



## Beginners Guide to Connecting Your RC Plane Electronic Parts

by [Enjoying Electronics](#) on September 17, 2013

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Hey! I'm 15 and enjoy learning about electronics. I am self-taught. Pretty much I'm just reading stuff online. I'm at the moment trying to get through Semiconductor, NJATC. I'm also trying to learn to program my Arduino!

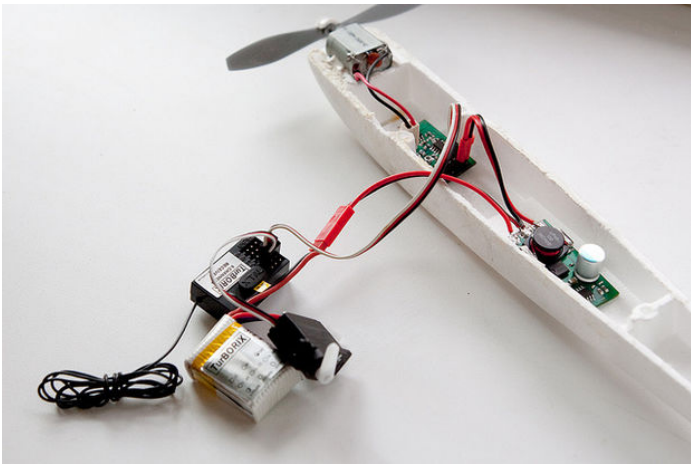
**Intro: Beginners Guide to Connecting Your RC Plane Electronic Parts**

I'm into building RC planes. One problem I had was that couldn't find a guide to the basics of connecting all the electronics parts together (on instructables). Hopefully this i'ble will help you get started with your RC plane.

My goal is to give you a general idea of what each component is show you how to hook them up.

Biolethal made a very good instructable on a COMPLETE guide to RC electronics so for more detail on each part please read his i'ble. While he thoroughly explains each component, he doesn't explain how to hook it all up. That is the goal of this i'ble to explain how to connect everything.

See his i'ble @ <http://www.instructables.com/id/The-Complete-Guide-to-RC-Electronics/>



**Step 1: Transmitters**

The transmitter is what you use to control your plane with. This is usually the most expensive electronic component that you will buy. Most standard transmitters cost around 60 bucks.

Most modern transmitters us a 2.4 Ghz frequency. These new ones have shorter antennas and are easier to work with.

The transmitter that I use the HobbyKing's transmitter. It cost 25 dollars for the transmitter AND the receiver. Its probably the cheapest 6 channel on the market today.

Speaking of a 6 channels what does that mean? There are 3-,5-,6-channel transmitters and so forth. Channels are the amount of things you can control. For instance a three channel transmitter means you can only control three motors/servos/accessories. A standard RC transmitter you buy for a RC plane has 6 channels. These channels are controlling the rudder, elevator, ailerons, motor, Aux 1, and Aux 2. So basically each channel controls a different motor.

Aux 1 and Aux 2 are reserved for different features on your plane. For instance you could have 2 bomb drops, or 1 bomb drop and a set of lights. The auxiliaries are usually controlled extra switches or knobs on the transmitter.



**Image Notes**

- 1. AUX 1
- 2. AUX 2

## Step 2: Receivers

The receiver is what goes into your aircraft and controls the servos and motor(s). You can see from this receiver that it is a 6 channel receiver. The BAT slot is not considered a channel. The receiver shown above was only 10 dollars as opposed to around 20.

The receiver runs off of 5v, and sends signals to the servos to turn them. It also sends a signal to the ESC (we'll talk about that later) to tell it how fast to run the motor.

**Make note: Each receiver will only bind with a specific brand and type of transmitter. Make sure you buy a matching pair transmitter/receiver.**



## Step 3: ESC (Electronic Speed Controller)

### ESC basic info

ESC. An Electronic Speed Controller does several things. First, it converts your battery voltage down to 5v which is what your receiver runs off of. Not all speed controllers have this capability. When buying one what you are looking for is an ESC which says on it BEC or UBEC. This stands for [ (Universal) Battery Elimination Circuit.]

The second thing the ESC does is it converts the DC power from your battery to an AC current which is required by the motor. Brushless motors run off of AC current.

### Choosing an ESC.

When picking out an ESC there is one very key feature to look out for. That is the amperage rating. Each motor will take a different amount of amps. Say I have a motor that pulls 10 amps. I do not want to buy an ESC that is rated for 10 amps. I would want to get an ESC that is rated for 15 or 18 amps. It is always good to go higher. The higher amp-rated ESC you get the less heat will be radiated.

Speaking of heat, this ESC can get very warm at times! That's why it is important to get an ESC with an amperage rating higher than your motor or your motor will pull too many amps through the ESC and cause the ESC to overheat and possibly catch fire.

Then you risk a fire and burning up your RC plane! That would be horrible! Then your plane would go down in flames onto your neighbors hay barn, catch that on fire, then the fire starts spreading. . . I'm just kidding, well about it burning everything up part :D.



#### Step 4: Battery

Batteries have several different characteristics. LiPo batteries are standard for the RC hobby.

The first thing to talk about is the battery's voltage. While the battery's exact voltage may not be printed on the battery itself it will tell how many cells the battery has. LiPo batteries are made up of cells. Each cell is 3.7 volts. For example the battery shown above is a 2s battery. This means that it has 2 cells, which would give it a total voltage of 7.4 volts.

The next thing is the Amp capacity. The battery shown above is a 2200 Mah battery. This means the battery can supply 2200 Mah over a 1-hour period.

Finally there is the discharge rate. This particular battery has a 25c discharge rate. This is how much current the battery is able to supply.



#### Step 5: Motor

Your motor is the powerplant of your plane. The motor will turn your propeller at a high speed to propel it through the air!

The standard motor that you put in your RC plane runs off of AC current. This is why you need a speed controller to convert the battery's DC power into AC.

When choosing a motor there are two basic things you need to look for.

RPM. The motor above runs at 1400 KV. KV means that for every volt applied motor will spin 1400 times.

Power rating. The motor below is 52 watts. In order to find the wattage of the motor multiply the max current of the motor by the voltage applied to it. This motor pulls 7 amps and uses a 2s battery (7.4v) so  $7 \times 7.4 = 51.8$

This motor is suggested for a 275 gram plane.



## Step 6: Servos

Servos are what move your control surfaces. The servos plug into the receiver. The ailerons plug into channel 1 on the receiver and the elevator plugs into channel 2 on your receiver.



Servo motor used in RC Airplanes

## Step 7: Soldering

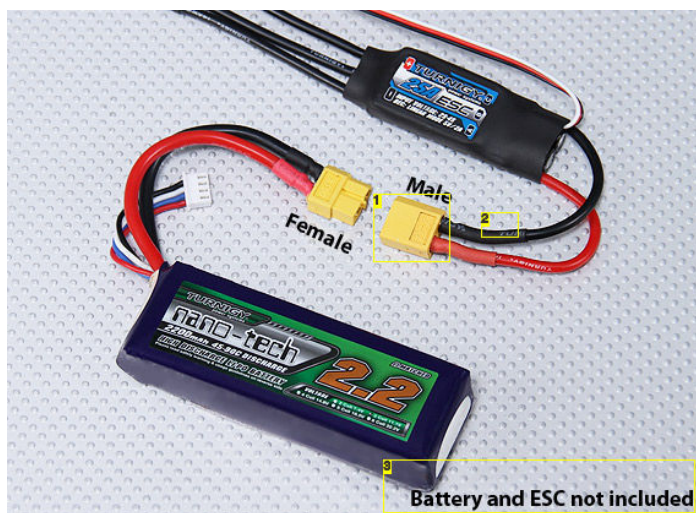
When you get your speed controller it will not have all the connectors necessary to hook everything up so you will need to pull out your soldering iron and heat shrink and get to work! The speed controller hooks up to three things, the motor, the battery, and the receiver. With that in mind. . .

First find out what type of battery connector is on your battery. The type of plug that was on the battery shown above was an XT60 type. This means you will need to buy one male XT60 connector for your ESC. (the two big wires from the ESC connect to the battery)

Make sure when you solder the wires on that they are in the correct polarity. You can 'half plug' the two connectors together and make sure that the red and black wires match. Make sure to cover any exposed wires with heat shrink.

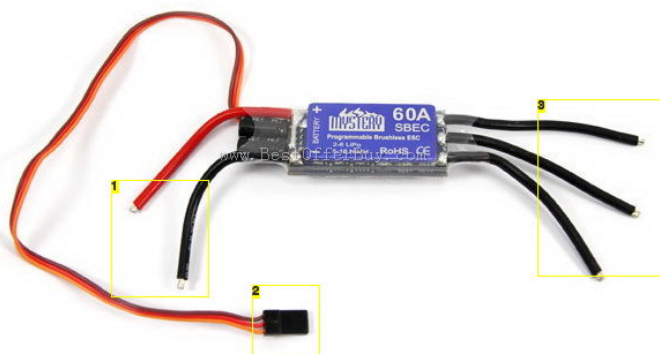
Now you need to add the connectors that go to the motor. On the specifications for your motor it should tell you what type of connectors are on. For instance, the motor shown above comes with 3.5 mm 'bullet' connectors. In order to connect this to the ESC, you will need 3x 3.5mm bullet FEMALE connectors. Solder these three onto the three wires coming out of the ESC. Again, make sure all exposed wires are covered in heat shrink. Now slide the male connectors from the motor to the three female connectors coming from the ESC. Make note, it does not matter which order you plug them in for now. See the last image to see the motor attached to the ESC.

Refer to pictures for further instruction.



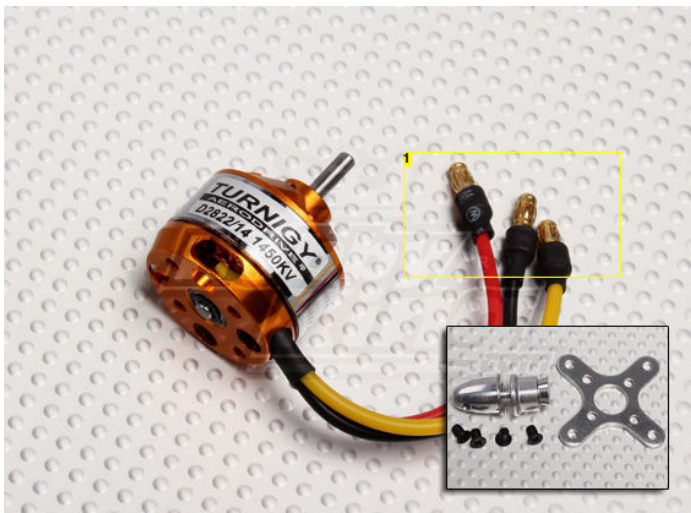
### Image Notes

1. XT60 type. Remember, for the ESC you will need a MALE connector.
2. Make sure when you solder the wires on that they are in the correct polarity. You can 'half plug' the two connectors together and make sure that the red and black wires fit. Make sure to cover any exposed wires with heat shrink.
3. Ignore this :D

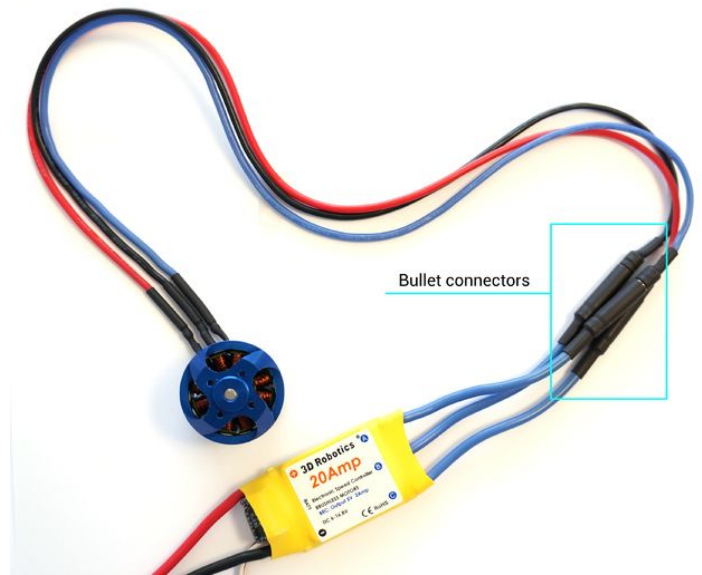


### Image Notes

1. These two connect to the battery.
2. This connects to the receiver
3. These wires go to the motor. On these three wires gets soldered the 3.5 mm FEMALE connector.



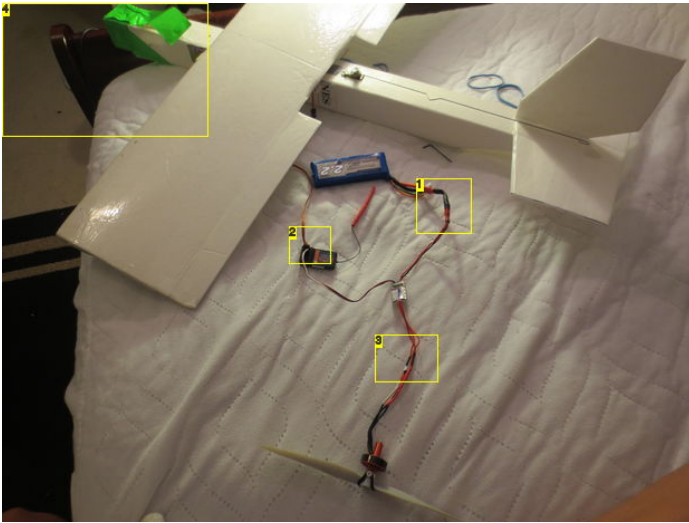
**Image Notes**  
1. 3.5 mm connectors.



### Step 8: Connecting it all up!

Make sure when you connect anything to the receiver that you push in the servo leads so that the brown wire (negative) faces AWAY from the text on the receiver.

1. Connect the battery and the ESC
2. ESC servo lead to channel 3 on receiver. **You plug this into channel three and NOT the BAT slot.** You would plug the battery into the BAT slot if you were making a plane without a motor, i.e. a glider.
3. ESC to the motor. Connect the three wires in any way. You can change this later.



**Image Notes**  
1. Battery-->ESC  
2. ESC-->Channel 3 on Receiver  
3. ESC-->Motor  
4. My EPIC foamboard plane! This thing cost 3 bucks to make! Shhh, I may might make in I'ble on it!

### Step 9: Binding the Receiver to the Transmitter

So now you have everything hooked up, but when you turn on the transmitter, nothing happens! Well this is because you haven't bound the receiver to the transmitter.

#### Binding the receiver.

When you get the receiver it has to be bound to the transmitter. If your transmitter is not bound to the receiver than you will not be able to control anything. The steps below are for binding this specific receiver, but works with others too. Consult your manual for further instruction.

1. Plug the bind plug into the BAT slot.
2. Plug in the power connector from your ESC. Make sure you have the ESC connected to the motor and the battery.
3. The red light on the receiver should start flashing
4. Turn on your transmitter holding down the bind switch. The bind switch must already be pressed before transmitter power-up.
5. Wait a few second and if you see the red light on the receiver stop flashing then you have successfully bound it!

## Step 10: Where To Buy Parts

RC electronics have been continually been getting cheaper. All the electronic shown in this instructable were taken from HobbyKing. Hobbyking is one of the cheapest web sites online. Please visit [www.hobbyking.com](http://www.hobbyking.com) to check out their incredibly low prices.

## Step 11: Conclusion:

I hope this has been helpful to you in understanding what parts need to be connected to what. If you have any question feel free to PM me or to leave a comment! Don't forget to vote!

## Related Instructables



**The Complete Guide to RC Electronics** by biolethal



**Sturdy Quadcopter Build** by Chris\_Schroeder



**Simple Trainer RC Plane 'Nut Ball' from Scratch (Photos)** by the merog



**Radio Control - au electronics** by nonickname



**A Wide-Body Quadrotor - designs and ideas to build your own.** by vtxstar



**Radio Controlled Cardboard Hovercraft** by Pib2