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[Home](#) > [ELEV-8 Tutorials](#) > [ELEV-8 v3 Quadcopter Assembly Guide](#)

ELEV-8 v3 Quadcopter Assembly Guide

Congratulations and thank you for purchasing a Parallax [ELEV-8 v3 Quadcopter](#) [1], designed and manufactured in California, USA. If you require assistance, please do not hesitate to [e-mail](#) or [call us](#) [2].

These instructions are for the Parallax [ELEV-8 v3 Quadcopter](#) [1] (#80300) in its standard configuration. (If you have the [ELEV-8 v2](#) [3], go to the [v2 Assembly Guide](#) [4] instead.) To work offline or from paper, Click on the "Printer-Friendly Version" link at the bottom-right corner of this page (it may take several minutes to load). Be advised it's around 100 pages when printed.



If you have an ELEV-8 Quadcopter you must register it with the [Federal Aviation Administration's UAS Registry](#) [5] before flying outdoors.



Preparation

This guide will take you through assembly and configuration of your ELEV-8 v3 Quadcopter Kit. But first, go through the Preparation list below.



Please do not rush through the assembly and testing process! Go slowly and don't skip anything, to avoid a dysfunctional quadcopter and extensive troubleshooting. It never hurts to double-check your work at each step!

1. Read both sides of the [ELEV-8 v3 Package Insert](#) ^[6] included with your kit. Please pay close attention when reading all of the important safety and liability information; building a Quadcopter is a rewarding but potentially dangerous undertaking, so it is critical that you have an understanding of the risks involved to maximize enjoyment and minimize danger.
2. Carefully cross-check the contents of your kit with the insert's Bill of Materials. If you are missing anything, email sales@parallax.com or call our Sales folks (888-512-1024). Note that some items are small sub-kits with parts not listed separately. (Also, parts and quantities are subject to change without notice).
3. BEFORE beginning assembly of your ELEV-8 v3 Quadcopter, please read the entirety of the [UAV Safety, Laws, and Good Citizenship](#) ^[7] tutorial. It will only take about 30 minutes and will help keep you & your ELEV-8 safe and out of trouble.
4. Read through the entire assembly guide before beginning, so you know what to expect. Assembly and testing takes about 5 to 10 hours, depending on your skill level, tools, experience, and workspace.
5. Gather up your kit, necessary tools, and the Additional Items Required (below), and take them to a roomy, well-lit and comfortable work area.
6. After educating yourself on the safe and proper use of Lithium-Polymer (LiPo) batteries, charge your LiPo battery.



BEFORE beginning assembly of your ELEV-8 v3 Quadcopter, please read the entirety of the [UAV Safety, Laws, and Good Citizenship](#) ^[7] guide. The owner, operator, and pilot of every ELEV-8 v3 are to abide by all laws, regulations, and guidelines, including, but not limited to, those detailed in the aforementioned document. Reading and abiding by the entire [UAV Safety, Laws, and Good Citizenship](#) ^[7] document could help prevent property damage, personal injury, prosecution, and fines.

Additional Items Required

These items are required for ELEV-8 v3 Quadcopter flight and are NOT included in your basic kit.

- Radio Control Transmitter and Receiver; 5-channel minimum required for flight. We recommend the Spektrum DX6 transmitter and Spektrum AR610 receiver, providing one extra channel for simple projects. If you anticipate building complex applications in the future, consider the [Spektrum DX7](#) ^[8] or DX8 and Spektrum AR8000 receiver.
- An 11.1 (3-Cell) Lithium Polymer (LiPo), with at least 3000 mAh capacity, 25C discharge rate, and an EC3 connector. Parallax's [3300 mAh LiPo battery](#) ^[9] and [5300 mAh LiPo battery](#) ^[10] are well suited for your ELEV-8 v3.
- A [LiPo Balance Charger](#) ^[11] for recharging your quadcopter's battery. Only use a charger with balance capabilities and designed for LiPo batteries; others can cause the battery to flame and release toxic smoke.
- A Windows 7/8 computer (not RT) with an available USB port, for the Ground Station software.
- A [USB A to Micro B cable](#) ^[12], for connecting your ELEV-8 Flight Controller to your computer.

We also recommend the [ELEV-8 Crash Pack \(#80380\)](#) ^[13]. Crashes are an inevitable part of the learning process, and having to wait around for replacement parts is always a bummer.

Additional Tools Required

- Paper Towels or other disposable work surface/wipes
- [#1 Philips Head Screwdriver](#) ^[14]
- Needle-Nose Pliers (optional)
- Book or Box approximately 1 ¼" tall, slightly larger than the top chassis plate
- Removable Tape
- [Scissors](#) ^[15]
- [Permanent Marker](#) ^[16] (or Paint Pen)

- [Flat-Nose Pliers](#) [17]
- [Diagonal Cutters](#) [18]
- [Small Flat-Head Screwdriver](#) [19] (optional)
- [5/16" Wrench, 5/16" Socket, or Adjustable Wrench](#) [20]

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Section 1: Assemble the Booms

In this section, you'll be assembling the four booms, or "arms" for your ELEV-8 v3.



Warning! As tempting as it may be, DO NOT attach the propellers or propeller adapters to the motor yet. In fact, you won't need them until the very last step, so go ahead and stash them away for the moment.

This section will take approximately 1 to 2 hours, depending on your skill level and equipment.

Tools Needed in this Section

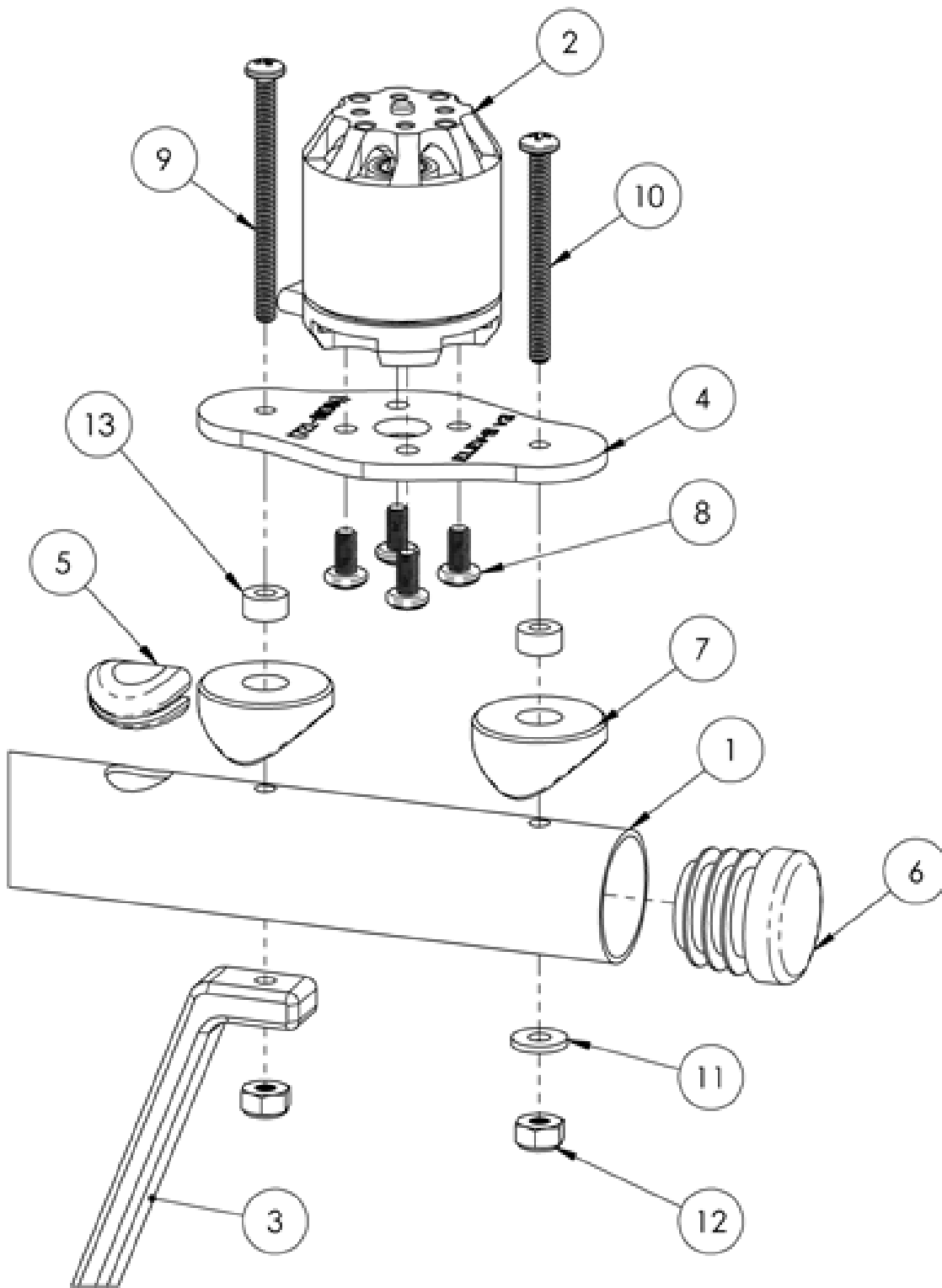
- 1.5 mm Hex Key (#725-00067, included in Kit)
- Paper Towels or other disposable work surface/wipes
- [#1 Philips Head Screwdriver](#) [14]
- Needle-Nose Pliers (optional)



Tip! For your reference, wherever hardware is included in a Parts list, just click on the item link to open [this image](#) [21] in a new window.

Parts Needed in this Section

- 2 - ELEV-8 v3 Boom - Silver (Clear) (#730-00065), #1 in drawing below
- 2 - ELEV-8 v3 Boom - Blue (#730-00066), #1 in drawing below
- 4 - KEDA 1000kV Outrunner Motor (#750-90010), #2 in drawing below
- 4 - Landing Gear (#721-80007), #3 in drawing below
- 4 - ELEV-8 v3 Motor Mount (#721-80304), #4 in drawing below
- 4 - Black Rubber Grommet (#700-00140), #5 in drawing below
- 4 - Plug, Fits 3/4"OD Tube (#700-00145), #6 in drawing below
- 8 - Saddle Washer, 3/4" (#712-00010), #7 in drawing below
- 16 - [Machine Screw, M3-0.5 x 6mm](#) [21], #8 in drawing below
- 4 - [Machine Screw, #4-40 x 1 1/2"](#) [21], #9 in drawing below
- 4 - [Machine Screw, #4-40 x 1 1/4"](#) [21], #10 in drawing below
- 4 - [Flat Washer, #4](#) [21], #11 in drawing below
- 8 - [Locknut, #4-40](#) [21], #12 in drawing below
- 8 - [Nylon Spacer, #4 x 1/8" Length](#) [21], #13 in drawing below
- 1 - Loctite® Threadlocker Blue 242® (#700-00106)



A PDF of the above drawing is available for download [here](#). [22].

Step 1: Loctite® Motor Set Screws

Apply Loctite® to the motor set screws to prevent them from loosening during flight and potentially causing equipment failure.

Tools Needed:

- Paper Towels or other disposable work surface/wipes
- 1.5 mm Hex Key

Parts Needed:

- 4 – KEDA 1000kV Outrunner Motor (#750-90010)
- 1 – Loctite® Threadlocker Blue 242® (#700-00106)

Instructions:

1. Using the hex key, carefully remove the motor set screw from each motor. The screws may be very tight; be careful not to break your hex key. If your motors have two set screws, remove only one at a time.



Tip! To open the Loctite® twist off the cap. When you are done, use the other end of the cap to seal the Loctite®, you'll need it a few more times in the assembly process.

2. For each motor, apply a small amount of Loctite® to the set screw threads and carefully reinstall the screws. Seat each screw firmly but do not over-tighten. Work over a paper towel or other disposable work surface for easy cleanup! If your motors have two set screws, remove and Loctite® the second set screw only after reinstalling the first one.



3. Allow the Loctite® to set for 10 minutes; it will fully cure in 24 hours.

Step 2: Attach Motors to Motor Mounts

Before the motors can be attached to the Booms, they need to be connected to the Motor Mounts, which are one of the sacrificial parts of the ELEV-8 v3.

Sacrificial parts are intentionally engineered to fail under excess mechanical stress. They are engineered to fail first, thus protecting other parts of the system, just as an electrical fuse protects an electrical circuit. In this case, the motor mount is engineered to break before the motor is damaged in most (but not all) crashes, since it is less expensive and easier to replace than the motor.

Tools Needed:

- #1 Philips Head Screwdriver

Parts Needed:

- 4 – KEDA 1000kV Outrunner Motor (#750-900010)
- 4 – ELEV-8 v3 Motor Mount (#721-80304)
- 16 – [Machine Screw, M3-0.5 x 6mm](#) [21]



Tip! For your reference, wherever hardware is included in a Parts list, just click on the item link to open this image in a new window.

Nylon Machine Screw
#4-40 x 5/8"
(4)



Nylon Hex Nut
#4-40
(4)



Nylon Spacer
#4-40 x 1/8"
(28)



Nylon Spacer
#4-40 x 3/16"
(4)



Machine Screw
M3-0.5 x 6 mm
(16)



Aluminum Standoff
#4-40 x 7/8"
(4)



Stainless Steel
Flat Washer
#4
(4)



Stainless Steel
Nylon-Insert Locknut
#4-40
(16)



Machine Screw
#4-40 x 3/8"
(8)



Machine Screw
#4-40 x 1 1/4"
(4)



Machine Screw
#4-40 x 1 3/8"
(4)



Machine Screw
#4-40 x 1 1/2"
(4)



Machine Screw
#4-40 x 1 5/8"
(4)



Instructions:

1. Hold the motor upside-down (the wires come out the bottom of the motor), and place a mount plate over it so that the holes in the mount line up with those in the motor, and the motor wires come out of the end of the mount. You may need to flip or rotate your mount around (so it may not match the shown image).



2. Lay the four motor screws out on a paper towel or other disposable work surface. Place a drop of Loctite® on the threads of each screw.



3. One at a time, insert four screws into the inner-most holes on the motor mount bottom, making sure to line up with the threaded holes in the bottom of the motor. Tighten with the screwdriver.



4. Repeat this process for the three remaining motors.



Step 3: Feed Motor Wires Through Booms

The extension wires are feed through the booms to protect them, and it's easiest to do so before the motors are mounted. Grommets are used to protect the wires from the sharp edges of the holes

Tools Needed:

- Needle Nose Pliers (optional)

Parts Needed:

- 4 – Motor/Mount Assemblies from Step 2
- 2 - ELEV-8 v3 Boom - Silver (Clear Anodized) (#730-00065)
- 2 - ELEV-8 v3 Boom - Blue (#730-00066)
- 4 - Black Rubber Grommet (#700-00140)

Instructions:

1. Feed the three cables of one of the motor assemblies through one of the grommets.



2. Slide the grommet all the way to the motor.



3. Feed the three cables of one of the motor assemblies through the large hole on the side of one of the booms, towards the opposite end of the boom.



4. Pull/push the wires all the way through the boom until they emerge from the other end. You may find needle nose pliers helpful to pull the wires through.



5. Fit the grommet into the hole.



6. Repeat this for the other three booms.



Step 4: Bolt Motor Mount and Landing Gear to Booms

Now you will be fastening the motor mounts to the booms and attaching one side of the landing gear.

Tools Needed:

- #1 Philips Head Screwdriver
- Parallax Combination Wrench (#700-10025)

Parts Needed:

- 4 – Motor/Mount/Boom Assemblies, prepared in Step 3
- 4 – Landing Gear (#721-80007)
- 8 – Saddle Washer, 3/4" (#712-00010)
- 8 – Locknut, #4-40 [21]
- 4 – Machine Screw, #4-40 x 1 1/2" [21]
- 4 – Machine Screw, #4-40 x 1 1/4" [21]
- 8 – Nylon Spacer, #4 x 1/8" Length [21]
- 4 – Flat Washer, #4 [21]



Note: When determining which machine screw to use, use the screws with a length that is equal to or just shorter than the length listed. (Industry standard tolerance for machine screws allows them to be up to 1/16" shorter than their numerical size.)

Instructions:

1. Feed a #4-40 x 1 1/2" screw through the hole on the motor mount next to where the wires come out of the motor. Feed a #4-40 x 1 1/4" screw through the hole on the opposite end of the motor mount.



2. Slide a nylon spacer *and* saddle washer over the other end of each screw.



3. Insert the screws into the holes on the boom, and feed it through to the other side.



4. Take the *short side* of the landing gear (see the last image on this page) and feed it over the screw next to the motor wires, followed by the locknut.



5. Place a washer over the other screw, followed by a locknut.



6. Using the screwdriver and wrench, tighten (clockwise) until there is no longer a gap between any parts (including nut or screw-head). Then turn the locknut one more full rotation and stop. Do not turn more than this or you may begin to crush the boom.



7. Repeat for the other three booms.



Step 5: Insert Tube Plugs

In the final step of boom assembly, you'll be fitting plastic caps to the end of the booms, which will help protect them from impact and gives the ELEV-8 a cleaner look!

Tools Needed:

- None

Parts Needed:

- 4 – Motor/Boom Assemblies, prepared in Step 4
- 4 - Plug, Fits 3/4"OD Tube (#700-00145)

Instructions:

1. Take a tube plug and orient it such that the lines on the backside are parallel to the axis of the motor. If your plug looks different, no alignment is necessary.



2. Push the plug firmly into the end of the boom nearest the motor until it bottoms out.



3. Repeat for the other three booms.

Section 2: Assemble the Chassis

In this section, you will assemble the ELEV-8 v3 Quadcopter chassis, following the four steps below. This section will take approximately 0.5 to 1.5 hours, depending on your skill level and equipment.

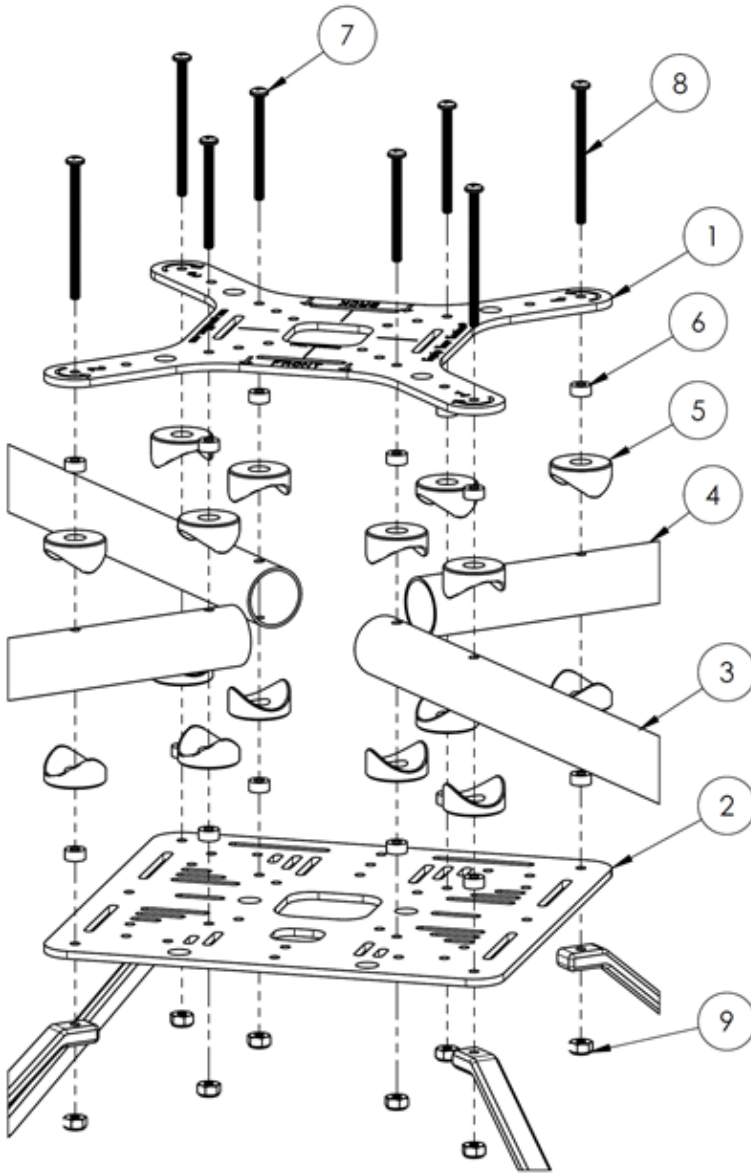
Tools Needed in this Section

- Book or Box approximately 1 ¼" tall, slightly larger than the top chassis plate
- Removable Tape
- #1 Philips Head Screwdriver [14]
- Parallax Combination Wrench (#700-10025)
- Scissors [15]

Parts Needed in this Section

- 1 – Top Chassis Plate (#721-80302), #1 in drawing below

- 1 – Bottom Chassis Plate (#721-80303), #2 in drawing below
- 4 – Motor/Boom Assemblies from Step 5, #3 & 4 in drawing below
- 16 – Saddle Washer, 3/4" (#712-00010), #5 in drawing below
- 16 – Nylon Spacer, #4 x 1/8" Length [21], #6 in drawing below
- 4 – Machine Screw, #4-40 x 1 3/8" [21], #7 in drawing below
- 4 – Machine Screw, #4-40 x 1 5/8" [21], #8 in drawing below
- 8 – Locknut, #4-40 [21], #9 in drawing below
- 4" – Foam, Adhesive-Backed (#900-00105), not pictured
- 2 – Hook and Loop Cable Tie (#900-00021), not pictured



A PDF of the above drawing is available for download [here](#) [23].

Step 6: Prepare the Top Chassis Plate

Chassis assembly starts with laying out the hardware and placing the top chassis plate upside down on an elevated surface, so that the booms can be positioned level in the next step.

Tools Needed:

- Book or Box approximately 1 1/4" tall, slightly larger than the top chassis plate
- Removable tape

Parts Needed:

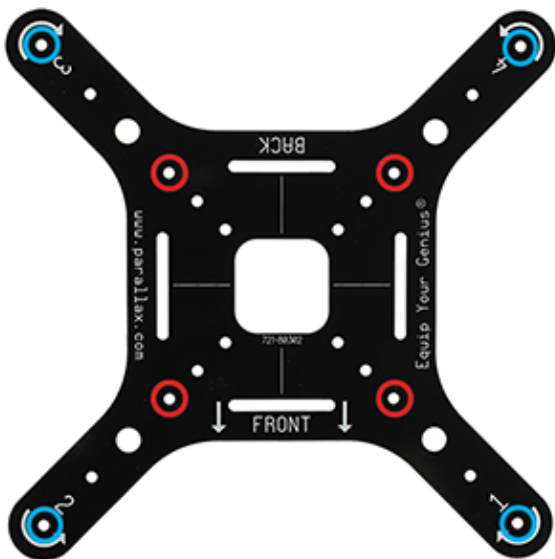
- 1 - Top Chassis Plate (#721-80302)
- 8 – Saddle Washer, 3/4" (#712-00010)
- 4 – Machine Screw, #4-40 x 1 3/8" [21]
- 4 – Machine Screw, #4- 40 x 1 5/8" [21] (or 1 3/4", depending on your kit)
- 8 - Nylon Spacer, #4 x 1/8" Length [21]

Instructions:

1. Place a small piece of tape under the bottom side of the top plate, underneath the FRONT marking (unless yours is already marked).



2. Holding the top chassis plate upright with the front toward you, place 1 3/8" screws through the holes indicated by red circles, and 1 5/8" (or 1 3/4") screws through the holes indicated by blue circles.





3. Place the book or box (shown here as foam) over the plate and hold them together as you flip them over, so that the top plate is upside-down and the front is now aimed away from you.





4. Slide a nylon spacer over each screw followed by a saddle washer.



Step 7: Connect Booms to Top Chassis Plate

Now you will carefully lay out the booms to ensure the colors are placed in the correct orientation. The clear anodized (appear silver in color) booms will be at the front, and the blue anodized booms will be at the rear.

Parts Needed:

- 4 – Motor/Boom Assemblies, prepared in Step 5
- 1 - Top Chassis Plate, prepared in Step 6

Instructions:

1. Take a silver boom and carefully slide it over the front right pair of screws, so that the landing gear is pointing upwards.



2. Repeat with the other silver boom over the front left pair of screws.



3. Put the remaining two blue booms over the back two pairs of screws.



Step 8: Attach the Bottom Chassis Plate

With everything prepared, you will now carefully attach the bottom chassis plate. Some patience will serve you well here. The ELEV-8 v3 is designed with tight tolerances to achieve the strongest and most rigid from possible, so it may take a minute or two to get everything lined up properly.

Tools Needed:

- #1 Philips Head Screwdriver
- Parallax Combination Wrench (#700-10025)

Parts Needed:

- 1 - Boom/Top Chassis Plate Assembly, prepared in Step 7
- 1 - Bottom Chassis Plate (#721-80303)
- 8 - Nylon Spacer, #4 x 1/8" Length ^[21]
- 8 - Saddle Washer, 3/4" (#712-00010)
- 8 - Locknut, #4-40 ^[21]

Instructions:

1. Over each screw, slide a nylon spacer followed by a saddle washer.



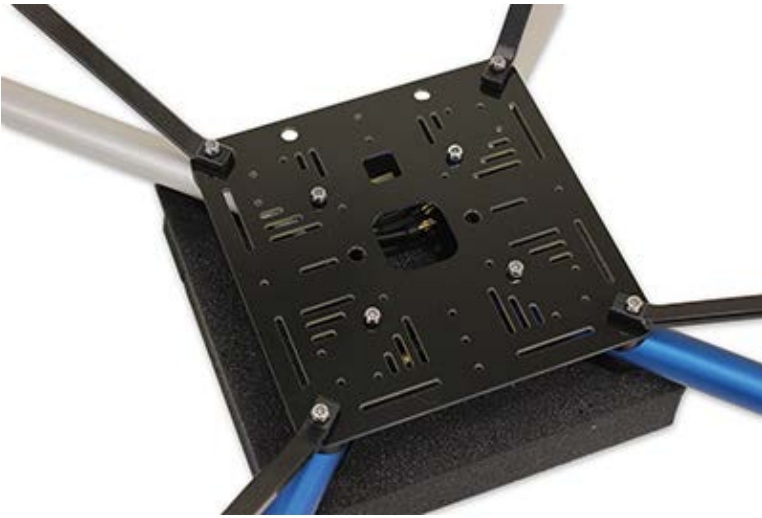
2. Slide the bottom chassis plate over the screws, so that the large hole is towards the front (farthest away from you).



3. Slide the landing gear over the outer screws.



4. Thread locknuts onto all eight screws.



5. Using the screwdriver and wrench, tighten (clockwise) all eight screws until there is no longer a gap between any parts (including nut or screw-head). Then turn the locknut one more full rotation and stop.



Step 9: Attach Battery Straps and Foam Pads

While the two hook and loop straps normally secure the battery well, some users prefer the extra security provided by the addition of two foam pads underneath the battery. Adding the foam pads more firmly secures the battery in place and also works to prevent slipping.

Tools Needed:

- Scissors

Parts Needed:

- 1 - Chassis Assembly, prepared in Step 8
- 4" - Foam, Adhesive-Backed (#900-00105)
- 2 - Hook and Loop Cable Tie (#900-00021)

Instructions:

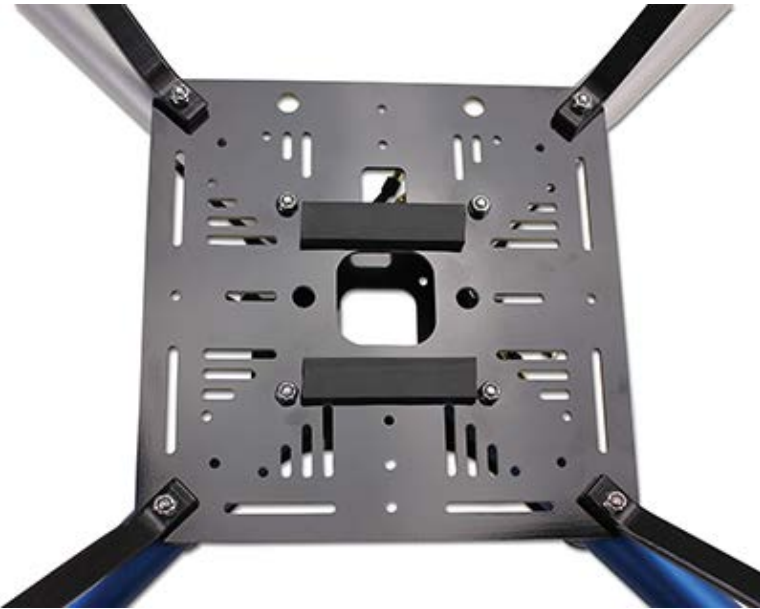
1. Using the scissors, cut the foam padding in half, creating two 2” strips.



2. Orient the ELEV-8 so that it is upside-down and facing away from you.



3. Remove the protective paper backing from each piece of foam and attach to the bottom chassis plate, as shown in the figure below.



4. Taking the narrow end of one of the hook and loop cable tie, feed it through the slot in the bottom chassis plate shown in the image below.



5. Insert the strap back into a slot three spaces away from the current one, and feed it up through the chassis.



6. Use the same procedure to install a second strap on the other side of the ELEV-8.



Section 3: Connect the ESCs

In this section, you will connect the electronic speed controllers (ESCs), following the 3 steps below.

This section will take approximately 10 to 30 minutes, depending on your skill level and equipment.

Tools Needed in this Section

- Permanent Marker [16] (or Paint Pen)
- Removable Tape (optional)

Parts Needed in this Section

- 1 – Chassis Assembly prepared in Section 2
- 4 – Parallax xRotor 20A ESCs (#750-90015)



Step 10: Connect the ESCs to the Motors

You will connect the electronic speed controllers (ESCs) to the motor cables. Don't secure (zip-tie or otherwise) the ESCs just yet; that will be done after the motor spin direction has been configured in Section 7, since it may be necessary to unplug the ESCs at that time.

Parts Needed:

- 1 - Chassis Assembly, prepared in Step 9
- 4 - Parallax xRotor 20A ESCs (#750-90015)

Instructions:

1. Arrange the wires exiting each boom at the center of the chassis so that they go to the right.



2. Connect an ESC to one of the sets of motor wires. To make the connection; firmly insert each of the connectors at the end of the motor wires into into one of the ESC's output connectors.



3. Repeat the previous instruction for each of the remaining three motors, plugging an ESC into each set of wires.

Step 11: Label ESC Signal Cables

As the number of wires and connections grows, it becomes increasingly easy to make minor mistakes in setting up the electrical connections. To minimize the risk of such a mishap, you will now label the ESCs with the motor numbers.

Tools Needed:

- Permanent Marker [16] (or Paint Pen)
- Removable Tape (optional)

Parts Needed:

- 1 - Chassis Assembly with ESCs, prepared in Step 10

Instructions:

1. Number the signal cable connectors for the ESCs, as shown in the images below, using the numbers on the top chassis plate. You may want to put a small piece of masking tape on each connector first if your marker does not show up well.



Step 12: Route ESC Signal Cables through Chassis

For a cleaner appearance and better protection, route the signal cables for the ESCs up through the center of the top chassis plate.

Parts Needed:

- 1 - Chassis Assembly, prepared in Step 11

Instructions:

1. Feed the signal cable for each ESC up through the center of the top chassis plate and off to the side of motors 2/3.



Section 4: Make the Isolation Assembly

In this section, you will make the Isolation Assembly, following the 4 steps below.

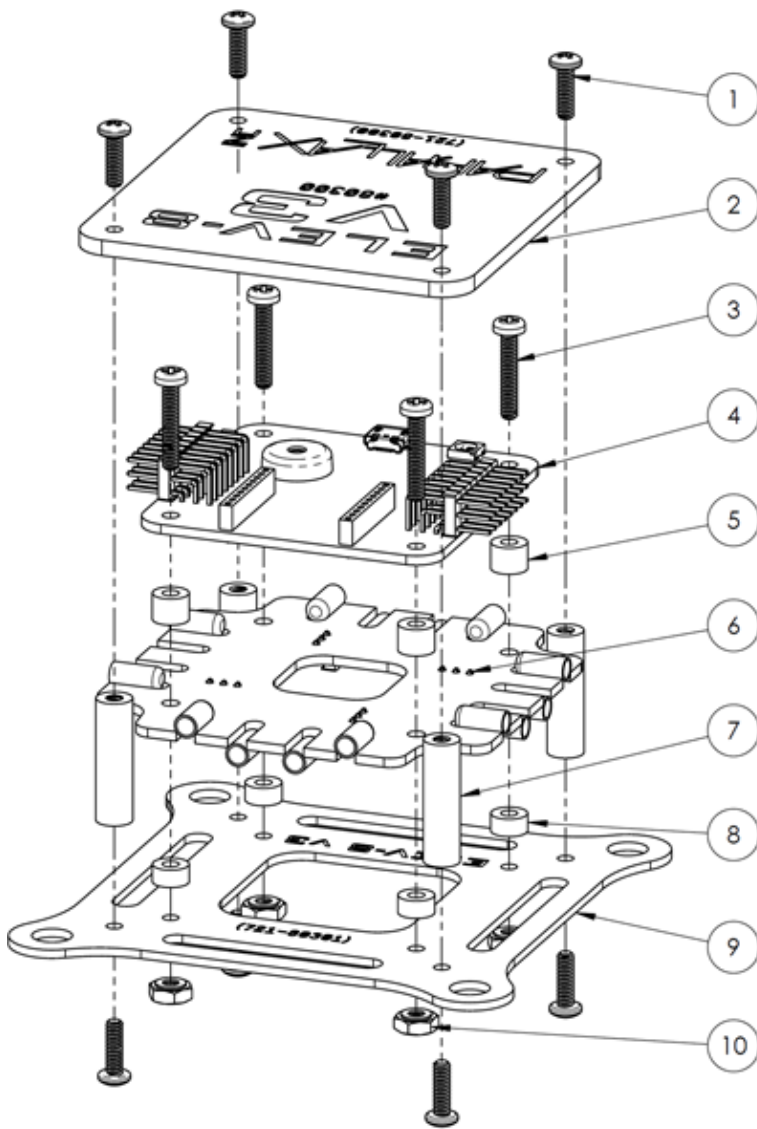
This section will take approximately 15 to 60 minutes, depending on your skill level and equipment.

Tools Needed in this Section

- Paper Towels or other disposable work surface/wipes
- #1 Philips Head Screwdriver [14]
- Flat-Nose Pliers [17]
- Parallax Combination Wrench
- Scissors [15]

Parts Needed in this Section

- 8 - Machine Screw, #4-40 x 3/8" [21], #1 in drawing below
- 1 - ELEV-8 v3 Flight Controller Cover (#721-80300), #2 in drawing below
- 4 - Nylon Machine Screw, #4-40 x 5/8" [21], #3 in drawing below
- 1 - ELEV-8 Flight Controller (#80204), #4 in drawing below
- 4 - Nylon Spacer, #4 x 3/16" [21], #5 in drawing below
- 1 - ELEV-8 Power Distribution Board (#80361), #6 in drawing below
- 4 - Standoffs, #4-40 x 7/8" [21], #7 in drawing below
- 4 - Nylon Spacer, #4 x 1/8" [21], #8 in drawing below
- 1 - Isolation Plate (#721-80301), #9 in drawing below
- 4 - Nylon Hex Nut, #4-40 [21], #10 in drawing below
- 1 - 3-Wire Servo Extension Cable, 4" (#800-00040), not pictured
- 1 - Foam, Open-Cell Block (#900-00106), not pictured
- 1 - Loctite® Threadlocker Blue 242® (#700-00106), not pictured



A PDF of the above drawing is available for download [here](#) [24].

Step 13: Bolt Standoffs to Isolation Plate

Assembly of the Isolation System starts with bolting the aluminium standoffs to the Isolation Plate. These bolts will face upwards, so it is best practice to use some method of threadlocking to keep them secure. Here, we will be using Loctite®.

Tools Needed:

- Paper Towels or other disposable work surface/wipes
- #1 Philips Head Screwdriver [14]
- Flat-Nose Pliers [17]

Parts Needed:

- 1 - Isolation Plate (#721-80301)
- 4 - Screws, #4-40 x 3/8" [21]
- 4 - Standoffs, #4-40 x 7/8" [21]

Instructions:

1. Over a disposable work surface, apply a *small* drop of Loctite® to one end of each standoff. After it "soaks in" wipe off any excess that remains on the end surface fo the standoff.



2. Feed a screw through one of the holes indicated in the image below. Thread on a standoff from the opposite side and hold pliers while you use the screwdriver in the other hand to tighten. Tighten until you start to feel resistance, and then one ¼ turn.



3. Repeat this for the remaining three standoffs.



Step 14: Mount the Flight Controller and PDB

It's now time to secure the flight controller and power distribution board. Nylon (plastic) hardware is used here to reduce the risk of damage to the boards from over-tightening, and because they are non-conductive.

Tools Needed:

- [#1 Philips Head Screwdriver](#) [14]
- Parallax Combination Wrench

Parts Needed:

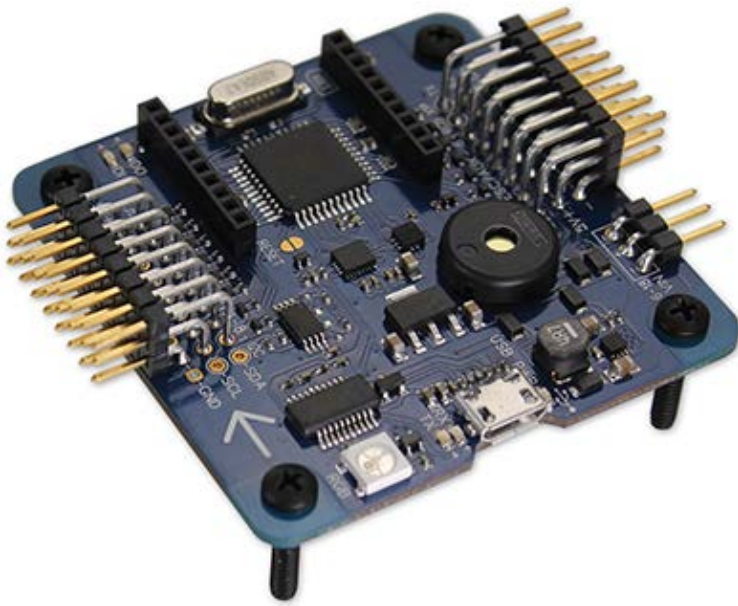
- 1 - Isolation Plate assembly, prepared in Step 13
- 1 - ELEV-8 Flight Controller (#80204)
- 1 - ELEV-8 Power Distribution Board (#80361)
- 4 - [Nylon Machine Screw, #4-40 x 5/8"](#) [21]
- 4 - [Nylon Spacer, #4 x 3/16"](#) [21]
- 4 - [Nylon Spacer, #4 x 1/8"](#) [21]
- 4 - [Nylon Hex Nut, #4-40](#) [21]



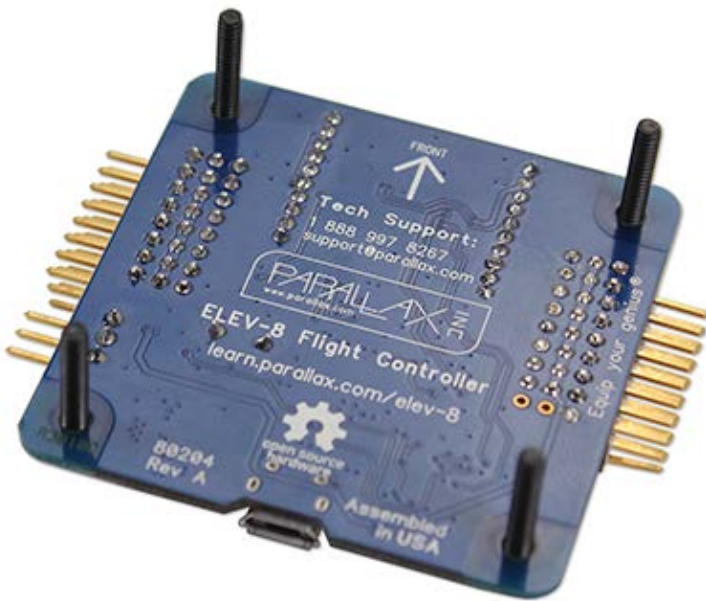
Warning! The ELEV-8 Flight Controller is a sensitive piece of electrical equipment. Handle it with care, and do not expose it to water or static electricity.

Instructions:

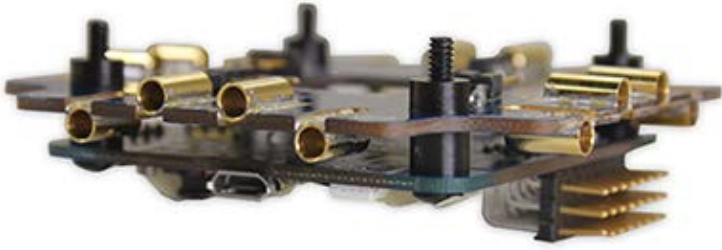
1. Feed the nylon machine screws through the holes in the flight controller.



2. Holding the screws in place (with your hand or some tape), carefully flip the flight controller over. You'll need to hold the screws like this for the remainder of this step.



3. Slide the 3/16" nylon spacers over the four screws.
4. Slide the power distribution board down over the four screws, *so that the side with the headers and name is facing up* (while the assembly is upside-down).
5. Slide the 1/8" nylon spacers over the four screws.



6. Slide the isolation plate assembly over the four screws with the standoffs facing downward (while the assembly is upside-down).
7. Thread a nylon hex nut onto each of the four screws. Tighten each screw with the screwdriver and wrench until you start to feel resistance, and then *only one ¼ turn more*.



Step 15: Install the FC Power Cable

Before the Isolation Assembly is attached to the chassis, the cable that will provide power the the flight controller is attached.

Parts Needed:

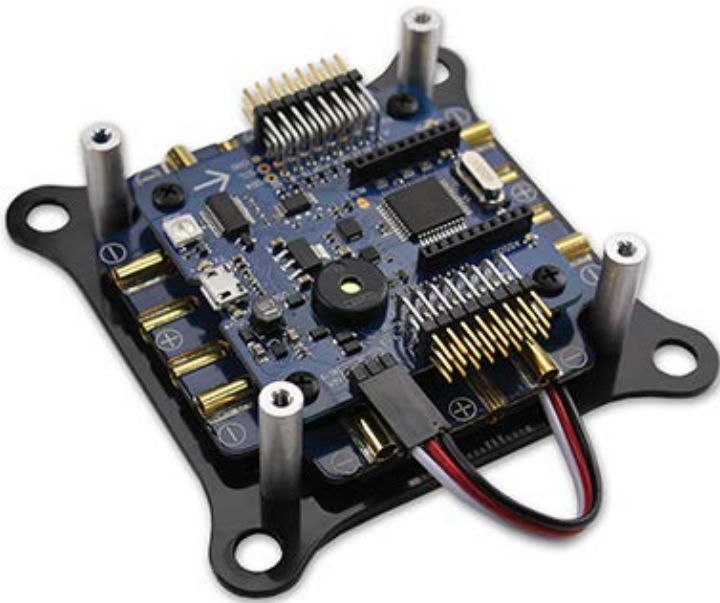
- 1 - Isolation Assembly, prepared in Step 14
- 1 - 3-Wire Servo Extension Cable, 4" (#800-00040)

Instructions:

1. Hold the isolation assembly upside down so that the front of the flight controller is facing away from you.
2. Carefully feed the cable from the left side in between the isolation plate and power distribution board and plug it into the header at the front of the board (farthest from you).



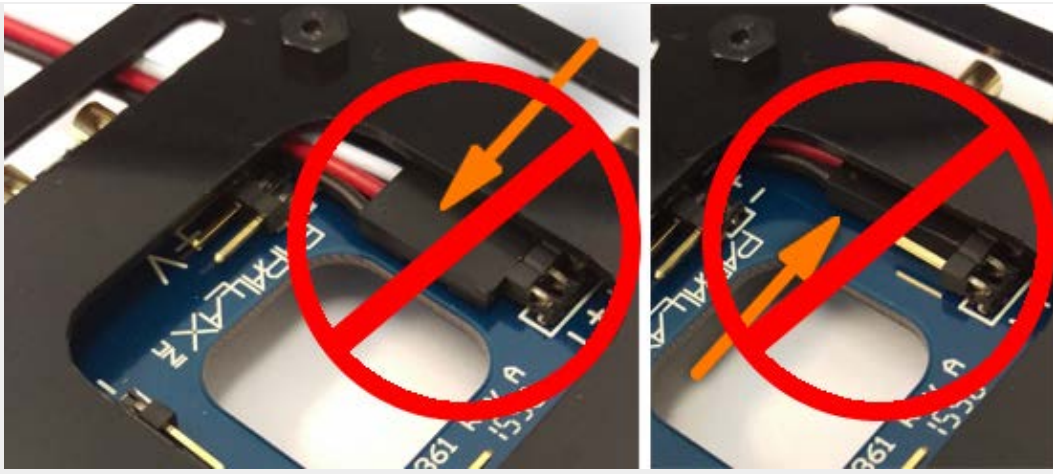
3. Flip the assembly over and firmly insert the connector into the Vin header on the power distribution board.



4. Double-check to ensure that the cable is plugged in correctly:



WARNING: If the 3-pin cable connecting the flight controller to the power distribution board is plugged into the 3-pin header incorrectly, it will destroy your flight controller when you connect your battery!



Step 16: Shield Sensors and Install FC Cover

The barometric pressure sensor on the flight controller (FC) is sensitive to sunlight and wind, so a piece of open-cell foam will be placed over it to protect it. The foam will shield it from direct light and high speed airflow, while still allowing enough air to pass through to accurately measure the air pressure. The flight controller cover will further shield the electronics while still allowing you to view the flight controller.

Tools Needed:

- Scissors [15]
- #1 Philips Head Screwdriver [14]

Parts Needed:

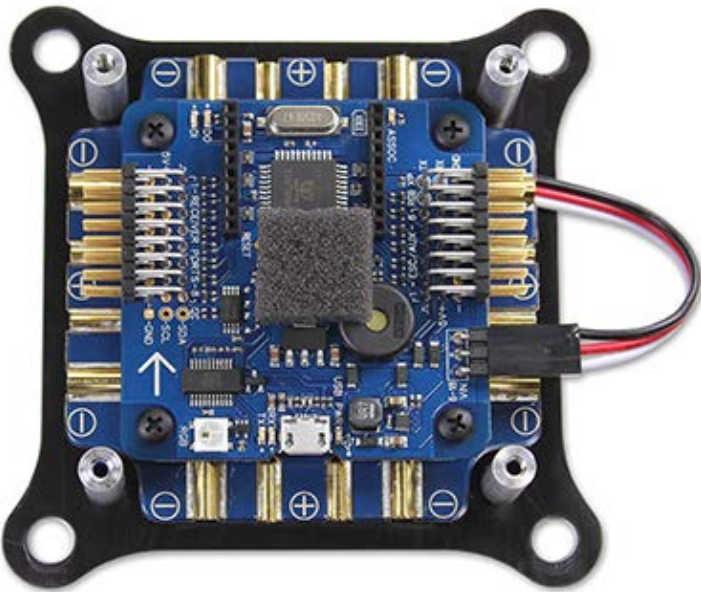
- 1 - Isolation Assembly, prepared in Step 15
- 1 - Foam, Open-Cell Block (#900-00106)
- 1 - ELEV-8 v3 Flight Controller Cover (#721-80300)
- 4 - Machine Screw, #4-40 x 3/8" [21]

Instructions:

1. Using the scissors, cut the foam block in half.



2. Place the foam block, cut side facing up, over the barometer on the flight controller, as shown in the image below (place your block in the *exact* location as shown).



3. Peel the protective paper off of the flight controller cover.
4. Place flight controller cover over the isolation assembly, lining up the holes with the screws. Make sure that the arrow on the FC points away from you when the writing on the cover plate is oriented towards you.
5. Thread the screws into the standoffs with your screwdriver, just until you start to feel resistance. Do not overtighten.



Section 5: Install the Electronics

In this section, you will install the isolation assembly and electronics in your ELEV-8 v3 Quadcopter, following the 4 steps below.

This section will take approximately 30 to 60 minutes, depending on your skill level and equipment.

Tools Needed in this Section

- [Small Flat-Head Screwdriver](#) ^[19] (optional)
- [Flat-Nose Pliers](#) ^[17]
- [Diagonal Cutters](#) ^[18]

Parts Needed in this Section

- 1 – Chassis Assembly from Section 4
- 4 – Vibration Damper, 80g (#700-00098)
- 1 to 4 – Zip Tie, 5.9" length (#700-00099)
- 6 – 3-Wire Servo Extension Cable, 6", Beveled (#800-00043)
- 1 – ELEV-8 PDB Power Cable, 6" (#800-00300)
- 1 – RC Radio Receiver (not included)
- 1 – Fully Charged 3-Cell LiPo Battery w/ EC3 connector (not included)



Step 17: Attach the Isolation Assembly

The Isolation System dampens vibrations created by the propellers to improve the performance of the flight controller.

Tools Needed:

- [Small Flat-Head Screwdriver](#) ^[19] (optional)

Parts Needed:

- 1 - Chassis Assembly, prepared in Step 12
- 1 - Isolation Assembly, prepared in Step 16
- 4 - Vibration Damper, 80g

Instructions:

1. Slowly and carefully insert a vibration damper into each of the four large holes on the top chassis plate. They are intentionally a snug fit, so it may help to twist them and/or carefully use a small flat head screwdriver to push them through. Don't push too hard or use a sharp object, as that may damage the dampers.



2. Place the isolation assembly over the chassis, lining up the front of the chassis with the arrow on the flight controller.



3. Carefully feed the top flange of each damper through the corresponding hole on the isolation plate.



Step 18: Connect the ESCs to the PDB and FC

With all the major components of the ELEV-8 v3 installed, the wiring process begins with connecting the ESCs.

Parts Needed:

- 1 - ELEV-8 v3 Assembly, prepared in Step 17

Instructions:

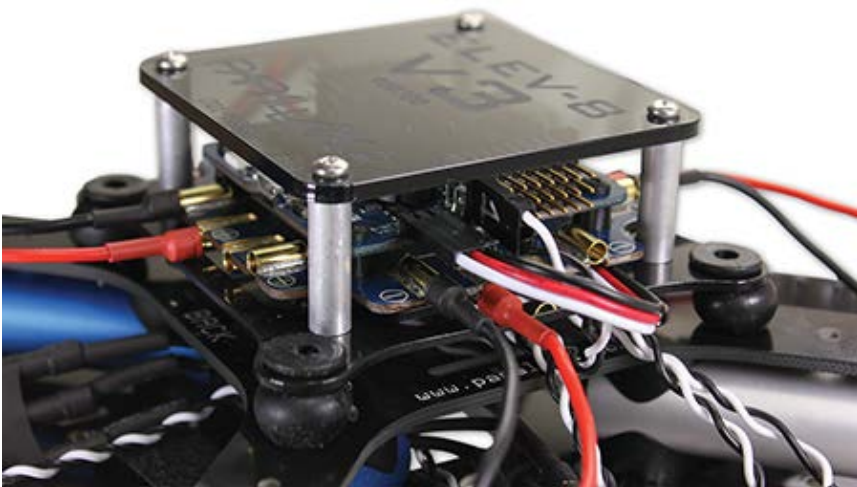
1. Plug all four ESC into the power distribution board. The red (positive) wires must be plugged into the socket adjacent to the (+) symbol, and the black (negative) wires must be plugged into the socket adjacent to the (-) symbol, as shown in the image below.



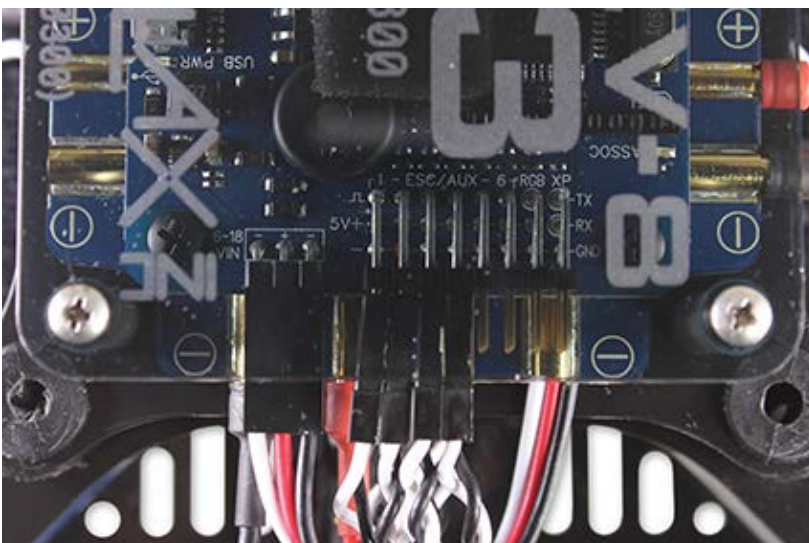
WARNING: Reversing the polarity may cause permanent damage to the ESCs and other components. Check your connections carefully!



2. Orient your ELEV-8 so that it is upright and facing to your right. Locate the ESC/AUX header pins on the right side of the flight controller (the side closest to you).
3. Take the ESC signal cable that you labeled 1 and insert into the farthest left pins (labeled 1 on the flight controller PCB) oriented vertically so that the black wire is on the bottom and white wire is on the top.

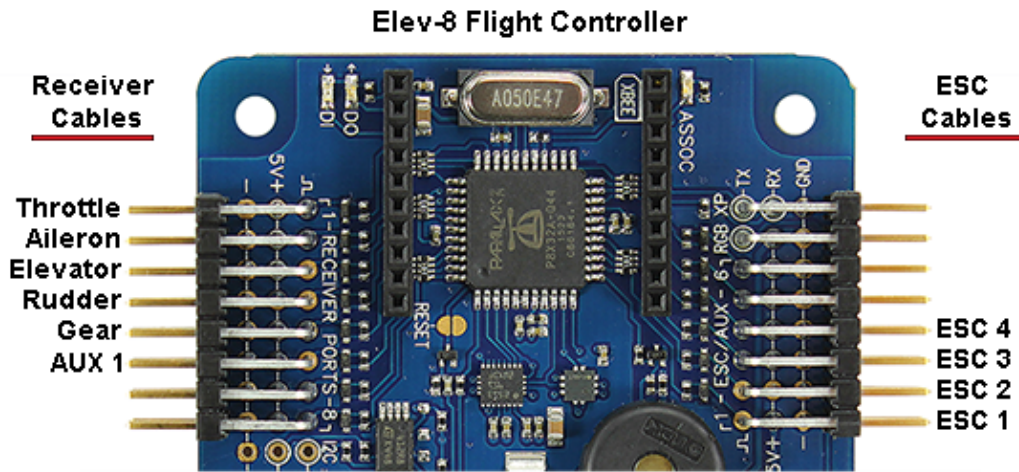


4. Plug in the three remaining signal cables in order (1-2-3-4) maintaining the same orientation.



Step 19: Connect and Mount Your Radio Receiver

In this step you will connect the signal cables for the receiver to both the ELEV-8 Flight Controller and the receiver, and then mount the receiver to the chassis.



Tools Needed:

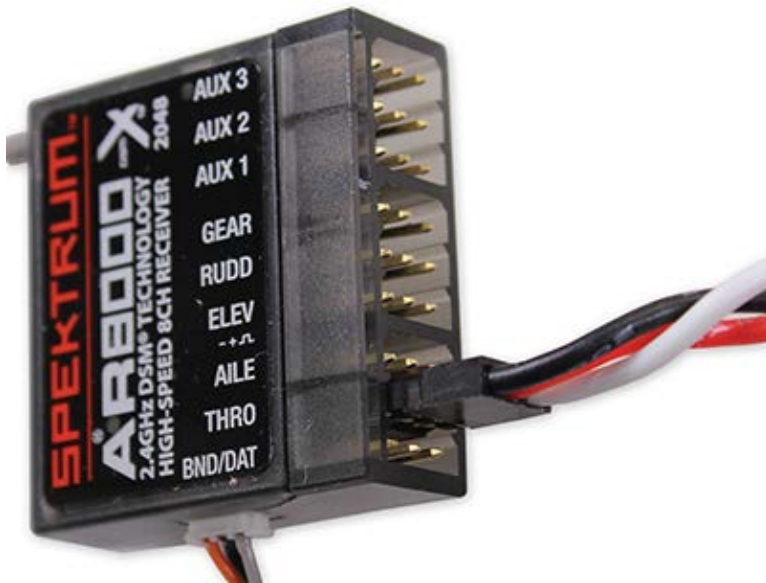
- [Flat-Nose Pliers](#) [17]
- [Diagonal Cutters](#) [18]

Parts Needed:

- 1 - ELEV-8 v3 Assembly, from Step 18
- 1 - RC Radio Receiver (not included, yours may differ from the Spektrum AR610 and AR8000 receivers shown below)
- 6 - 3-Wire Servo Extension Cable, 6", Beveled (#800-00043)
- 1 to 4 - Zip Tie, 5.9" length (#700-00099)

Instructions:

1. Take your receiver and determine the correct orientation to plug the cables into the unit. Many receivers have some sort of symbol (such as, ^ + -) to indicate orientation, where ^ corresponds to the white signal wire, + corresponds to the red positive wire, and - corresponds to the black negative wire. (Spektrum AR610 and AR8000 receivers shown below.)



2. Plug a servo extension cable into the Throttle, Aileron, Elevator, Rudder, Gear, and Auxiliary 1 Channels (often abbreviated as THRO, AILE, ELEV, RUDD, GEAR, and AUX 1, respectively), keeping the orientation you determined in Instruction 1. (Spektrum AR610 receiver shown below.)

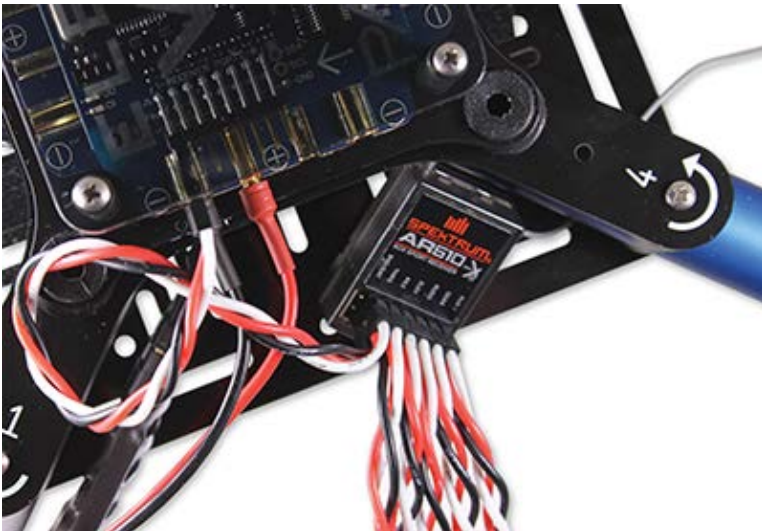


3. Now, locate the pins for the receiver signal cables on the left side of the flight controller (“Receiver Port” is written

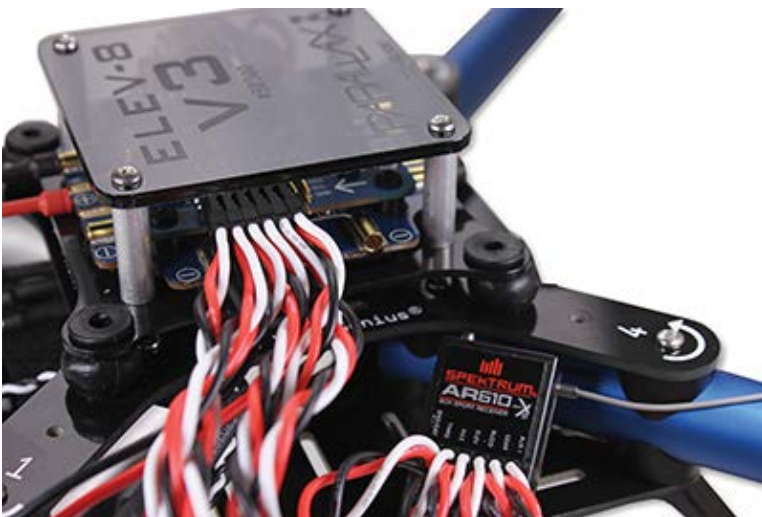
on the PCB).



4. Plug the throttle channel into the farthest left pins (labeled 1 on the flight controller PCB) oriented vertically so that the black wire is on the bottom and white wire is on the top.



5. Using the same orientation, plug in the remaining cables in the following order: THRO-AILE-ELEV-RUDD-GEAR-AUX 1.

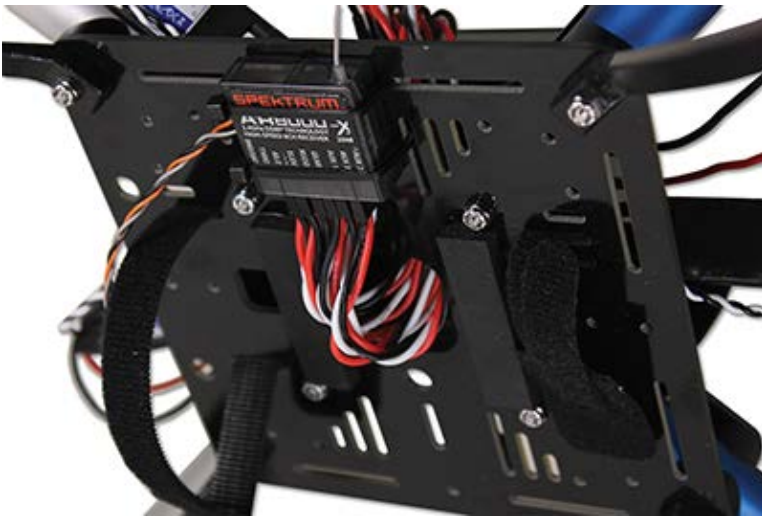
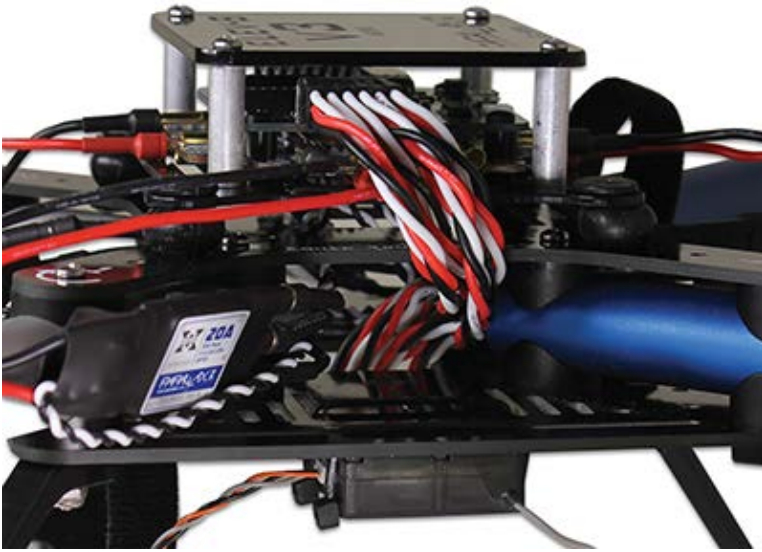


6. Place the receiver on the underside of the bottom chassis plate, secure with at least one zip tie (pull tight with pliers), and cut off the “tail” of the zip tie (with diagonal cutters), as shown in the images below.



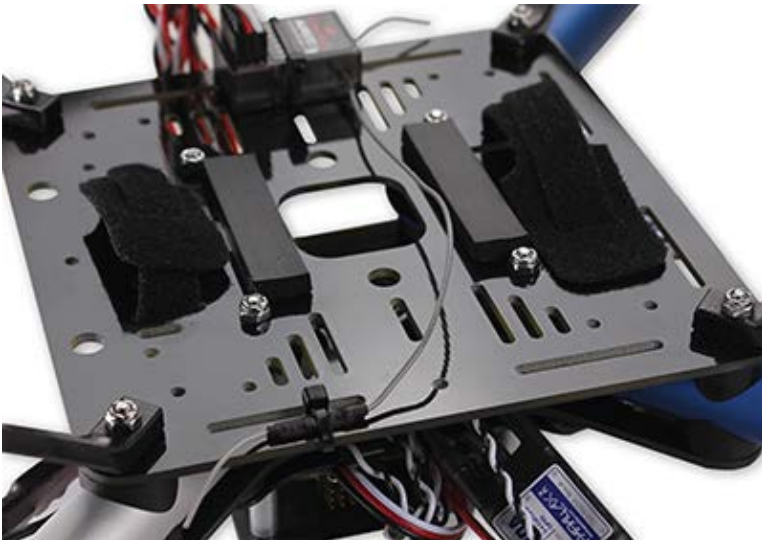
Alternate Mounting (Best for receivers w/ headers on their side, such as Spektrum AR8000):

7. Feed the receiver cables down through the hole in the center of the chassis, and mount the receiver to the underside of the chassis as shown below.

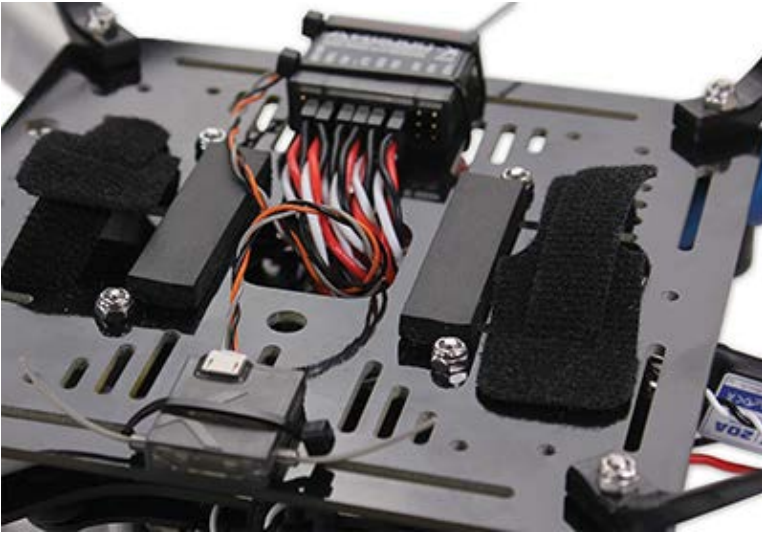


Instructions for Antenna / Satellite Module

8. If your receiver came with a long antenna, you can mount it as shown below:



9. If your receiver came with a satellite module, you can mount it as shown below:



Step 20: Connect PDB Power Cable and Secure Battery

It is now time to install the battery underneath the chassis. Thanks to the hook-and-loop straps, it can be easily removed for charging and storage.

Parts Needed:

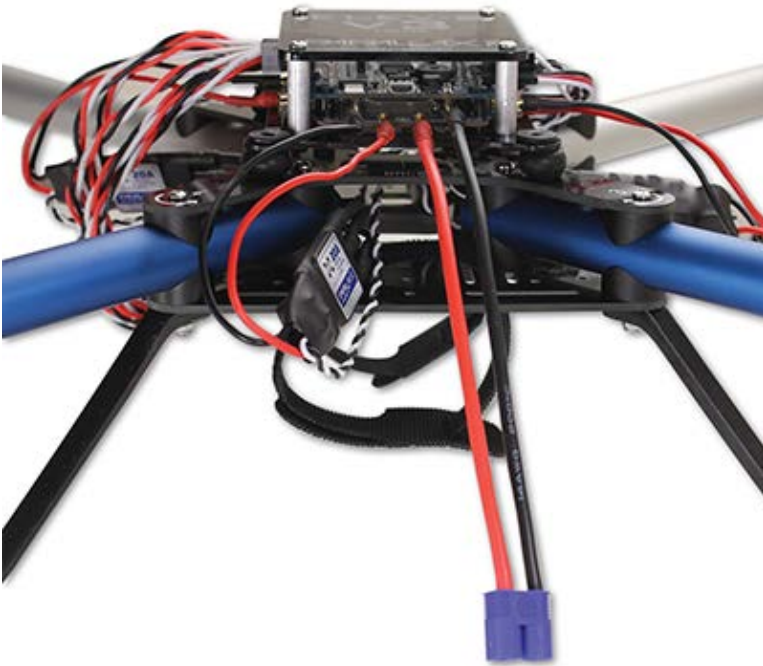
- 1 - ELEV-8 v3 Assembly, from Step 19
- 1 - ELEV-8 PDB Power Cable, 6" (#800-00300)
- 1 - Fully Charged 3-Cell LiPo Battery w/ EC3 connector (not included)

Instructions:



WARNING: Reversing the polarity may cause permanent damage to the battery and other components. Check your connections carefully!

1. Plug the power cable into the back of the power distribution board as shown below.



2. With the ELEV-8 upside-down, slide the battery through the straps so that the battery leads face the back of the ELEV-8.



3. Take one end of the strap in each hand and pull firmly apart and slightly up to tighten, and then push down to secure.



4. Repeat for the remaining battery strap.



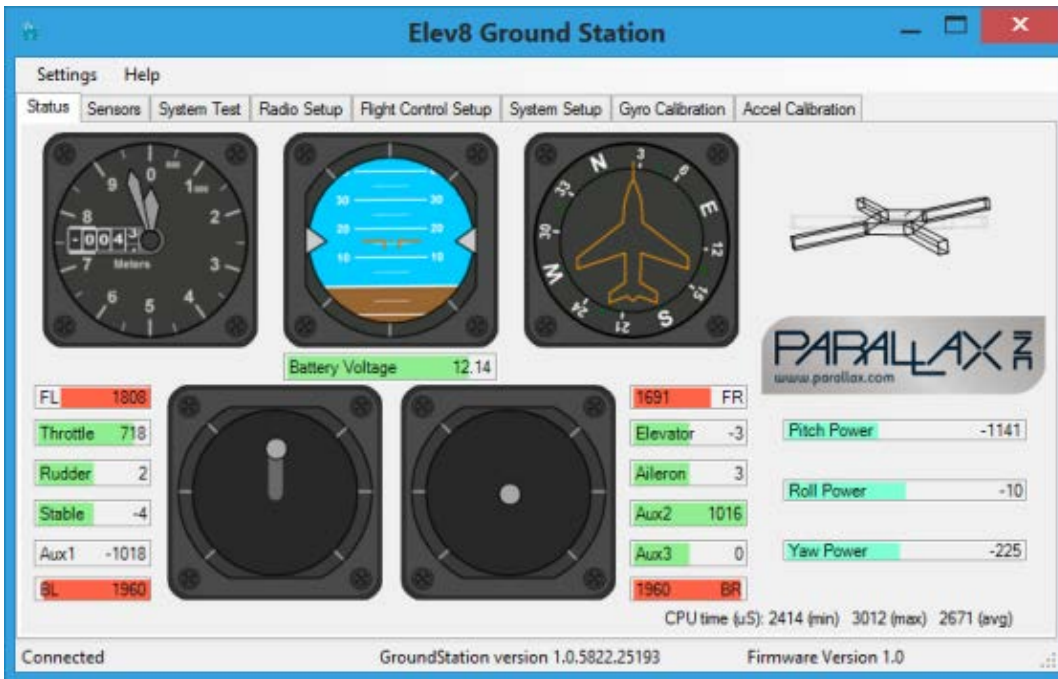
Section 6: Software and Firmware

In this section, you will configure your transmitter, install the GroundStation software, and update and configure your flight controller firmware, following the 4 steps below.

This section will take approximately 1 to 2 hours, depending on your skill level and equipment.

Parts Needed in this Section

- ELEV-8 v3 Assembly w/ LiPo Battery, prepared in Section 5
- Fully Charged RC Radio Transmitter (not included)
- RC Receiver Bind Plug (not included)
- SD Card & SD Card Reader (optional)
- Computer running Windows 7/8/10 with internet connection (not included)
- USB A to Micro B cable (not included)



Step 21: Configure the Transmitter and Bind to Receiver

Radio transmitters come with an overwhelming array of settings. This step will guide you through configuring your transmitter so that it can properly control your ELEV-8 v3. Below is a table of transmitter setting recommendations for flying the ELEV-8 v3, regardless of transmitter selection. You will also bind your transmitter to your receiver, which enables your particular transmitter to control your particular receiver for the ELEV-8 v3.

Parts Needed:

- ELEV-8 v3 Assembly w/ LiPo Battery, prepared in Section 5
- Fully Charged RC Radio Transmitter (not included)
- RC Receiver Bind Plug (not included)
- SD Card & SD Card Reader (optional)

Transmitter Settings

Box Model Type	ACRO (Plane Mode)
End Point (Travel) Adjustment	Spektrum: 125% for all channels Others: Unknown (let us know what works for you!)
Channel Reverse	Spektrum: Aileron, Rudder, Gear, Aux 1 Others: Unknown (let us know what works for you!)
Trims & Sub-Trims	Centered
Dual-Rates (D/R)	100% (Disabled)

Exponential	None
Gear Channel Control	3-Position Switch

Configuration Instructions

We'll guide you through making these settings on a Spektrum DXe, DX6, & DX7 in the following instructions.



To get started, choose the your transmitter type from the list below. Once you have finished configuring your transmitter, scroll down the page to find the receiver binding instructions.

For other transmitters/receivers, refer to the literature provided by the manufacturer. If you are new to radio control, many of these terms may be foreign to you. For the sake of brevity we won't go into those terms now, but we do strongly recommend that you take the time to research any term or concept that is unfamiliar. Please remember to read and abide by your RC transmitter's instruction manual, as every system is different.

Instructions and Important Notes for Spektrum DXe

If your transmitter has never been used, proceed directly to the binding instructions. If your transmitter has been used, make sure that all settings are set to their default value and all trims are centered, then proceed to the binding instructions.

Notice that the DXe has a Dual Rate ("D/R") Switch, which changes the sensitivity of the joysticks. You will want to keep this switch in the "Hi" at *all* times, including during GroundStation transmitter calibration. Failure to do so may cause unexpected behavior and inhibit your ability to arm/disarm the ELEV-8. If you have the DXe Programming cable, we recommend you disable this feature.

Instructions for Spektrum DX6/DX7 w/ SD card

1. Connect the SD card to your computer with the SD card reader
2. [Download the settings file from the download page on parallax.com](#) _____ [25]
3. Transfer the settings file to the root level of your SD card and then eject it from your computer
4. With your transmitter off, insert the SD card.
5. Press the roller while turning on the transmitter. When "System Setup" appears, release the roller
6. Scroll down to "Transfer SD Card"
7. Scroll right to "Select Option", and click. Scroll right until "Import Model" appears and click again.
8. Scroll to select the "001~ELEV-8 v3.SPM" file on the SD card. When prompted, scroll then click to select "Import." This will import all configuration settings.
9. Turn off the transmitter (& remove SD card if desired) and proceed to binding instructions

Instructions for Spektrum DX6i, DX6, & DX7 Configuration

1. Press the roller while turning on the transmitter. When "System Setup" appears, release the roller.
2. (Optional) If you wish to disable or alter the transmitter sounds, scroll right until "System Settings" is highlighted and click once. Scroll right until "Next" is highlighted and click once. Scroll right until the "Select" next to

- “Volume Controls” is highlighted, and click again. Use the scroller to select the volume setting and the adjust them as you desire. To return to the “System Setup” menu, scroll left to “List” and click once, then click again.
3. Rotate the roller to “Model Select” and click once. Scroll to the first unused model and click once. When prompted “do you want to create a new model”, select “Create”.
 4. Rotate the roller to “Model Type” and click once. Select “Acro” by rotating the roller to highlight it and click once. When prompted "Data will be reset", select "Yes".
 5. Scroll to “Model Name” and click once. Use the roller to name your model (we suggest “ELEV-8 v3”); scroll until the cursor is under the character you wish to edit, then click once; scroll until the character you want appears, then click again to save. Scroll to move the cursor to the next character and repeat. Once done, scroll to "Back" in the upper-right corner and click.
 6. Scroll down to “Channel Assign” and click once. Scroll right to “Next” and click again. Scroll right until a box appears next to “5 Gear” and click again. Scroll right until “D” appears in the box and click again. Once done, scroll to "List" in the upper-right corner and click.
 7. Scroll to "Main" in the upper-right hand corner and click once.
 8. With the transmitter powered on and in the main screen, press and release the roller to enter the “Function List” ["Adjust List" in DX6i]. Rotate the roller to the right until “Servo Setup” ["Travel Adj" in DX6i] is highlighted and click once.
 9. With the throttle stick all the way down, scroll right until a flashing box appears above "THR" then click again. Scroll right until "125" is displayed in the flashing box, then move the throttle stick all the way up (so that the top number above “THR” is now boxed), scroll right until “125” is displayed, and then click again. [For DX6i...]
 10. Scroll right until a flashing box appears above "AIL" then click again. Scroll right until "125 125" is displayed in the flashing box, then click again.
 11. Scroll right until a flashing box appears above "ELE" then click again. Scroll right until "125 125" is displayed in the flashing box, then click again.
 12. Scroll right until a flashing box appears above "RUD" then click again. Scroll right until "125 125" is displayed in the flashing box, then click again.
 13. Scroll right until a flashing box appears above "GER" then click again. Scroll right until "125" is displayed in the flashing box. Locate the "D" switch on the top left of the unit and switch it. The box on screen should now highlight the other "100"; scroll right until "125" is displayed in the flashing box, then click again.
 14. Scroll left until “Travel” is boxed, and click to select. Scroll right until “Reverse” appears, and click again.
 15. Scroll right until the flashing box surrounds “AIL”, and click to reverse the channel
 16. Scroll right until the flashing box surrounds “RUD”, and click to reverse the channel
 17. Scroll right until the flashing box surrounds “GER”, and click to reverse the channel;
 18. Scroll right until the flashing box surrounds “AX1”, and click to reverse the channel
 19. Scroll left until “List” is highlighted, then click. Scroll left until “Main” is highlighted, and click again. Your DX6/7 transmitter should now be fully configured.

Binding Instructions

General Instructions for Binding your Transmitter and Receiver

1. Insert the bind plug supplied with your receiver into the bind (BND/DAT) jack on your receiver.
2. Connect the battery to the PDB Power Cable to provide power to the ELEV-8 and RC Receiver
3. Follow the binding instructions supplied with your transmitter or receiver.

Instructions for Binding a Spektrum Transmitter and Receiver

1. Insert the bind plug supplied with your receiver into the bind (BND/DAT) jack on your receiver.

2. Make sure your transmitter is switched off and the throttle is all the way down.
3. Connect the battery to the PDB Power Cable to provide power to the ELEV-8. The LED in the receiver should be flashing rapidly.
4. Locate the "Trainer/Bind" switch/button on your transmitter. Hold the switch in the "1" position / depress the button while turning on the transmitter. Continue holding until the LED on the receiver stops flashing. (You may need to be at least 6 feet (2m) away from the receiver).
5. Unplug the battery, remove the bind plug, and turn off your transmitter.

Step 22: Install Software

In order to configure your ELEV-8 Flight Controller in the next step, you will need to install three small pieces of software.

Parts Needed:

You will need a Windows or Mac computer and two pieces of software, choosing the version for your operating system. You will also need the most recent version of the Flight controller firmware.

Install Simple IDE (for updating/modifying firmware):

1. Download and install the correct SimpleIDE programming software for your operating system
 - [SimpleIDE for Windows](#) ^[26] version 1.0 RC20
 - [SimpleIDE for Mac](#) ^[27] version 1.0 RC2

Install ELEV-8 Flight Controller Firmware

1. [Download the most recent ELEV-8 Flight Controller Firmware from the download page.](#) ^[28]
2. Run the installer. For best results with the tutorials, accept all default settings.

Installing Parallax GroundStation

1. Download and install the correct Parallax GroundStation software for your operating system
 - [Parallax GroundStation Software for Windows](#) ^[29]
 - [Parallax GroundStation Software for Mac](#) ^[30]
2. For best results with the tutorials, accept all default settings.

Step 23: Install or Update Firmware

To ensure your ELEV-8 Flight Controller is running the latest and greatest firmware (and because some units don't ship with firmware), you will now install the firmware on your ELEV-8 Flight Controller.

Parts Needed:

- ELEV-8 v3 Assembly, from Step 21
- Computer with software & firmware installed, from Step 22
- USB A to Micro B cable

Instructions:

1. Connect your ELEV-8 flight control board with to your computer's USB port with a USB A to micro B cable.



2. Wait for your computer to install any necessary drivers. It should say “Your device is ready to use”
3. Navigate to the folder where you installed the firmware on your computer in step 22, and double-click on the ELEV8-Main.side file to open it with SimpleIDE.
4. Click the Load EEPROM & Run button. Once “Loading Done” appears at the bottom of the window, you can quit the SimpleIDE application.

Step 24: Configure Flight Controller

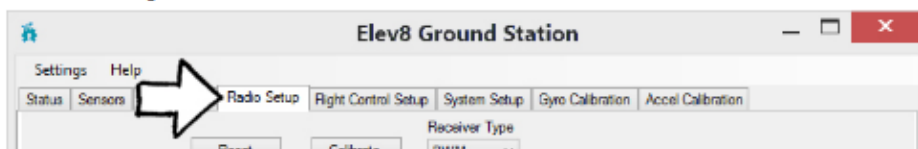
With the latest firmware now loaded onto your ELEV-8 Flight Controller, you will optimize it for your particular RC radio transmitter.

Parts Needed:

- ELEV-8 v3 Assembly w/ LiPo Battery
- Computer with software & firmware installed from Step 22
- Fully Charged RC Radio Transmitter (not included)
- USB A to Micro B cable (not included)

Instructions:

1. Click on the Radio Setup tab.



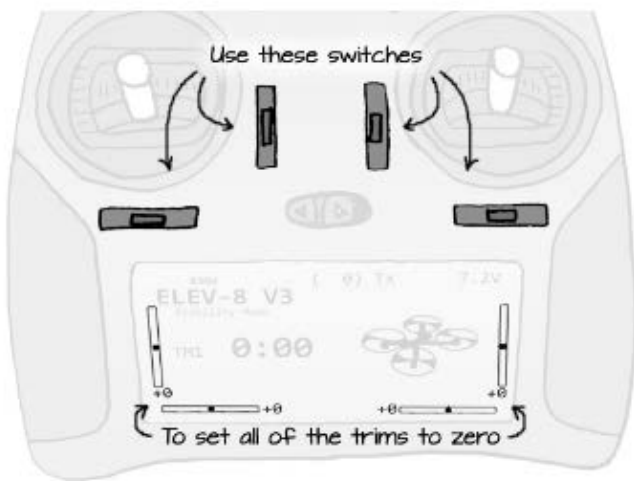
Before proceeding, make sure that you have carefully [followed the instructions in Step 21 for configuring your radio](#) [31], or by carefully following the manufacturers

instructions for setting up your transmitter.

2. Select your receiver type from the drop-down menu. Most receivers are PWM, but be sure to double-check your transmitter's specifications:



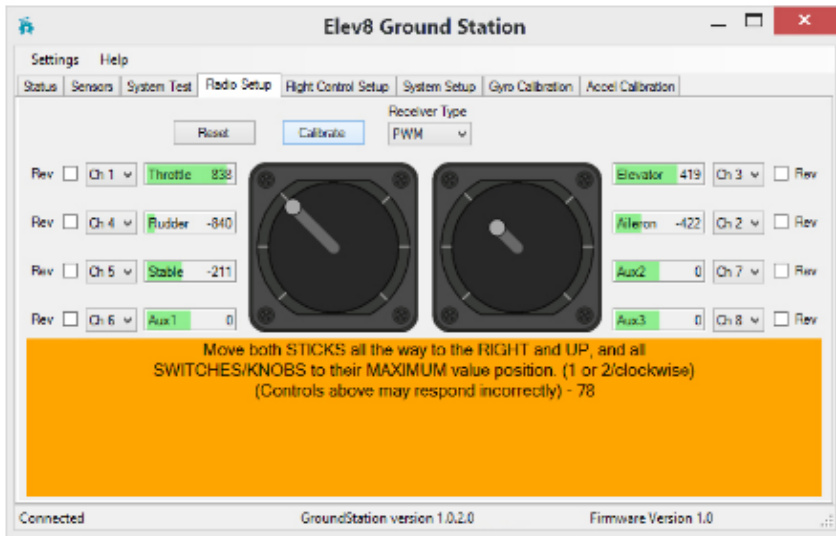
3. Make sure that your Transmitter is on (and, if applicable, set to the model configured in Step 21), and that all the trims are set to “zero” or “center”.



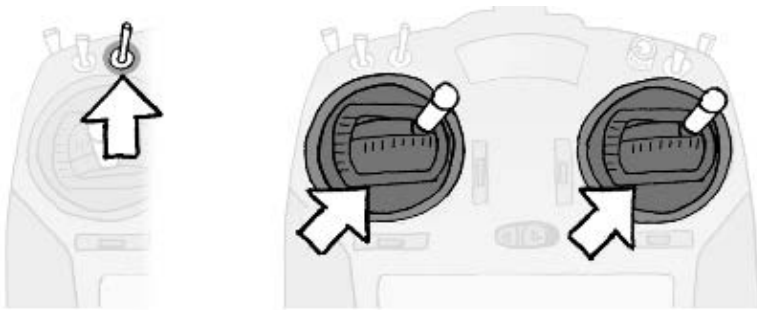
4. Next, click the “Reset” button. Move the right and left sticks around on your transmitter to verify their signals are being received by the flight controller. When you move the sticks, the sticks on the screen should move too. They may move in the opposite direction and they may not have the same range, but that is okay for now.
5. Next, check the switches and knobs on your radio. Flip each switch back and forth while watching the green bars on the GroundStation window. Identify which switch is connected to the “Gear” (fifth) channel. You may also be able to identify if any switches or knobs are connected to the “Aux 1”, “Aux 2”, or “Aux 3” channels, but these are optional and not required for flight.
6. Once you have identified which switch is connected to the Gear channel, you can proceed with the calibration. Click the button labeled “Calibrate”. The bottom of the screen will turn orange and contain instructions and a countdown timer.



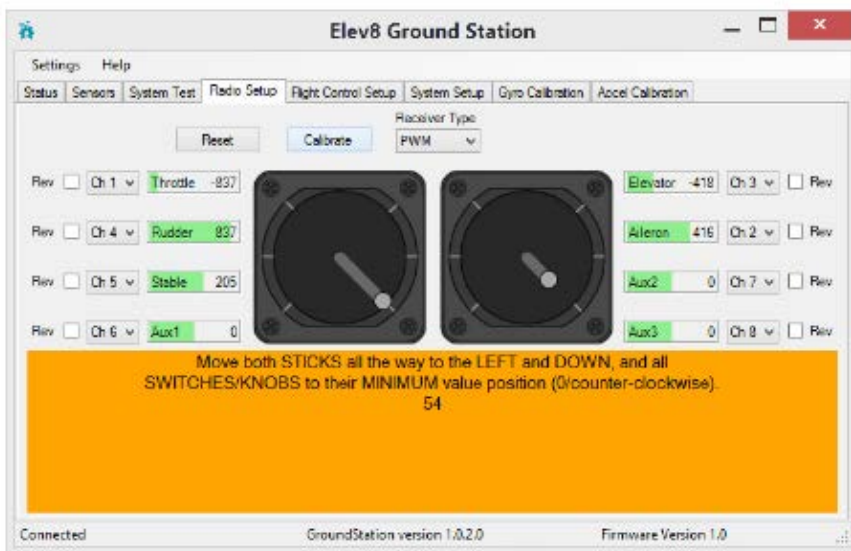
During calibration, only actuate switches for the auxiliary channels. Do not move Dual-Rate (D/R) switches (leave them in high or disable them), or Throttle Arm/Disarm switches (leave in "Arm" position). This is especially important for the **Spektrum DXe Transmitter**.



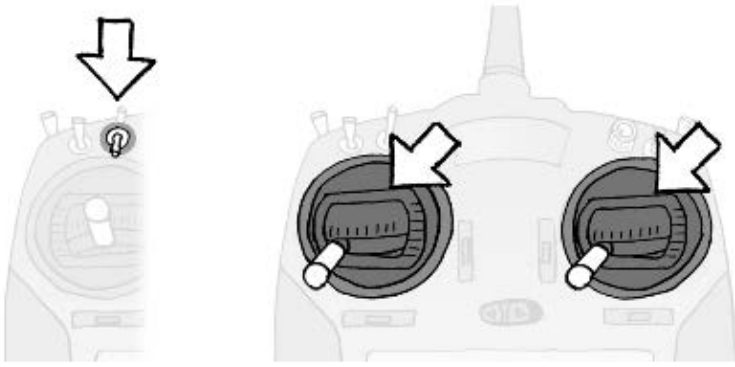
- On your transmitter, flip the Gear switch up (and if desired, any Aux switches or knobs) and push both sticks up and to the right. Hold them there until the timer runs out and the GroundStation gives you the next instruction.



- The next instruction on the screen will ask you to move the sticks and switches in the opposite direction.



- Flip the Gear switch down (and if desired, any Aux switches or knobs) and push both sticks down and to the left. Hold them there until the timer runs out and the yellow bar at the bottom of the screen disappears.



10. Once the calibration process is complete, move both sticks and the Gear switch to verify that the sticks and switches now show the full range of motion. If they do not, it may be for one or more of the following reasons:
 - Not holding the sticks correctly during the calibration process
 - A switch that was NOT identified as a Gear or Aux switch was flipped during calibration
 - Loose or disconnected cable between the receiver and flight controller
11. If your sticks and switches are not showing the full range of motion after you have followed the calibration steps, try to identify and correct the error and repeat the calibration process. You can reassign and reverse the channels by using the checkboxes and drop-down menus for each channel. This will allow you to fly your ELEV-8 v3 according to your preferences.
12. When you have finished setting up your Transmitter and everything appears to be functioning correctly, click the “Upload Changes” button on the bottom of the screen.

Section 7: Configure the ESCs

With Parallax GroundStation software now installed on your computer, you can use it to calibrate the throttle range of your ESCs and check the spin direction of your motors before mounting your ESCs to the booms, as you will do in this section's three steps.

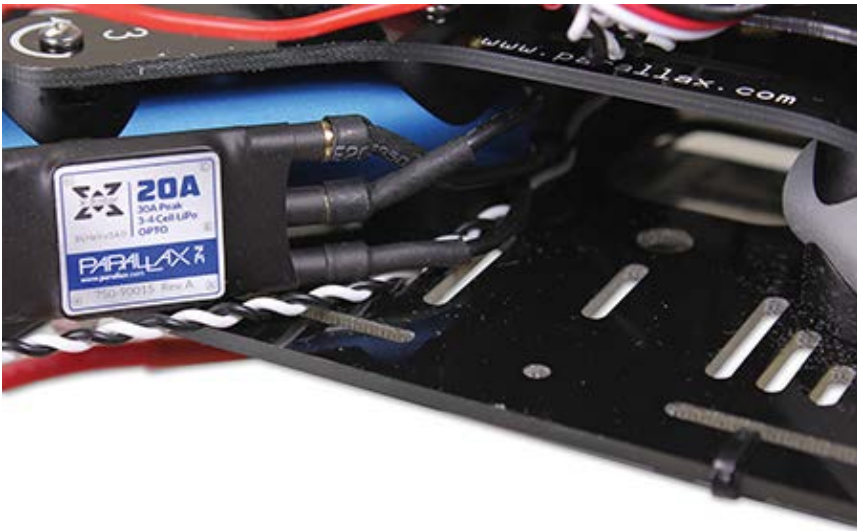
This section will take approximately 20 to 60 minutes to complete, depending on skill level and equipment.

Tools Needed in this Section

- [Flat-Nose Pliers](#) ^[17]
- [Diagonal Cutters](#) ^[18]

Parts Needed in this Section

- ELEV-8 v3 Assembly w/ LiPo Battery, prepared in Section 5
- Computer with Software & Firmware installed in Section 6
- USB A to Micro B cable (not included)
- 8 - Zip Tie, 5.9" length (#700-00099)



Step 25: Calibrate the ESC Throttle Range

Before moving on, the ESCs (electronic speed controllers) will need to be calibrated. This process tells the ESCs the minimum and maximum throttle range sent from the flight controller to the ESCs. If this is not done before flight, your motors may not respond correctly – causing unstable or unpredictable flight.

This calibration process is done using the Throttle Calibration button and by disconnecting and reconnecting your flight battery in a specific manner: you will need to have a charged battery and be able to connect and disconnect it during this process. Again, make sure that your propellers have been removed.

Parts Needed:

- ELEV-8 v3 Assembly w/ LiPo Battery
- Computer with software & firmware installed from Step 22
- USB A to Micro B cable

Instructions:



The Parallax GroundStation application will visually indicate when to unplug or plug in your battery during this calibration process. Watch for screen indicators.

1. Connect your ELEV-8 Flight Controller to your computer's USB port with a USB A to Micro B cable.
2. Launch the Parallax GroundStation Application & navigate to the System Test tab.
3. Click on the Throttle Calibration button. If your battery is connected, disconnect it (the screen gives you the same instruction). Once the battery is disconnected, click the button a second time.
4. The GroundStation screen will tell you to connect your battery again. When you connect your battery, you will hear a series of beeps – this is normal. Wait for all of the beeping to complete before moving on.
5. Once the first set of beeps has completed, click the Throttle Calibration button again. You will hear another series of beeps – this is normal. Wait for all of the beeping to complete before moving on.
6. Once you have completed the throttle calibration, disconnect both your battery and the USB cable to completely power down and reset the flight controller. Leave them disconnected for at least 10 seconds to make sure they have completely reset.



To hear what the series of beeps in instructions 4 and 5 should sound like during a successful calibration, [download this .zip file containing a wav sound file for each instruction](#) [32].

Step 26: Configure Motor Spin Direction

Now you will check that the motors are spinning in the desired direction. If any motors are spinning in the wrong direction, it is a simple matter of switching any two of the ESC outputs to fix the issue.

Parts Needed:

- ELEV-8 v3 Assembly w/ LiPo Battery
- Computer with software & firmware installed from Step 22
- USB A to Micro B cable

Instructions:

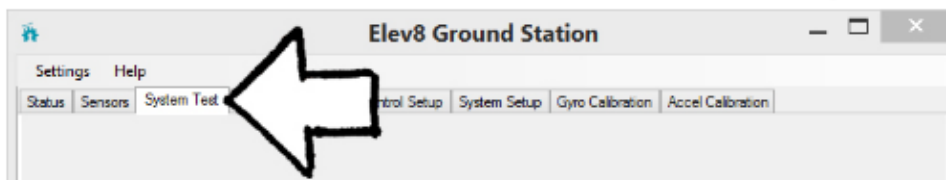


Warning! Propellers should not yet be installed on your ELEV-8 v3. If you have done so, remove them now before continuing.

1. Connect your ELEV-8 Flight Controller to your computer's USB port with a USB A to Micro B cable.
2. Open the ELEV-8 GroundStation software. The Status tab will be displayed first. Use the information displayed in the bottom-left corner to verify that the ELEV-8 v3 is properly connected. It will display “Connected” if it is



3. Once the ELEV-8 v3 is connected to the GroundStation software, click on the *System Test* tab.

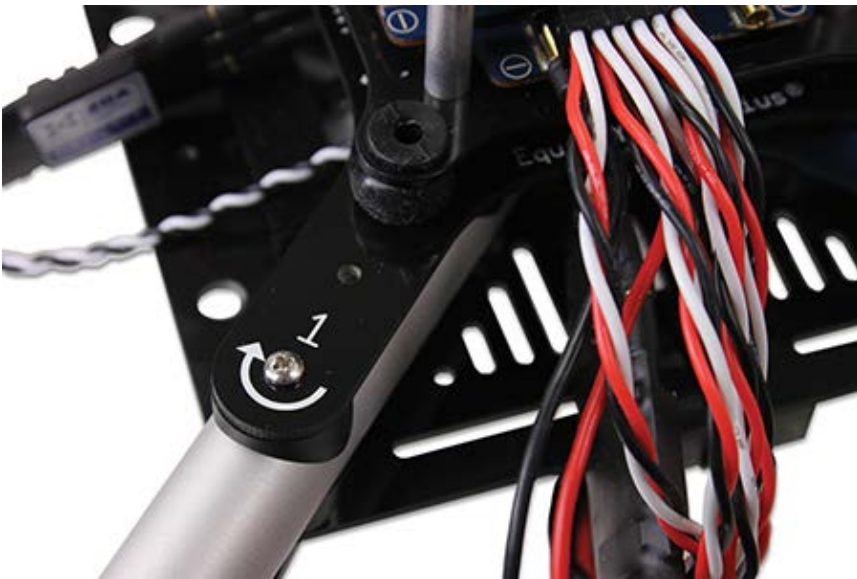


4. Make sure the propellers are not mounted on the motors, and then use the buttons with circular arrows to verify that each motor spins in the correct direction. Click the “Buzzer” and “LED” buttons to make sure both the buzzer

and LED are responding correctly as well. The buzzer will do a two-tone beep and the LED will cycle through a rainbow of colors.



If the motor spun in the correct direction (as indicated by the markings on your top chassis plate, shown below), skip to step 8. If it did not, follow steps 5-7.

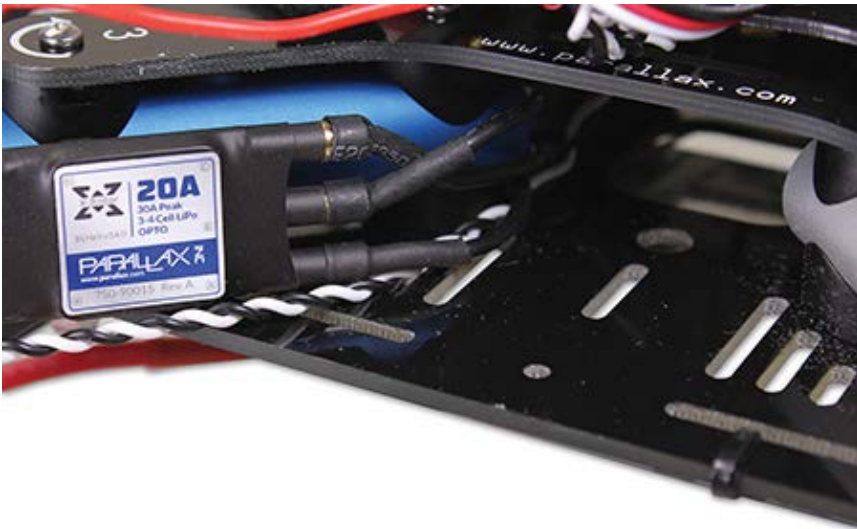


If the Motor Did Not Spin in the Correct Direction:

5. Turn the ELEV-8 over and locate the ESC corresponding to (matching the number of) the motor in question.
6. Locate any two of the (three) blue extension wires running to the ESC and unplug them from the ESC.



7. Switch the extension wires for one another, and plug them back in. You have now reversed (corrected) the motor's spin direction.



8. Repeat instructions 1-8 as necessary for the three remaining motors/ESCs.

Step 27: Mount ESCs to Booms

With the motors all spinning the correct directions, you can now secure the ESCs so that they don't move during flight. By securing them to the booms, they won't get in the way of folding up your ELEV-8 for transport if you ever choose to do so.

Tools Needed:

- [Flat-Nose Pliers](#) [17]
- [Diagonal Cutters](#) [18]

Parts Needed:

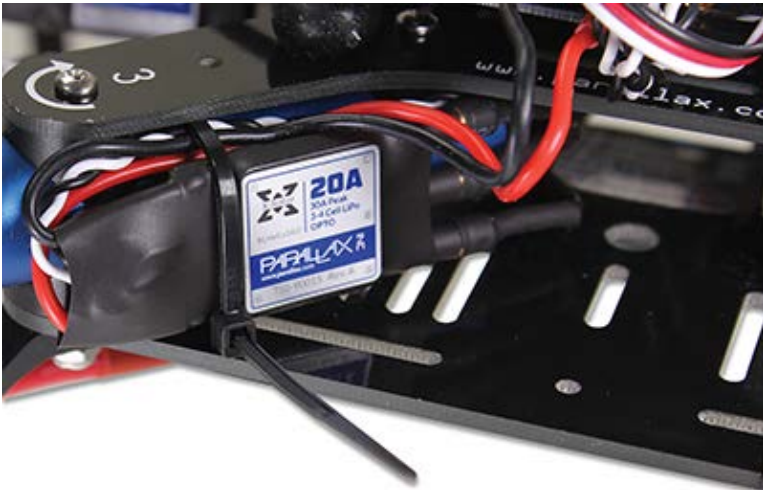
- ELEV-8 v3 Assembly
- (8) - Zip Tie, 5.9" length (#700-00099)

Instructions:

1. Feed a zip tie around the #3 boom.



2. Take the ESC connected to the wires coming out of that boom and place it up against to boom, with the wires above it, inside of the zip tie. Fasten the zip tie loosely around the ESC and wires as shown below.



3. Feed another zip tie around the boom and fasten as shown in the picture below.



4. Tighten both zip ties and trim the tails.



5. Repeat for the other 3 ESCs.

Section 8: Final Testing

In this section, you will conduct some final testing of your ELEV-8 v3 Quadcopter to ensure it is functioning properly and then install the propeller adapters and (finally) the propellers.

BEFORE continuing, please be sure that you have read the entirety of the [UAV Safety, Laws, and Good Citizenship](#) [7] guide; it contains very important information to keep you, your ELEV-8, and the public safe and legal. DO NOT SKIP THIS!



The owner, operator, and pilot of every ELEV-8 v3 are to abide by all laws, regulations, and guidelines, including, but not limited to, those detailed in the [UAV Safety, Laws, and Good Citizenship](#) [7] guide. Reading and abiding by the entire [UAV Safety, Laws, and Good Citizenship](#) [7] document could help prevent property damage, personal injury, prosecution, and fines.

At the end of the Step 30, you will be directed to the How to Fly a Multirotor sUAV tutorial, where you will learn to fly your ELEV-8 v3. DO NOT attempt to fly your ELEV-8 v3 until you have read through both this and the [UAV Safety, Laws, and Good Citizenship](#) [7] tutorials, as you may put yourself and others needlessly at risk.

This section will take approximately 15 minutes to 45 minutes, depending on your skill level and equipment.

Tools Needed in this Section

- [#1 Philips Head Screwdriver](#) [14]
- [5/16" Wrench, 5/16" Socket, or Adjustable Wrench](#) [20]
- [Flat-Nose Pliers](#) [17] (optional)

Parts Needed in this Section

- ELEV-8 v3 Assembly, prepared in Section 7
- 16 – Flat Head Phillips Screws, M2 x12mm (four included with each motor)
- 4 – Propeller Adapters (one included with each motor)
- 4 – Propeller Adapter Nuts (one included with each motor)
- 4 – Propeller Adapter Washers (one included with each motor)
- 2 – 11x4.5 CCW (L) Propeller (#721-80040)
- 2 – 11x4.5 CW (R) Propeller (#721-80040)
- 4 – Propeller Spacer Ring (included with each propeller)



Step 28: Full Systems Check

Before installing the propellers, you need to perform a radio control system range check, which will ensure that your transmitter and receiver are working properly. This step is often overlooked, but failing to perform this check can have significant, and often dangerous, consequences.

Range Check Instructions for Spektrum DX6, DX7, DX8 Transmitters.

(if you have a Spektrum DXe transmitter, skip this step)

1. Stand about 30 paces (90 feet/30 meters) away from your powered ELEV-8.
2. Face your ELEV-8 with your transmitter in normal flying position.
3. For Spektrum DX6, 7, and 8 transmitters, access the “Function List” by clicking the scroll wheel once from the main screen, then scroll down to “Range Check” and click again.
4. For Spektrum DX6i transmitters, hold the scroll wheel down while powering on the system to access the “Setup List”, then scroll down to “Range Check” and click again.
5. Press **and hold** the "Trainer/Bind" button on the top of the transmitter. This will cause a reduction in the output signal power. If you release the button the transmitter will go back to Full Power.

You should have full control of your ELEV-8 from this distance. If you are unable to arm/disarm your ELEV-8 v3 as described below, do not fly! Some component of your system is malfunctioning and you should begin troubleshooting.

A Note on Radio Control Range

At Parallax, we are very often asked about the range of the RC Equipment we use. Unfortunately, there is no simple answer, as most Radio Control manufacturers (including Spektrum, which we use with the ELEV-8 v3) do not publish any information on operating ranges for their equipment, and Parallax cannot accept the liability associated with providing any such information ourselves. However, we can provide some basic guidelines. The operating range of RC equipment can vary widely, and is dependent on many factors, including (but not limited to) weather, receiver mounting position and orientation, transmitter orientation, aircraft size and materials, obstructions between or near transmitter and receiver, ambient radio traffic, transmitter and receiver condition, power, and sensitivity, and finally, distance between transmitter and receiver. With all of these variables, it's important to read and follow all instructions provided by the manufacturers of RC equipment to avoid signal loss. Generally speaking "Parkflyer" type RC Equipment (such as the Spektrum DXe and DX6 Transmitters *with* AR610 Receiver) is only intended to be used on small aircraft flying at low speeds no more than a few hundred (300-500) feet line of sight from the operator (though they *may* work at greater distances). More high-end RC equipment (such as the Spektrum DX7 and DX8 Transmitters *with* AR8000 Receiver) may have far greater ranges, *possibly* well beyond your line of sight.

Important Notes Regarding the Spektrum DXe Transmitter



WARNING FOR SPEKTRUM DXE USERS: For ELEV-8 Flight Controller firmware versions prior to v1.1, switching the disarm switch will NOT actually disarm the quadcopter, but just temporarily stop the motors. Use the Ground Station software to view the version number of the ELEV-8 Flight Controller firmware.

1. Notice that the DXe has a Dual Rate ("D/R") Switch, which changes the sensitivity of the joysticks. You will want to keep this switch in the "Hi" at *all* times, including during GroundStation transmitter calibration. Failure to do so may cause unexpected behavior and inhibit your ability to arm/disarm the ELEV-8.
2. Also Notice that the DXe has a "Motor/Throttle" "Arm/Disarm" Switch. You must keep this switch in the "Arm" position for normal flight performance. Flipping the switch to the "Disarm" position should immediately disarm the Flight Controller and brake the motors. If you return the switch to the "Arm" position within 1 second, the Flight Controller will immediately re-arm; after that time you must use the combination stick command to re-arm as will be discussed below. Therefore, flipping the switch to the "Arm" position will not cause the Flight Controller to arm *unless* the flight controller was armed with the switch in the "Arm" position within the previous second.

ELEV-8 v3 Arming and Disarming Procedures

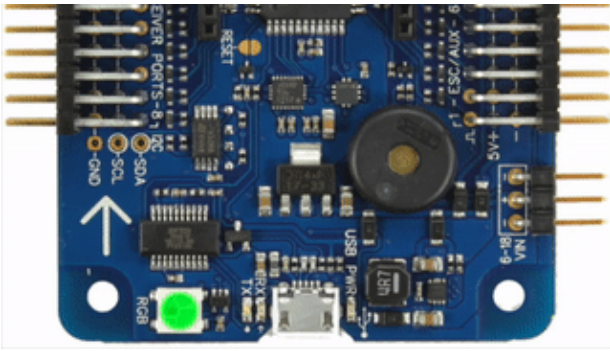


Only arm your ELEV-8 v3 when it is safe to do so. When the ELEV-8 v3 is armed, the propellers spin at low throttle - but they can still cause injury even at their lowest speed.

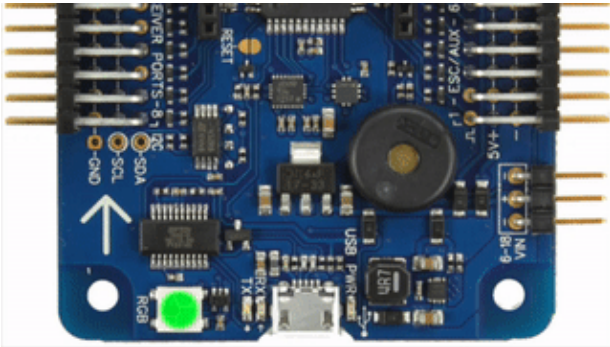
The ELEV-8 v3 currently has two flight modes, Stability and Manual. These modes determine the flight characteristics of the ELEV-8 v3. Manual Mode gives full control of the sUAV to the operator. Stability Mode helps the operator fly steadily by smoothing and limiting the operator's input.

When the ELEV-8 v3 is unarmed, the RGB LED on the flight controller will be green. There is also a different color that flashes to indicate the flight mode (gear). The LED's flash color pattern indicates the ELEV-8 v3's Status and Mode:

Disarmed (Stability Mode - Green with Blue Blink):



Disarmed (Manual Mode - Green with Orange Blink):



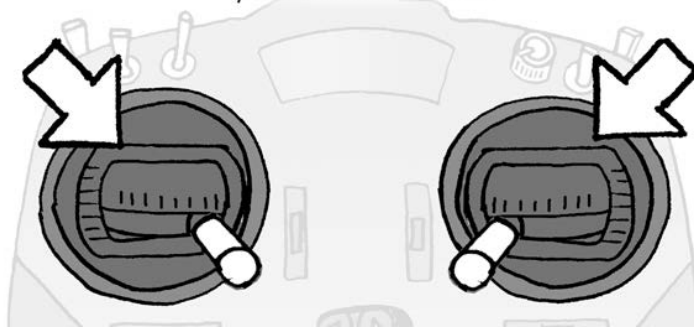
Arming Procedure:

To arm the ELEV-8 v3, make sure that the Gear Switch is in the correct mode, and then push and hold the transmitter sticks down and to the center:

Verify that your multirotor is in the correct mode

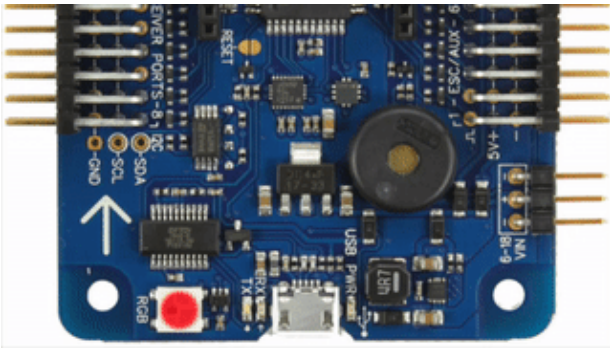


Then, push the left and right sticks Down and to the center and hold them until your multirotor arms

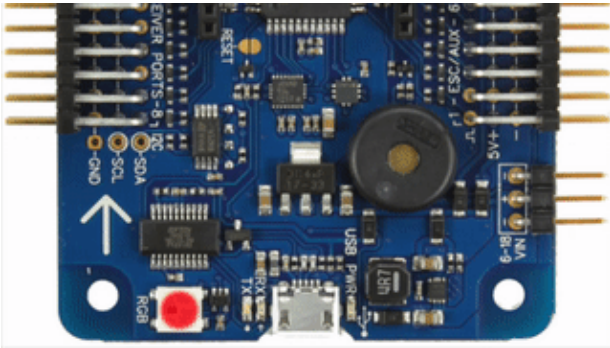


The RGB LED on the flight controller will turn yellow: After 1 second, the flight controller will beep, the RGB LED will turn red with a mode color blink, and the propellers will spin at low throttle:

Armed (Stability Mode - Red with Blue Blink):



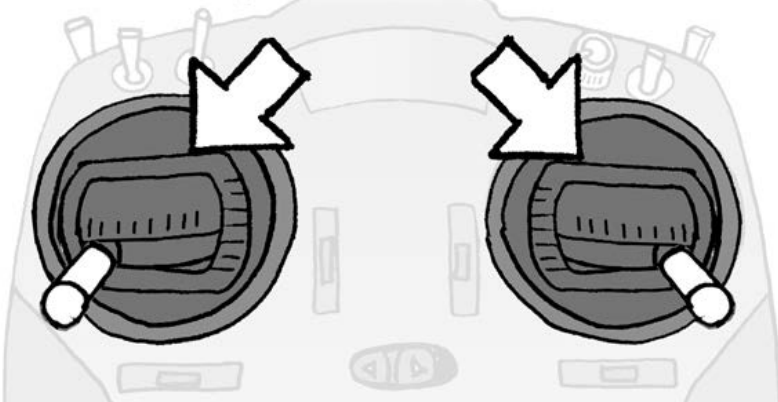
Armed (Manual Mode - Red with Orange Blink):



Disarming Procedure:

To disarm the ELEV-8 v3, push and hold the transmitter sticks down and away from the center:

Push the left and right sticks
Down and to the outside and hold them until
your multicopter disarms



The RGB LED on the flight controller will turn yellow. After 0.5 seconds, the flight controller will beep, the RGB LED will turn green with a mode color blink, and the propellers will stop spinning.

Brushless motors sometimes experience a phenomenon known as slip. When a motor slips, it spins slower and in the wrong direction. If this occurs disarm and re-arm, and confirm the issue has been fixed. If you skip this and quickly throttle up, you may not notice the issue until your quad just lifts off the ground and instantly flips.

Step 29: Fasten Propeller Adapters

The Propeller adapters allow you to easily attach and remove the Propellers, and ensure that they stay centered on the Motors.

Tools Needed:

- #1 Philips Head Screwdriver [14]

Parts Needed:

- ELEV-8 v3 Assembly, prepared in Step 28
- 16 – Flat Head Phillips Screws, M2 x12mm (four included with each motor)
- 4 – Propeller Adapters (one included with each motor)

Instructions:

1. Remove the nut and washer from the top of each propeller adapter and set aside for use in the next step.



2. Place a Propeller adapter over the top of a motor, and align the screw holes with the motor.



3. Use the supplied screws to secure the propeller adapter to the motor with the screwdriver. Tighten each screw until you begin to feel resistance, and then turn 1/8 of a turn more.



4. Repeat for the remaining three motors.

Step 30: Attach Propellers



STOP!! Propeller blades can cut skin. Do not install propellers until you are ready to fly in a properly prepared indoor ^[33]OR outdoor ^[34] flying area. Never install propeller blades on a quadcopter in a classroom or a bench testing area. Never

connect the flight controller to a computer if the propeller blades are installed.

Attaching the Propellers in the wrong positions is the #1 most common mistake, so follow the directions below carefully!

Tools Needed:

- 5/16" Wrench, 5/16" Socket, or Adjustable Wrench
- Flat-nose Pliers

Parts Needed:

- ELEV-8 v3 Assembly, prepared in Step 29
- 4 – Propeller Adapter Nuts (one included with each motor)
- 4 – Propeller Adapter Washers (one included with each motor)
- 2 – 11x4.5 CCW (L) Propeller (#721-80040)
- 2 – 11x4.5 CW (R) Propeller (#721-80040)
- 4 – Propeller Spacer Ring (included with each propeller)



WARNING: Do not install the propellers until you have gone through *every* step of the Assembly Guide.

Instructions:

1. Remove the spacer rings from the propeller bags and place the one indicated in the figure below over each propeller adapter shaft.





2. Attach a CW (R) propeller to motor #1. Place the propeller over the adapter shaft so that the small writing near the center of the propeller is upright, as shown in the image below (the sharper edges of the propeller should be on the bottom).
3. Place a washer over the propeller so that the flat side is down.
4. Thread a nut onto the adapter and tighten until it makes contact with the washer and propeller, and the resistance increases; then tighten another 1/4 turn.



5. Using the same procedure, attach a CW (R) propeller to motor #3. Attach a CCW (L) propeller to motors #2 and #4.



Now it's time to learn to fly!

Congratulations on completing the assembly of your ELEV-8 v3 Quadcopter! We know you are probably anxious to fly it, so please head over to the [How to Fly a Multirotor sUAV](#) ^[35] tutorial, where you will learn how to fly your ELEV-8 v3.

PLEASE DO NOT attempt to fly your ELEV-8 v3 until you have read through both the [How to Fly a Multirotor sUAV](#) ^[35] and [UAV Safety, Laws, and Good Citizenship](#) ^[7] tutorials, as you could put yourself and others needlessly at risk. (For example, the Flying Guide contains important information on how to identify and switch between flight modes).

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Source URL: <http://learn.parallax.com/tutorials/robot/elev-8/elev-8-v3-quadcopter-assembly-guide>

Links:

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- [2] <http://www.parallax.com/support>
- [3] <http://www.parallax.com/product/80200>
- [4] <http://learn.parallax.com/elev-8-v2-quadcopter-assembly-guide>
- [5] <http://www.faa.gov/uas/registration/>
- [6] <https://www.parallax.com/downloads/elev-8-v3-quadcopter-kit-package-insert>
- [7] <http://learn.parallax.com/uav-safety-laws-and-good-citizenship>
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- [14] http://learn.parallax.com/sites/default/files/content/ELEV-8/Tools/tool_screwdriver.jpg
- [15] http://learn.parallax.com/sites/default/files/content/ELEV-8/Tools/tool_scissors.jpg
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- [24] <http://learn.parallax.com/sites/default/files/content/ELEV-8/v3-Assembly/80300-IA%20RevA03.PDF>
- [25] <http://www.parallax.com/downloads/spektrum-dx6-or-dx7-configuration-file>
- [26] <https://www.parallax.com/downloads/simpleide-propeller-c-software-windows>
- [27] <https://www.parallax.com/downloads/simpleide-propeller-c-software-mac>
- [28] <http://www.parallax.com/downloads/elev-8-flight-controller-firmware>
- [29] <http://www.parallax.com/downloads/parallax-groundstation-software-windows>
- [30] <https://www.parallax.com/downloads/parallax-groundstation-software-mac>
- [31] <http://learn.parallax.com/elev-8-v3-quadcopter-assembly-guide/step-21-configure-transmitter-and-bind-receiver>
- [32] <http://learn.parallax.com/sites/default/files/content/ELEV-8/v3-Assembly/Step25-ThrottleCalibrationBeeps.zip>
- [33] <http://learn.parallax.com/uav-safety-laws-and-good-citizenship/flying-indoors>
- [34] <http://learn.parallax.com/uav-safety-laws-and-good-citizenship/flying-outdoors>
- [35] <http://learn.parallax.com/how-fly-multirotor-suav>