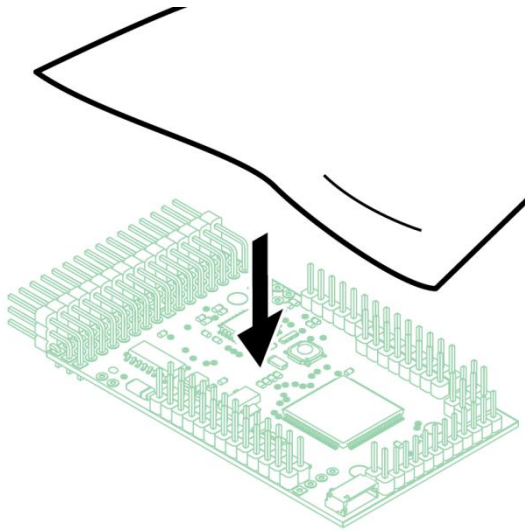
Take the two, 40 (or 36)-pin male connection headers and cut them into the lengths shown above. They will be used in later steps.



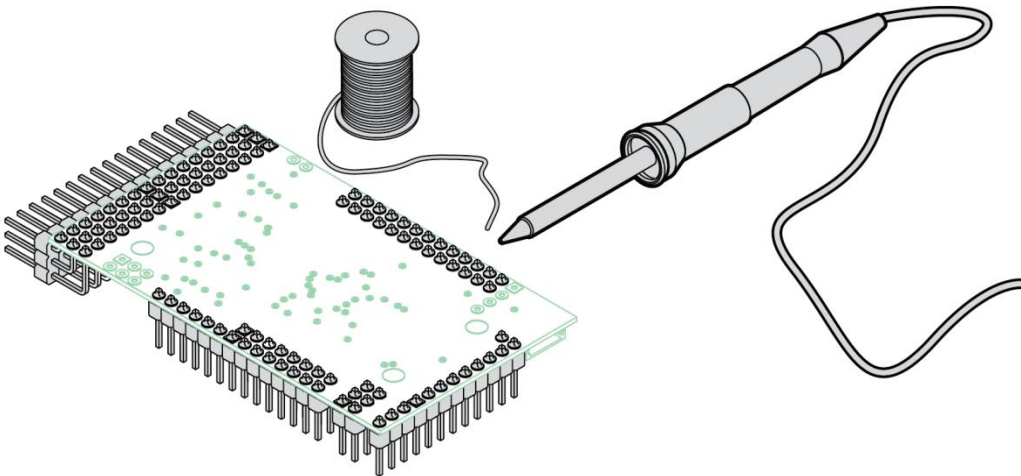
With the components of the ArduPilot Mega facing upwards, take the two, 3x8 right angle headers and insert them into the holes shown. The shorter, angled pins should be inserted into the board with the longer ones pointing away from the edge of the board.



Take the male headers you already cut and place the shorter side of the pins into the corresponding holes on the ArduPilot Mega.



Now that all of the pins are in their respectful holes, take a paper sheet and place it on top of the pins. While holding the sheet firmly against the pins, flip the ArduPilot Mega 180° so that the sheet and the pins are now resting on your table.

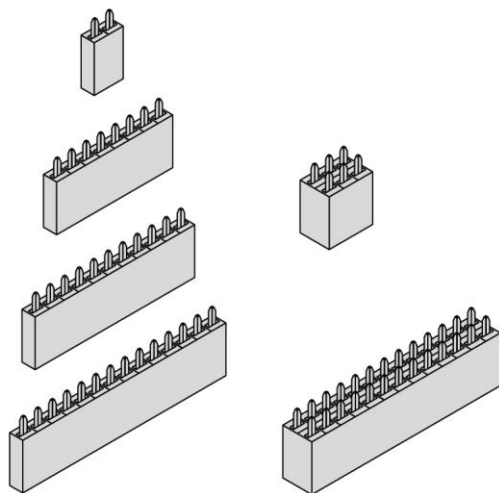
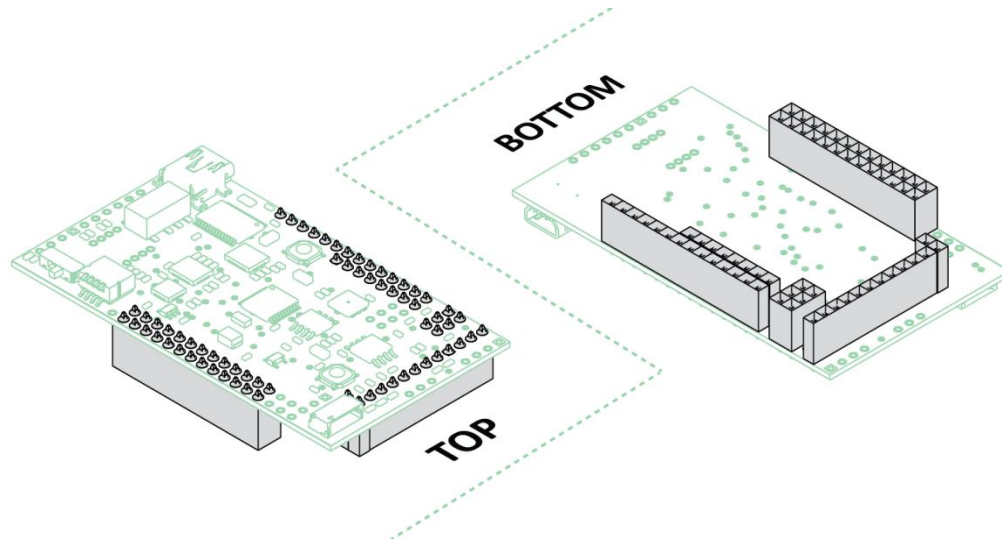


Solder each of the pins to the ArduPilot Mega.



Be careful not to solder any of the pins to each other.

Assembling your IMU board



Conn Header Female 02POS

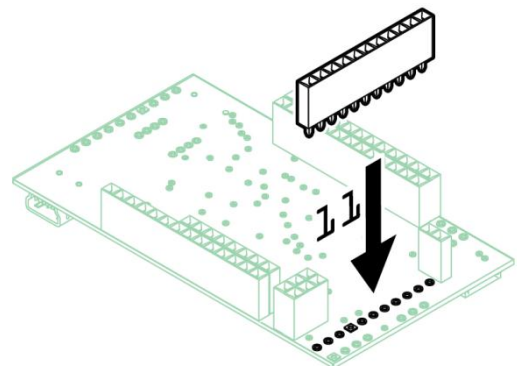
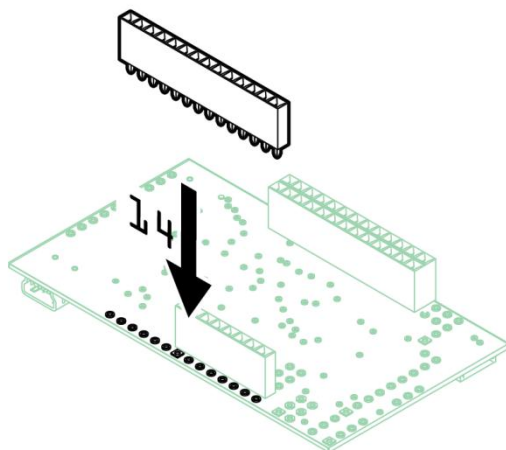
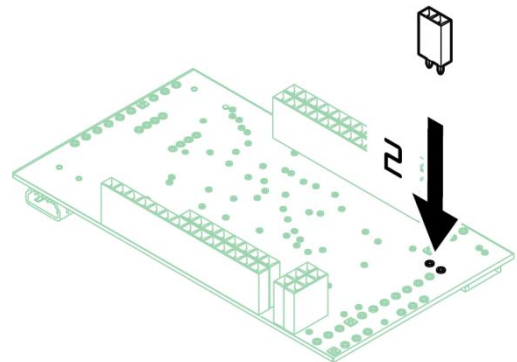
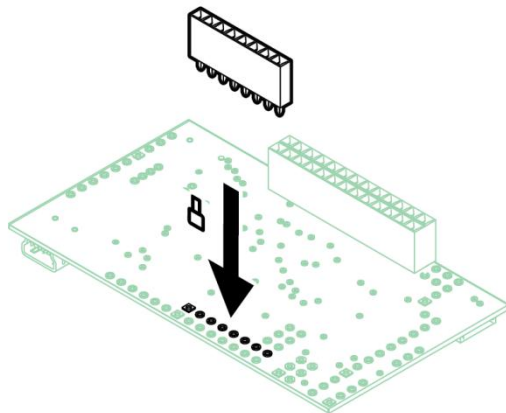
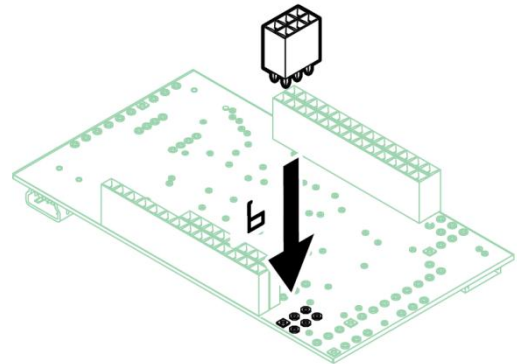
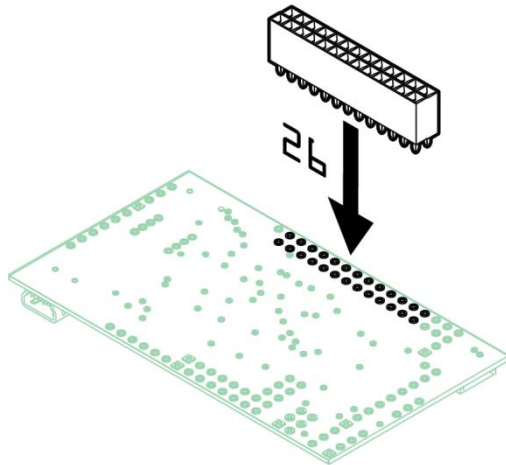
Conn Header Female 2x03POS

Conn Header Female 08POS

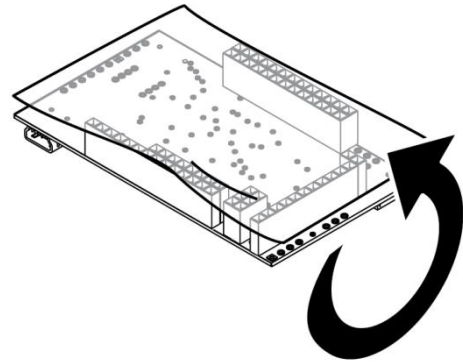
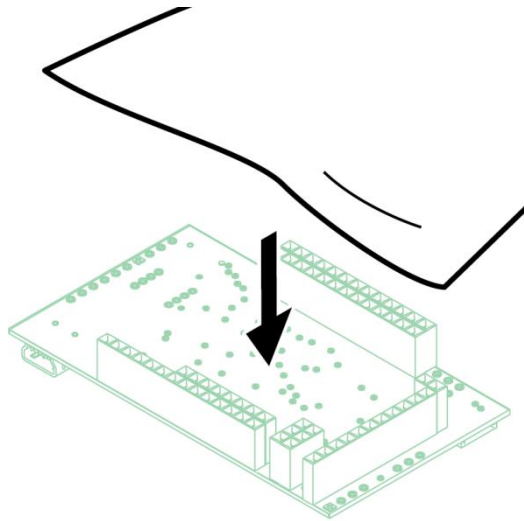
Conn Header Female 11POS

Conn Header Female 2x13POS

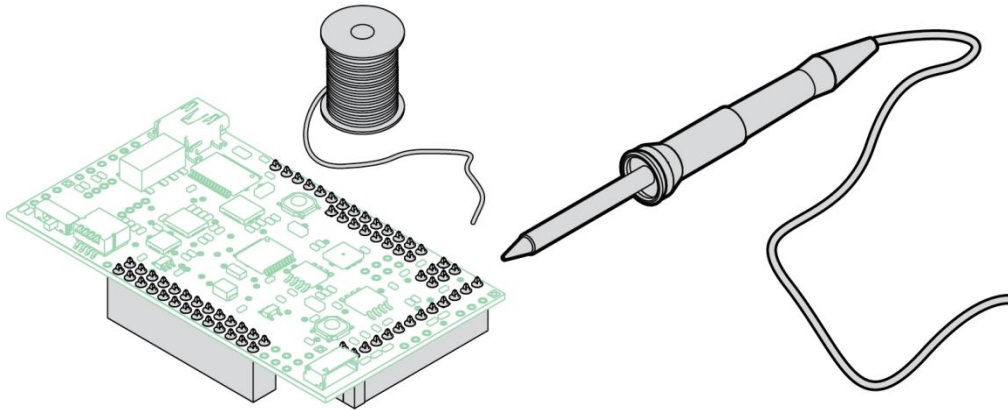
Conn Header Female 14POS



Flip the IMU over so that the components are face down. Place the pins of each female header into the corresponding holes shown above.



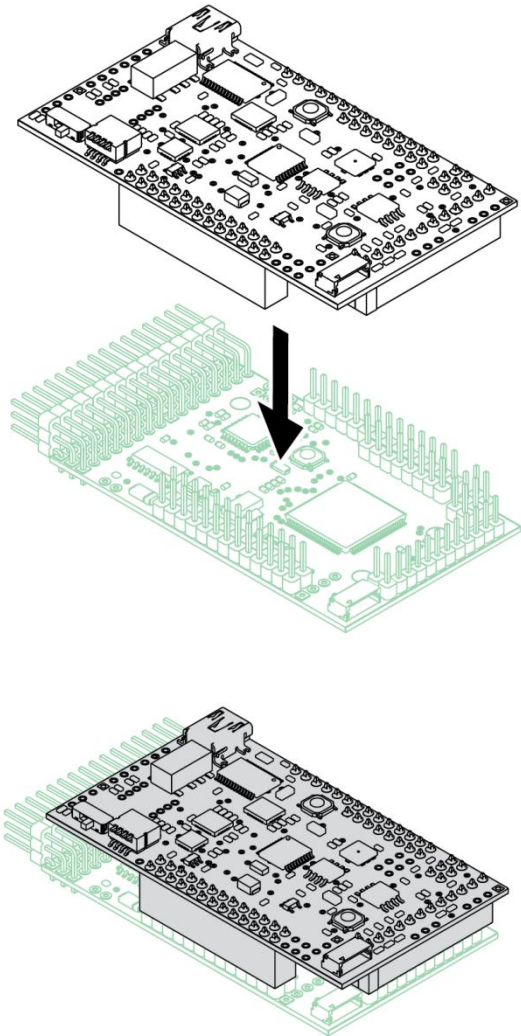
Now that all of the pins are in their respectful holes, take a paper sheet and place it on top of the plastic side of the female headers. While holding the notebook firmly against the pins, flip the IMU 180° so that the notebook and the female headers are now resting on your table.



Solder each of the pins to the IMU.



Be careful not to solder any of the pins to each other.



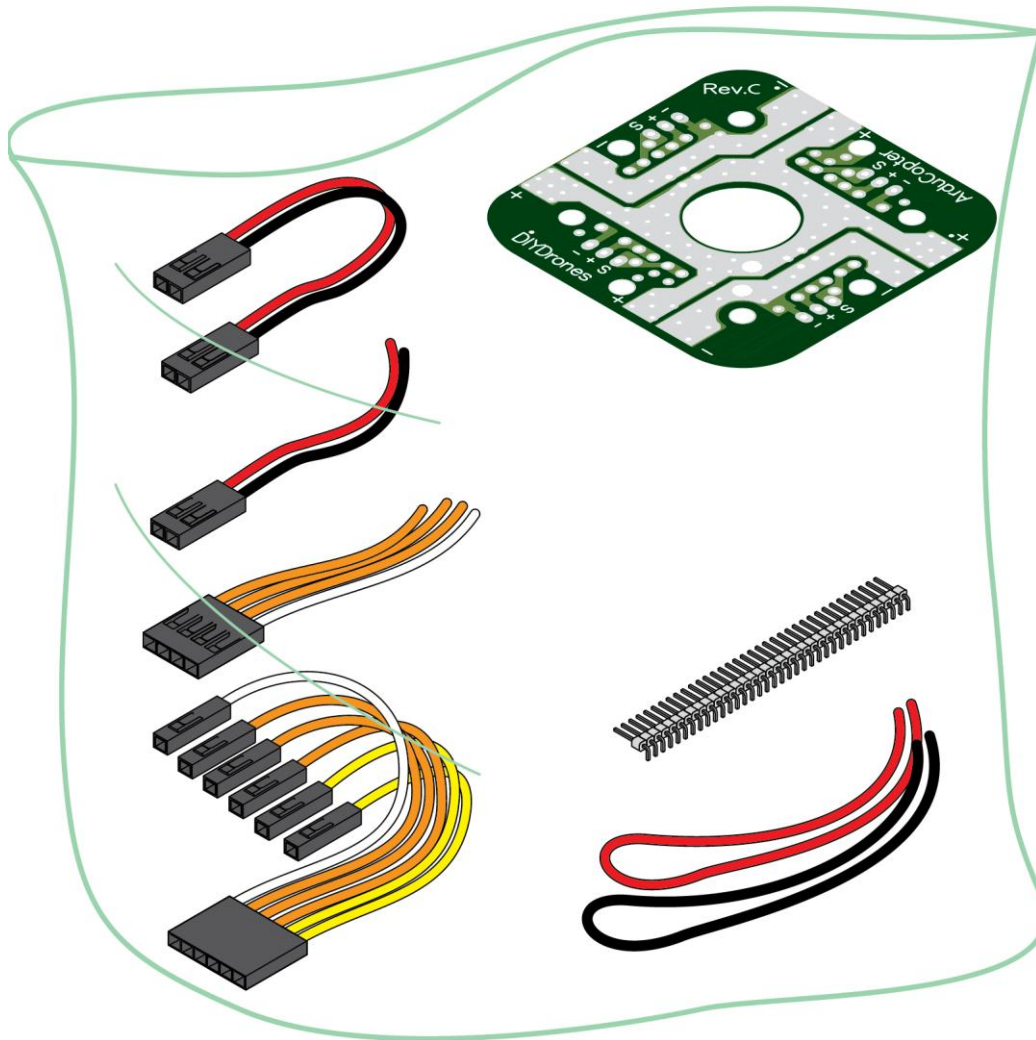
Now that you have male headers on the ArduPilot Mega and female headers on the IMU, they are ready to be joined together. Line up the headers and squeeze them together.



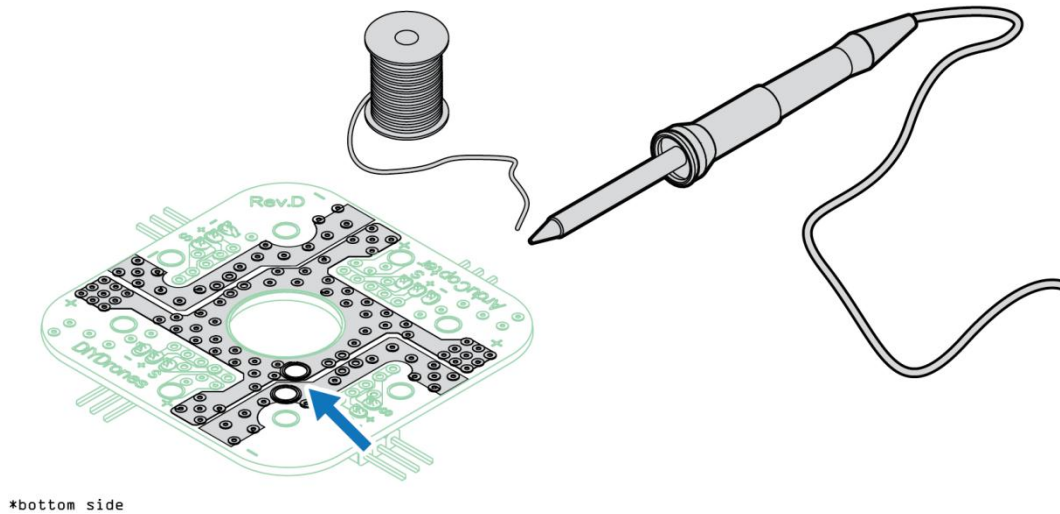
Be sure to push straight down so you do not bend the pins.

Soldering the Power Distribution Board (PDB)

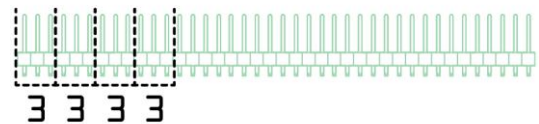
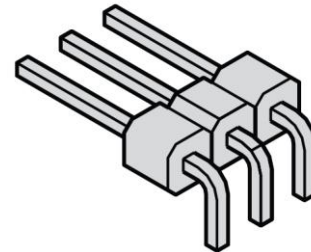
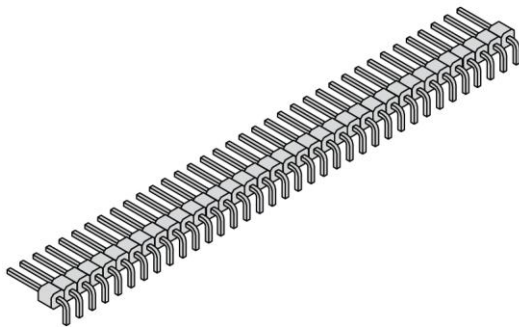
In Bag #3 you should find following items:



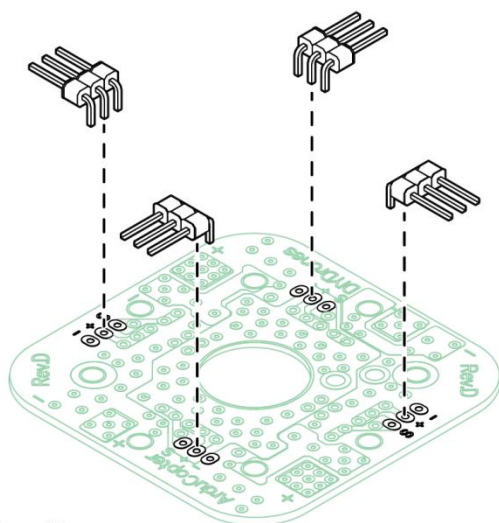
- ✓ 1 x PDB
- ✓ 1 x 4 Pin W/O/O/O Cable
- ✓ 1 x 2 Pin R/B Cable
- ✓ 1 x 2 Pin to 2 Pin R/B Cable
- ✓ 14cm 1xBlack & 1xRed silicon cable 12 AWG
- ✓ 1 x 40 pin 90° pin header



An extra layer of solder needs to be added to the traces in order to accommodate the current. A thickness of about 0.8 mm will be enough. **Keep these holes clear of solder.**



Take the 40-pin male connection headers and cut it into the lengths shown above.

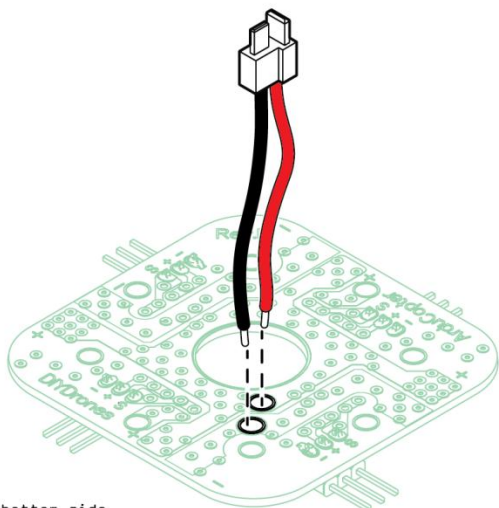


*top side

Find the three small holes labeled (-), (+), and (S). Now, take your 3-pin 90° header and put the shorter pins through the holes from the top side of the board (see the diagram for reference). Then, flip the board over to the bottom side and solder each pin.



Be careful not to solder any of the pins to each other.



*bottom side

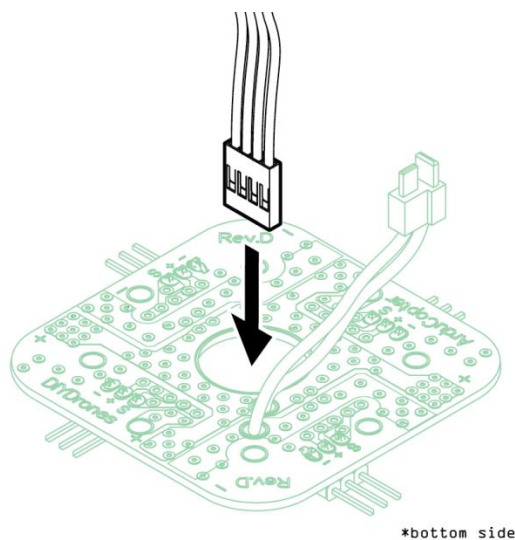
A battery cable is supplied. In the picture, a Deans connector is soldered to one end of the cable.

Depending on your battery, you may choose to solder different connectors such as a XT60 or an EC5.

Solder the battery cable to the bottom of the board into the positive and negative holes.

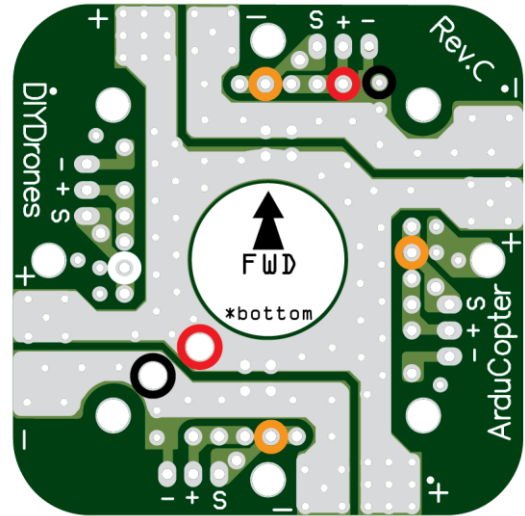
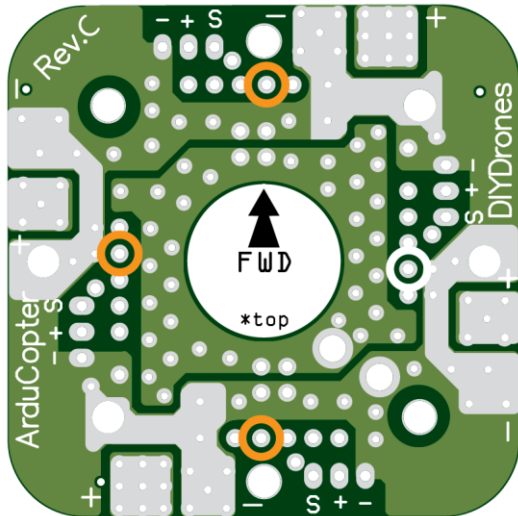


Be careful not to solder the cables to each other.

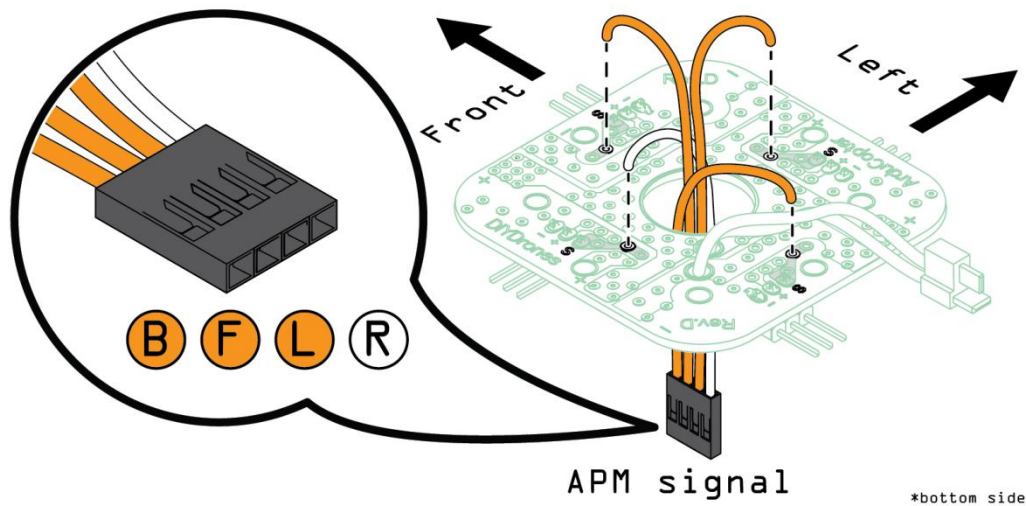


*bottom side

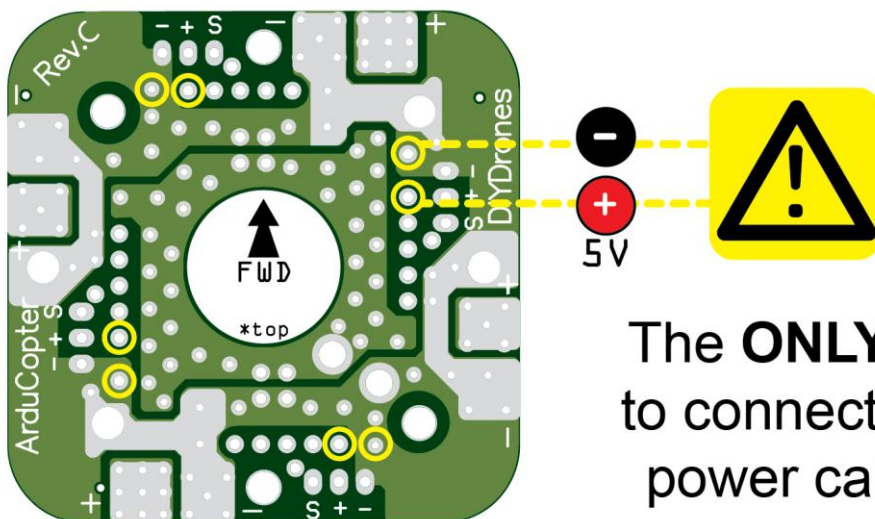
Slide the “RC signal” (W/O/O/O) cable through the center of the board from the bottom side.



The white cable should go to **RIGHT** motor.

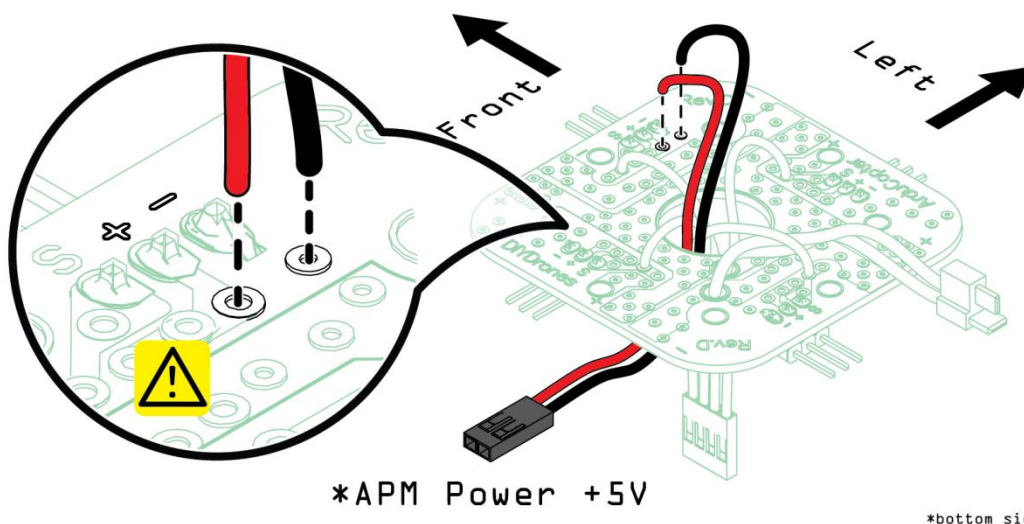


Solder the “RC signal” (W/O/O/O) cable to the bottom of the board into the corresponding holes shown above. **Follow the correct order of the motors shown.**



Never connect your APM Power feed cable to same area where main battery power is. Before connecting APM to power, it is suggested to measure voltage on your APM power cable (red/black 2pin cable).

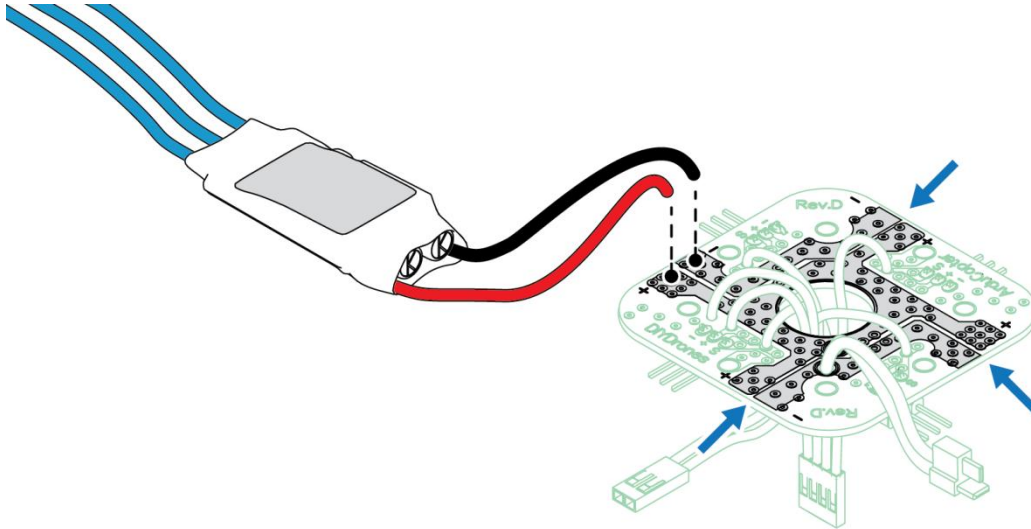
You should only have +5 volt on APM Power feed cable.



Solder the “APM Power” (R/B) cable to the bottom of the board into the corresponding holes shown above.

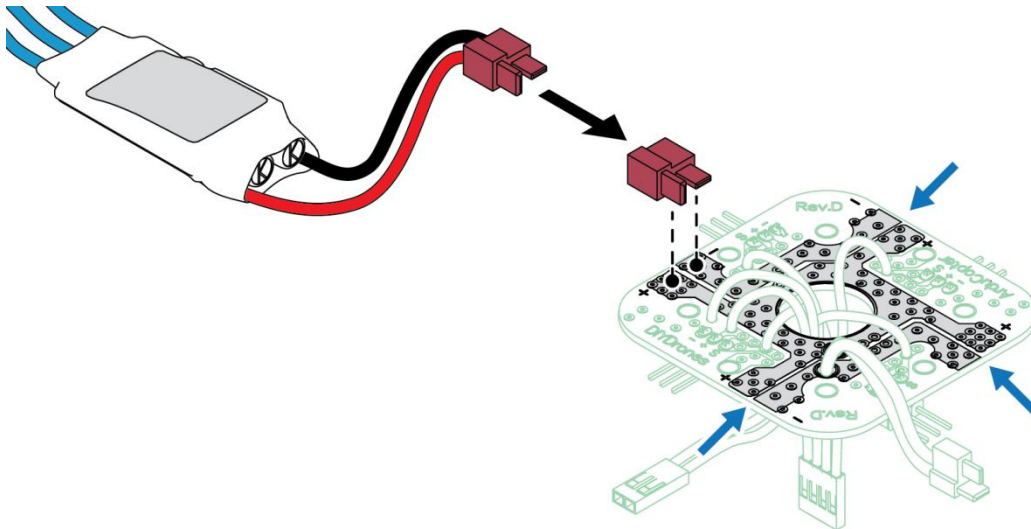


Be careful not to solder the cables to each other or to the same area where main battery power is. Before connecting APM to power, it is suggested to measure voltage on your APM power cable (red/black 2pin cable). You should only have +5 volt on the APM Power feed cable.

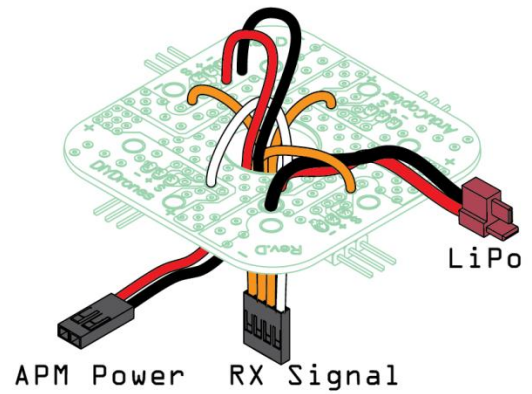
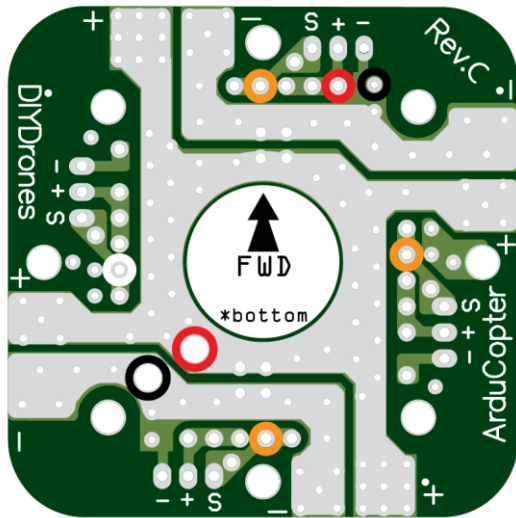


For all four of the ESCs, strip the end of the positive and negative wires so that they can be soldered to the PDB. Take note of the labeling on the PDB and remember that red wires should be positive and black wires should be negative. **Securely attach them with a layer of solder.**

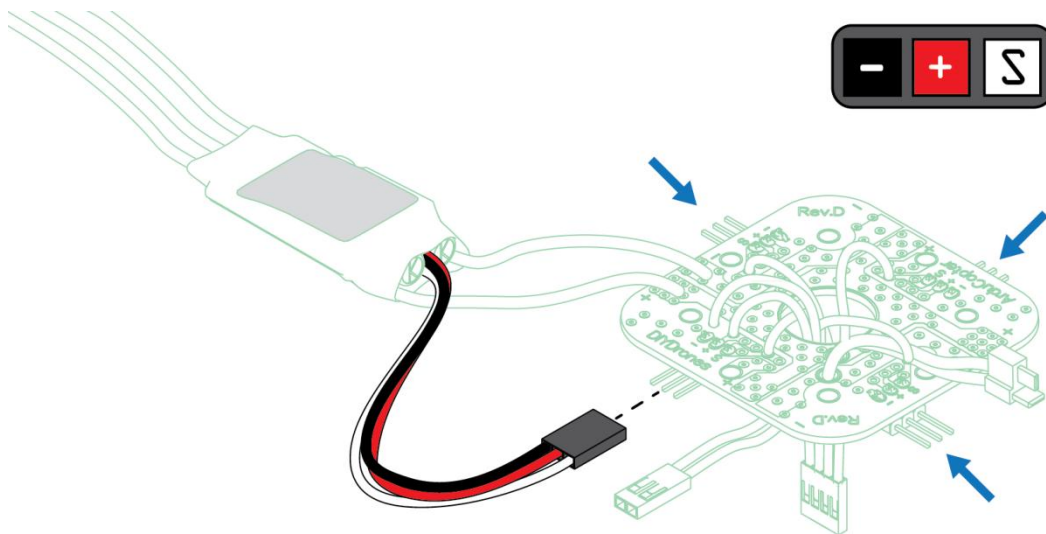
OR



If you have Deans (T) connectors soldered to ESC cable, you should solder **four “Female” Deans (T) connectors to the PDB**. Take note of the labeling on the connector and on the PDB.

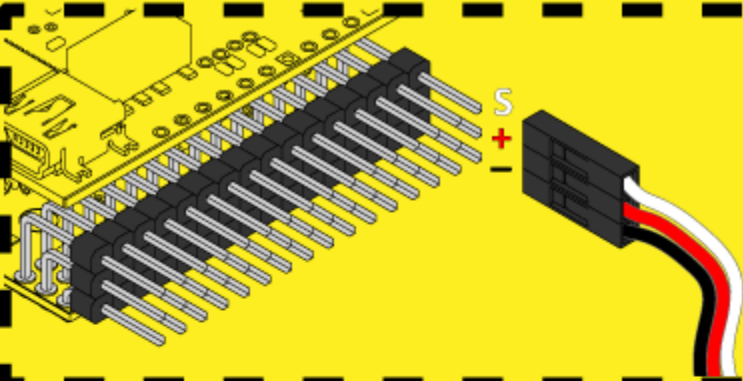



Before connecting the battery, check that all cables are soldered to the corresponding holes shown above. **Short circuiting the battery will lead to ignition or an explosion!!!**




When connecting the ESC to the **3-pin right angle headers**, take note of the labeling on the PDB.

Connecting PDB and RC receiver to the APM






WARNING



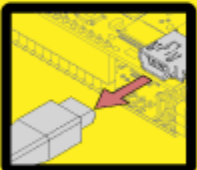
Be careful when plugging in your RC equipment! Inserting connectors upside down or offset can short-circuit BOTH the ESC BEC and APM board!



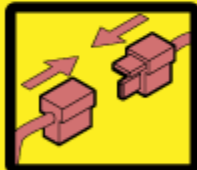
Do not connect or disconnect Servos, ESCs, or sensors while the APM board is powered !

If you connect too many peripherals to APM, it may not have enough USB power to run properly, causing "brown-outs."

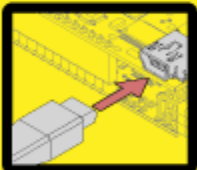
If the LEDS are dim or APM reboots erratically:




1. Disconnect USB !



2. Connect a LiPo battery to ESC or external BEC.

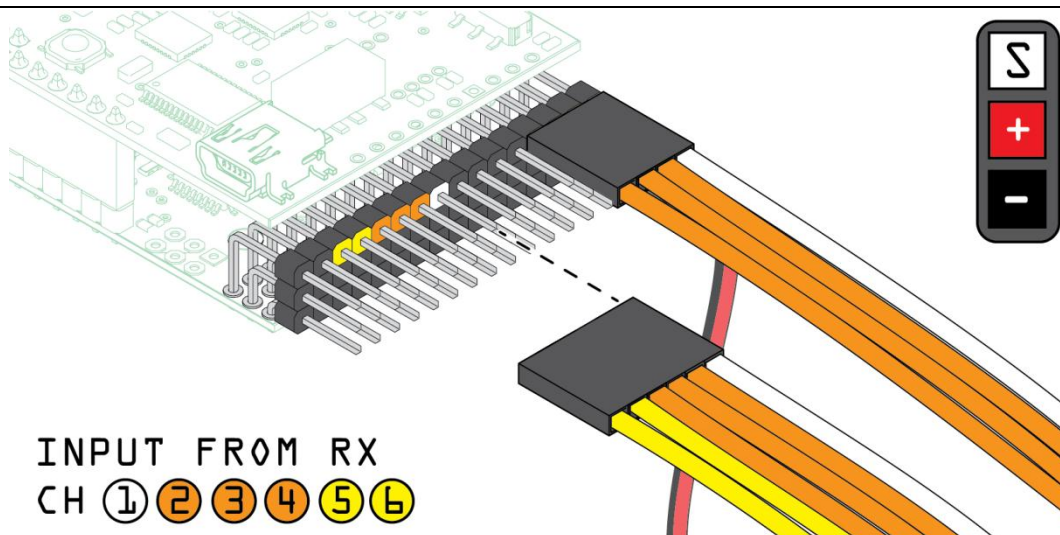
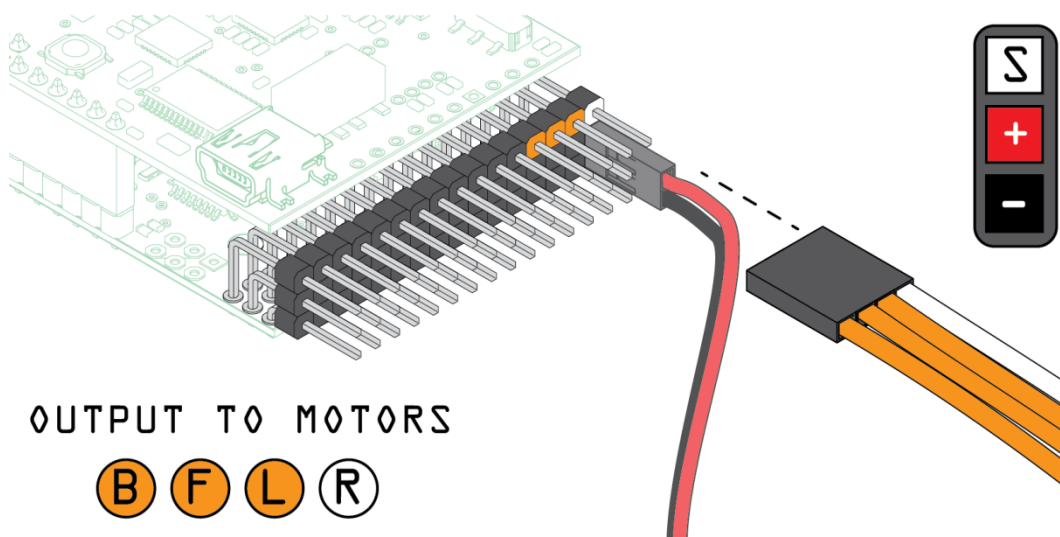
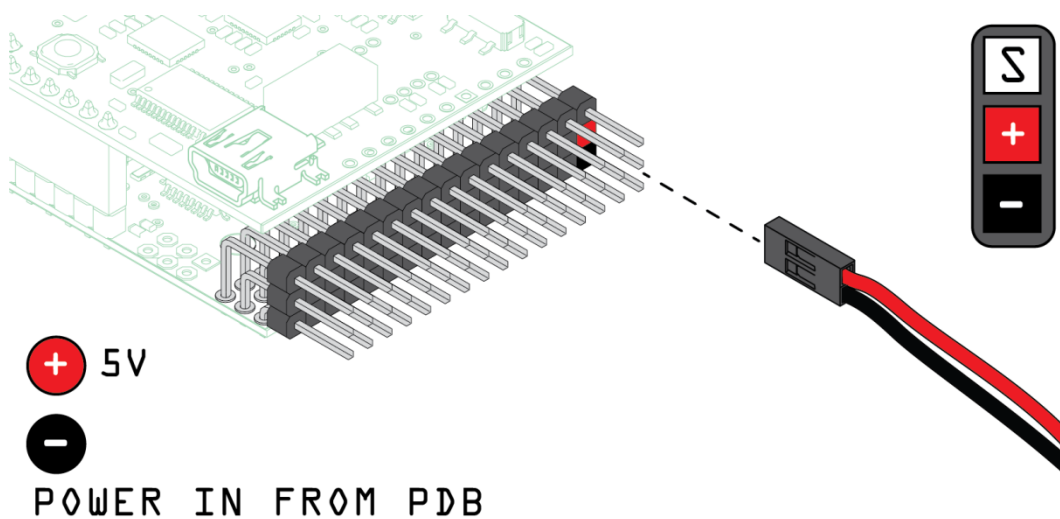


3. Connect to USB again.

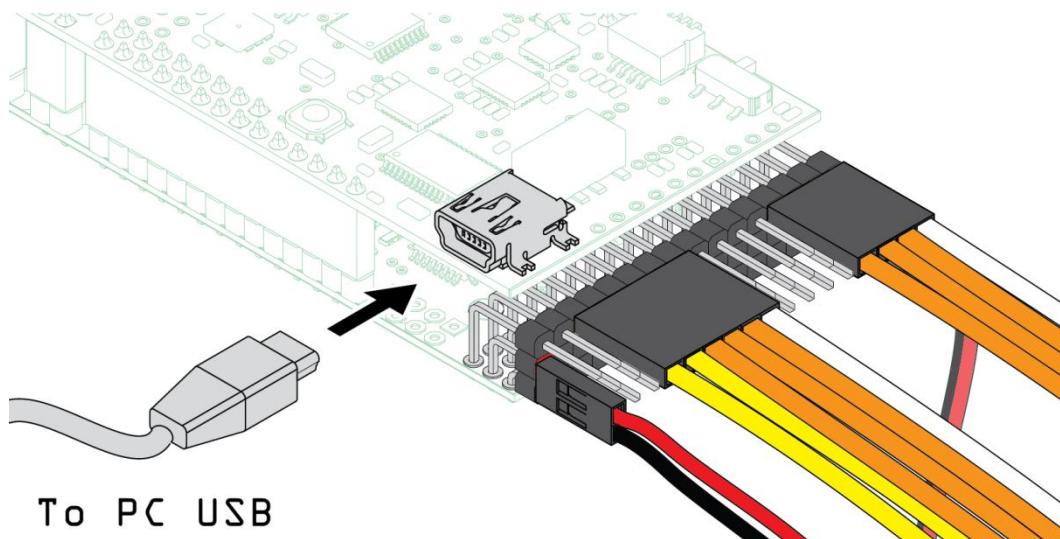
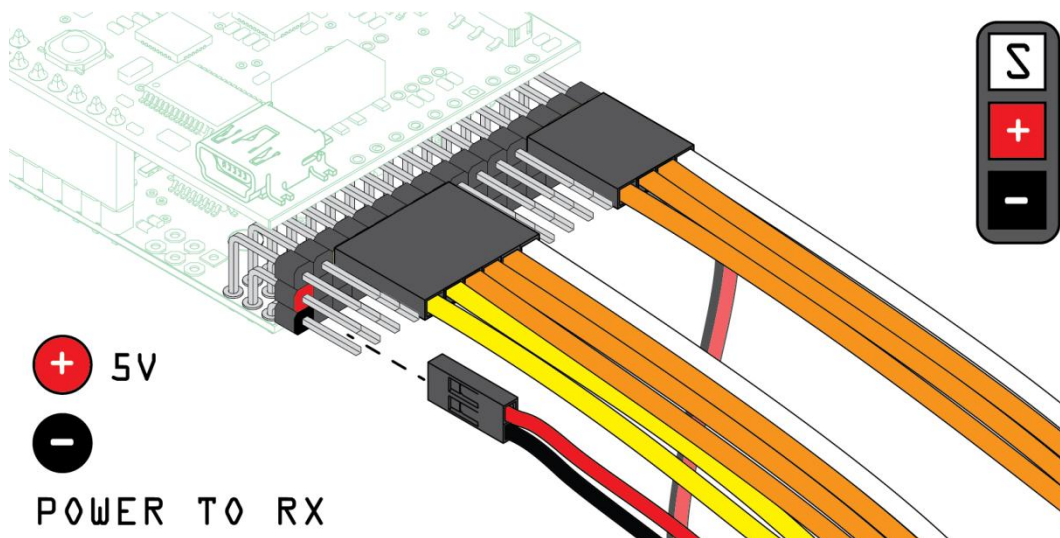


The servo and sensor pins for APM operate at 3-5 Volts. Applying higher voltages will cause permanent damage to APM !

**Brown-outs are not harmful to the APM hardware, but the code will not run until proper voltage is restored.*



Channel order might differ on different receivers.



CONGRATULATIONS! You have successfully connected your ArduPilot Mega with the IMU and soldered the PDB!
Now, move on to the next chapter and get one step closer to flying!