

ACES HIGH



Focke-Wulf *FW-190a*



EXTREME FLIGHT 

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Congratulations on your purchase of the AcesHigh Focke-Wulf 190A!

The FW-190 was a backbone of the German Luftwaffe, BMW 801 twin-row radial powered, multi-role fighter. A favorite of many, it was effectively flown by some of the most successful fighter aces. It wasn't until the arrival of the Spitfire that the 190 was challenged for air superiority.

AcesHigh have worked hard to create a model that pays great tribute to the performance of the real thing. As part of the Extreme Flight family, we have combined the highest level of aircraft manufacture with new technology, and the results are fantastic. Months of research and effort to create a realistic result without the typical weight problems that go along with detail. In making the model look real, our objective was to recreate the full size plane as it was in operation. Those aircraft worked hard, and got very dirty in the process. The details on the scheme are as if the full scale aircraft was wheeled into a photo booth... there are no pin-stripe panel lines and dots for rivets, because panels aren't pin-stripes, and rivets were rivets. This isn't the "brand new" looking warbird that is typically seen... congratulations on owning the first ARF that comes dirty out of the box!

We hope that you enjoy the build, love the flying, and appreciate just sitting and looking at it when she's just sitting there... waiting for the next sortie.

“Red Tulip” – Hermann Graf

When you're one of the best fighter aces of all time, why not brightly paint your cowling and rudder to something that can't be missed? This scheme is depicting the fighter flown by Hermann Graf. Serving on both the eastern and western front, Graf was the first ace to shoot down more than 200 adversaries; 212 victories and 830 combat missions.



Seen in this photo with 202 victories, Graf was awarded the highest military decoration at the time, the Knights Cross of the Iron Cross with Oak Leaves, Swords and Diamonds.

An instructor of other aces, an emblem of his fighter group can be seen on the right hand side of the plane; eagle teaching younger eagles. The emblem on the left hand side made up of previous flight groups, the Karaya-Staffel emblem. The rest of the markings feature on many of Hermann's aircraft.

Research was challenging as Hermann flew more than one FW190, as well as a number of Bf109's. His technique was based around getting very close to his prey before firing. He got so close that he was often firing through debris. So while he was not shot down, he went through a number of aircraft. The recreation of the details on this scheme were from singling out this exact airplane, and recreating it as closely as possible including the actual reproduction of the seemingly random camouflage pattern.



“Black Eight” - Willi Maximowitz

Willi was more into bombers. Credited with 27 victories, 15 of them were four engine bombers. At least one of these bombers (though he claimed a second also) was taken by, get this, ramming it. April 20 1945, Willi failed to return from a combat mission. If you use the airplane itself as a blunt instrument, going out with your boots on was probably a foregone conclusion. Maximowitz was posthumously awarded the gold German Cross.





THIS IS NOT A TOY!

Serious injury, destruction of property, or even death may result from the misuse of this product. Extreme Flight RC is providing you, the consumer, with a very high quality model aircraft component kit, from which you, the consumer, will assemble a flying model. It is beyond our control to monitor the finished aircraft you produce. Extreme Flight RC will in no way accept or assume responsibility or liability for damages resulting from the use of this user assembled product. This aircraft should be flown in accordance with the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured and operate your model at AMA sanctioned flying fields only. If you are not willing to accept ALL liability for the use of this product, please return it to the place of purchase immediately.

Extreme Flight RC, Ltd. guarantees this kit to be free of defects in materials and workmanship for a period of 30 DAYS from the date of purchase. All warranty claims must be accompanied by the original dated receipt. This warranty is extended to the original purchaser of the aircraft kit only. Extreme Flight RC in no way warrants its aircraft against flutter. We have put these aircraft through the most grueling flight tests imaginable and have not experienced any control surface flutter. Proper servo selection and linkage set-up is absolutely essential. Inadequate servos or improper linkage set up may result in flutter and possibly the complete destruction of your aircraft. If you are not experienced in this type of linkage setup or have questions regarding servo choices, please contact us at info@extremeflightrc.com or 770-887-1794. It is your responsibility to ensure the airworthiness of the model.

Tips for Success

- Before starting assembly, take a few minutes to read the entire instruction manual to familiarize yourself with the assembly process.
- Use a fresh bottle of thin CA with a fine glue tip when attaching the CA hinges. This will ensure that the proper amount of CA wicks into the hinge and surrounding balsa wood and creates a proper bond between the wood and hinges.
- Apply a couple drops of CA to high stress areas such as anti-rotation pins, landing gear mounts, servo trays and motor box joints.
- Take the time to properly balance and trim your aircraft and set up rates and exponential values. Your flying experience will be greatly enhanced by doing this.
- Note that this aircraft is printed using our printed covering technique. Your aircraft has been sealed with a matte clearcoat. Due to climate changes, wrinkles may develop in the covering. These are easily removed with a little bit of heat. Use your heat gun or a covering iron with a soft cotton iron sock, medium heat, and a gentle technique. Just like regular covering, you can remove any wrinkles that develop over the life of your aircraft, but go a little slower and be a bit more careful for best results. Your iron will feel a bit different gliding over this sealed covering than regular. Be careful not to use too much heat as the covering may shrink too much and begin to lift at the edges. Take your time, and the beautiful finish can be easily maintained.

Items Needed For Build

1. Masking tape
2. Thin and medium CA adhesive. We highly recommend Mercury M5T thin and M100XF
3. 30 minute epoxy
4. Blue Locktite thread locker
5. Small and medium Philips head screwdriver
6. Metric hex drivers
7. Needle nose pliers
8. Denatured Alcohol (methylated spirits) for epoxy clean up with paper towels
9. Plastic compatible adhesive/contact adhesive (shoe goo, seal-all work fine)

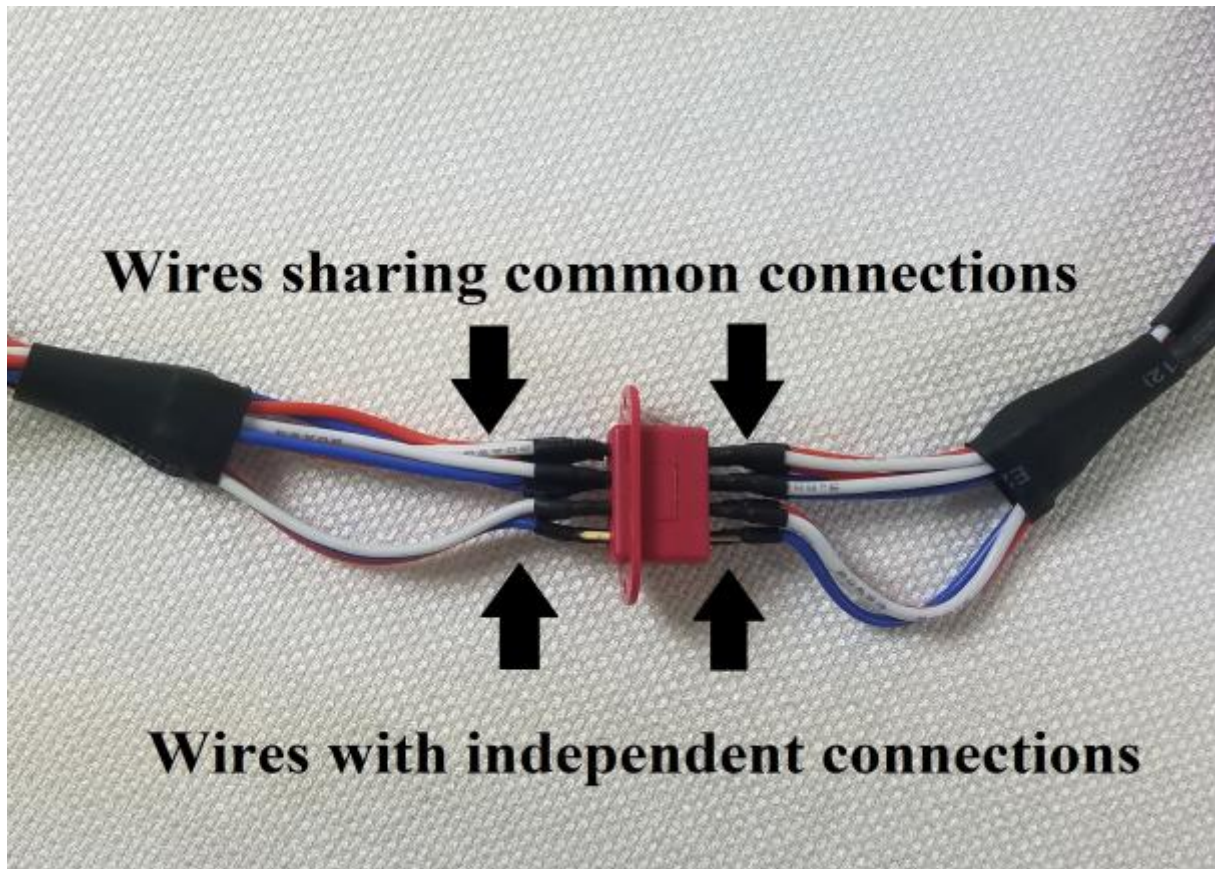
Required Equipment

1. Torque 4016T-500 brushless motor
2. Airboss Elite 80-Amp ESC
3. External BEC to power radio system
4. QTY 6 mini (~30g) servos (metal gears recommended)
5. 6S 3300 – 4400mah LiPo flight battery
6. 8 channel computer radio
7. 2x 12" servo extensions (ailerons)
8. 2x 6" servo extensions (flaps)
9. Recommended: one three-servo surface mount plug and one two-servo surface mount plug sets for easy wing equipment connection.
10. Prop and spinner (scale three blade spinner for the FW190 available from ExtremeFlight)
11. 2x 1" servo arms (ailerons)
12. 2x 3/4" – 1" servo arms (flaps)
13. 2x 3/4" arms (elevator and rudder)

Aces High FW-190 Assembly Manual Addendum

Thanks for your purchase of the Aces High FW-190 ARF! Since writing the assembly manual we've discovered a couple of key points that will enhance your enjoyment of the model:

1. It is highly recommended that the wing halves be glued together with epoxy once all electronics have been installed. This will add additional strength to the wing center section since it will be subjected to loads during landing from the retractable landing gear.
2. Operating voltage for the retract controller is 4.8-6 volts. Exceeding this voltage may damage the unit.
3. To make field assembly faster and easier we highly recommend using the Extreme Flight multi-plugs on the wing servo/retract connections. A 2 wire plug and a 3 wire plug are recommended so that you can incorporate the retract connector into the 3 wire multi-plug. When using the 3 wire plug, it is imperative that you pull back the black heat shrink tubing and inspect the wiring of the plug. You will notice that 2 of the wires share common contacts on the plug, while the 3rd wire is independent. It is of utmost importance that the connector for the retract system is plugged into the independent wire for proper operation. Failure to do so will lead to retract mechanism failure.



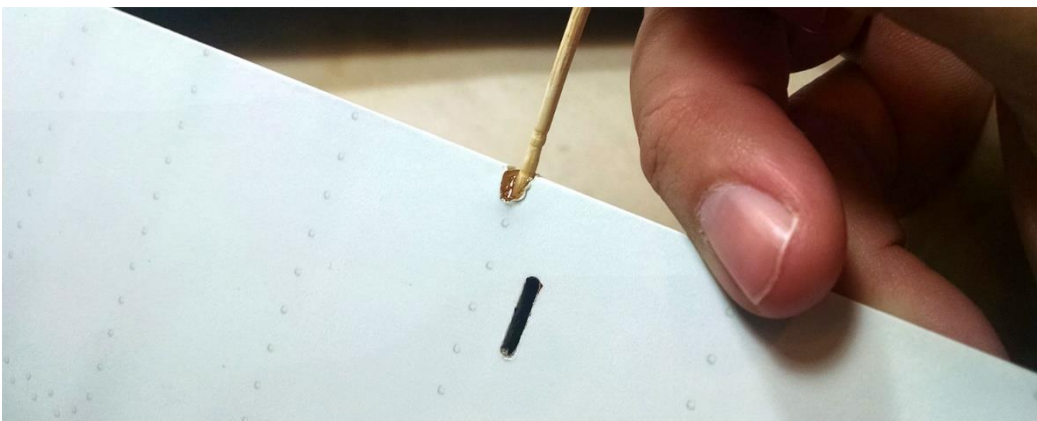
LET'S BEGIN !!!



Hinging the aileron. Remove the aileron, and place some pins into the center of the hinges. This will prevent the hinges from pushing into only one side of the control surface of the wing.



Insert the aileron into the wing, and remove the pins. Make sure that the aileron is aligned so that the end of it is in line with the wing tip. Then holding it deflected, add a couple of drops of *thin* CA to each hinge. Allow to cure, then flip the wing over and apply a drop to each hinge on the opposite side.



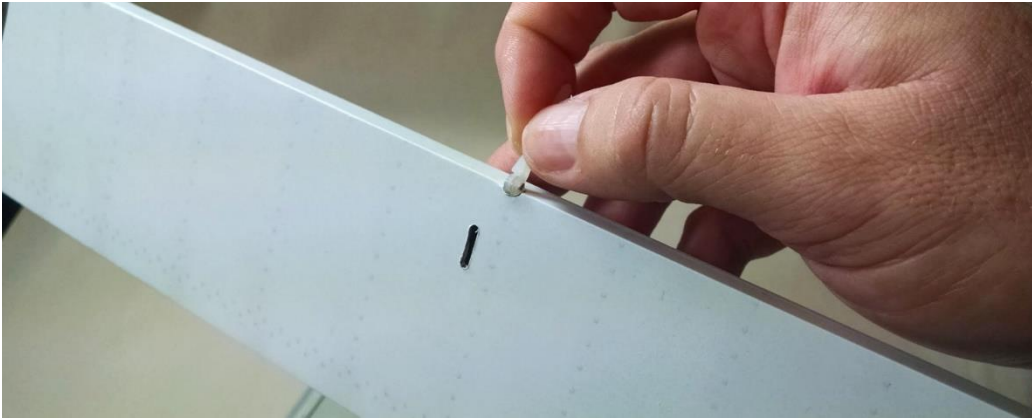
Remove the flap from the wing, and remove the hinges. Mix some epoxy and use a tool (like a toothpick) to coat the inside of the hinge holes with epoxy.

Note: We recommend doing one side of the hinge at a time. Gluing the hinges into the flap and allowing to cure before gluing into the wing.



Wipe some epoxy onto the barbed end of the hinge.

Note: One end of the hinges on the flaps have been shortened. The shorter end is to go into the flap surface itself, and the long end into the wing.



Insert hinge into the flap. Wipe with denatured alcohol (methylated spirits) to clean away any excess glue and ensure the hinge moves freely.

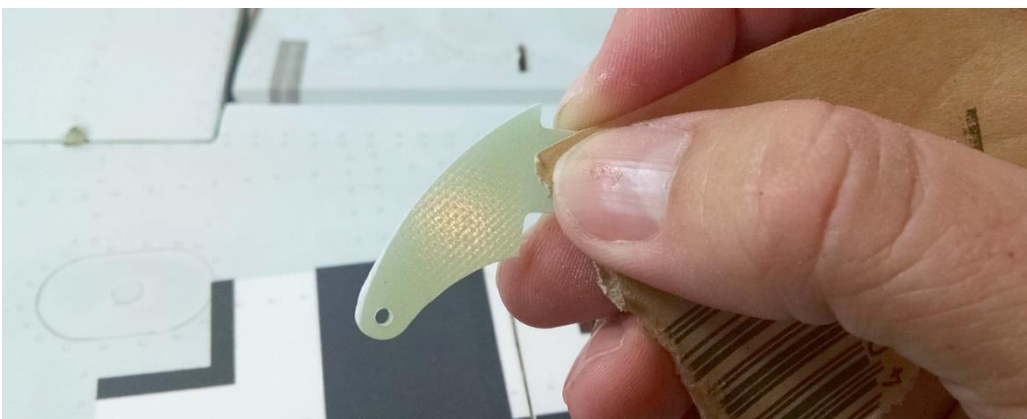


With all hinges glued into the flap surface, repeat the hinge gluing steps for the other side and insert the flap into the wing.

Note: Before the glue is fully cured, test that the flap moves freely. If needed, wipe a drop of denatured alcohol onto each hinge to free it up.



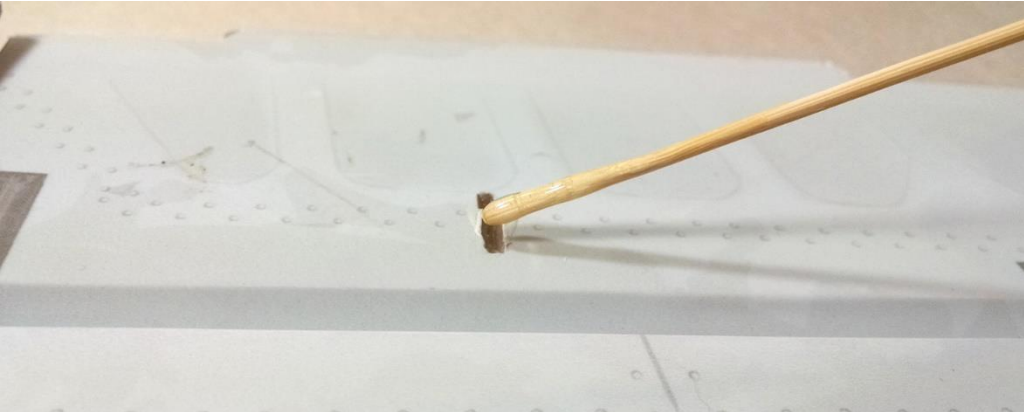
Next are the control surface horns found in the "Main Wing" bag.



Using some coarse sandpaper (100-150 grit is ideal), rough up the surface of the tabs on the control horns (the part of the horn that inserts into the wing). This will provide better adhesion for the glue.



Note: The curved horns are for the ailerons, and the triangle shaped horns are for the flaps.



Mix up some epoxy, and use a tool/stick to pace into the holes of the control surface.



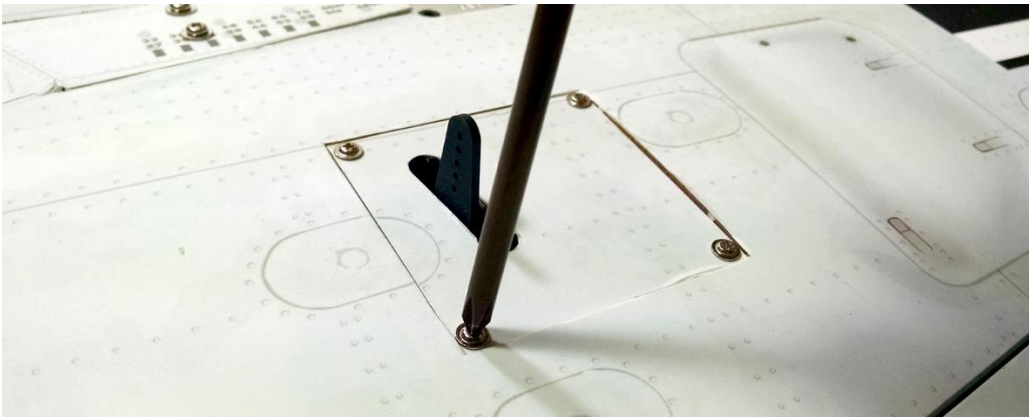
Wipe some epoxy onto the sanded tab area of the horn, and insert into control surface. Clean any excess glue with denatured alcohol (methylated spirits).

Repeat for all flap and aileron horns.



Using the hardware that came with your servo, mount the servos to the removable servo access doors as shown.

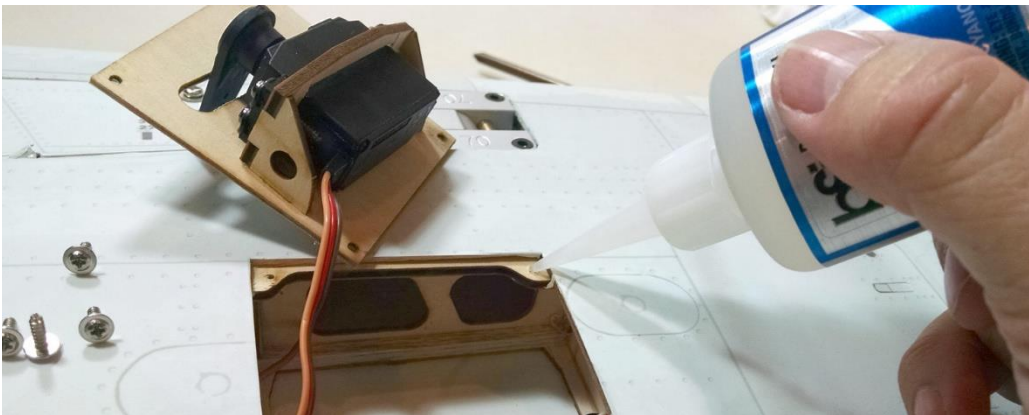
Note: We recommend screwing the servo to the mount and then removing it to apply a drop of thin CA to the servo screw holes to make them stronger.



Center your servo using your radio. Place a servo arm on the servo so that at center it sticks out of the hole at right angles to the servo mount door.

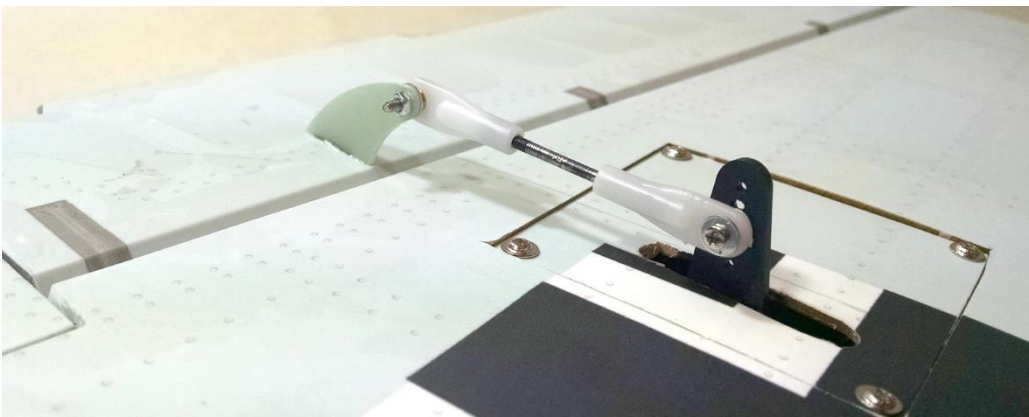
Run the servo wire through the wing and screw into place.

1 inch/25mm arm is ideal for ailerons. 3/4 inch / 20mm arm for flaps is ideal.



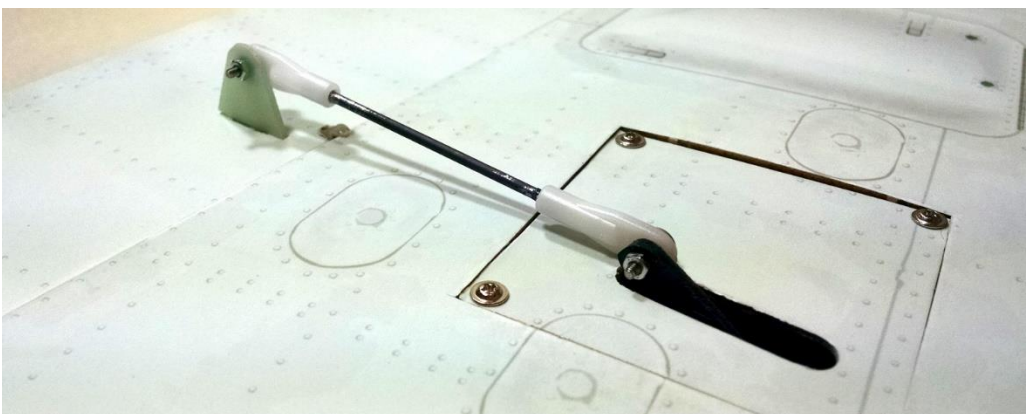
Remove the servo mount/door, and put a drop of thin CA into the screw holes. Allow a few seconds to cure and then screw back into place.

Repeat for the other servos in the wing.



Locate the shorter two pushrods, and four of the ball links. Thread the ball links onto the pushrod. The length of the pushrod should allow the servo arm to be perpendicular to the wing when the aileron is at center.

Use the 2mm screw and nuts to mount the pushrod.

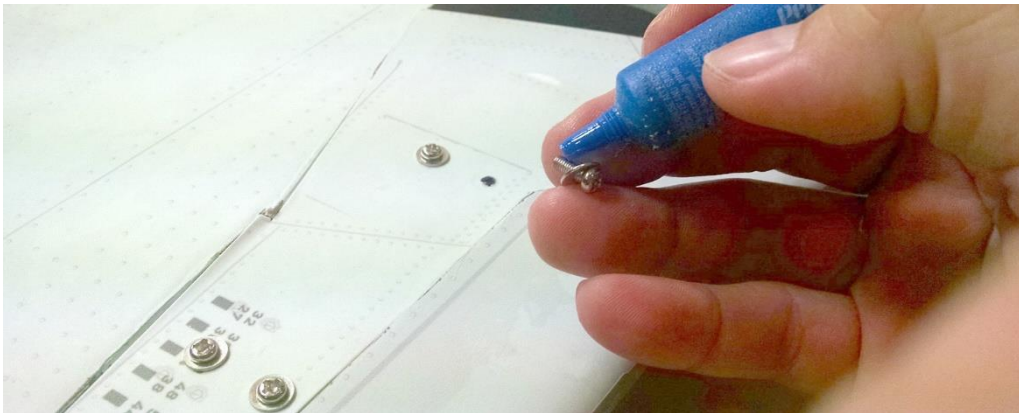


The length of the pushrod for the flaps, with the flap closed, should have the servo at the end of its travel toward the surface.

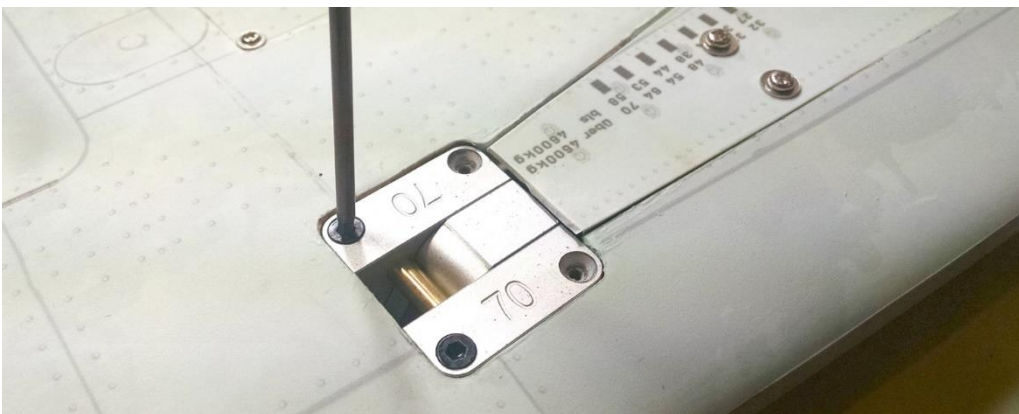
Note: The servo arm should still be straight out of the wing when centered, then move to end of travel to adjust the length of pushrod.



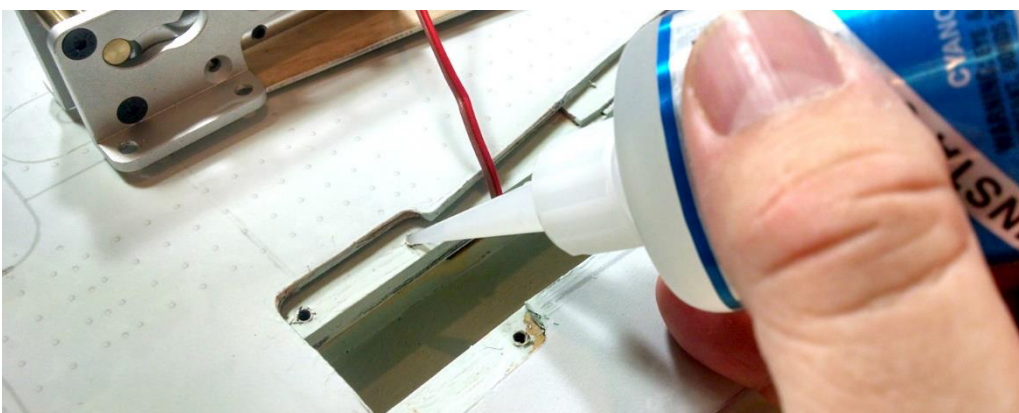
Apply a drop of thin CA, or blue thread locker, to all nuts of the control system.



One at a time, remove screws from the landing gear door and apply a small drop of thread locker.



Using a 2.5mm hex driver, remove the mounting screws from the retract units.

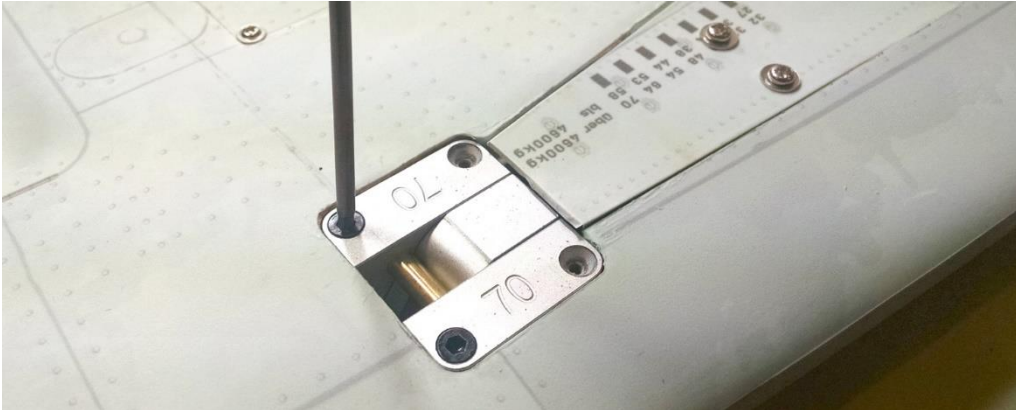


Remove the landing gear leg, and apply a drop of thin CA to each of the landing gear mount screw holes.

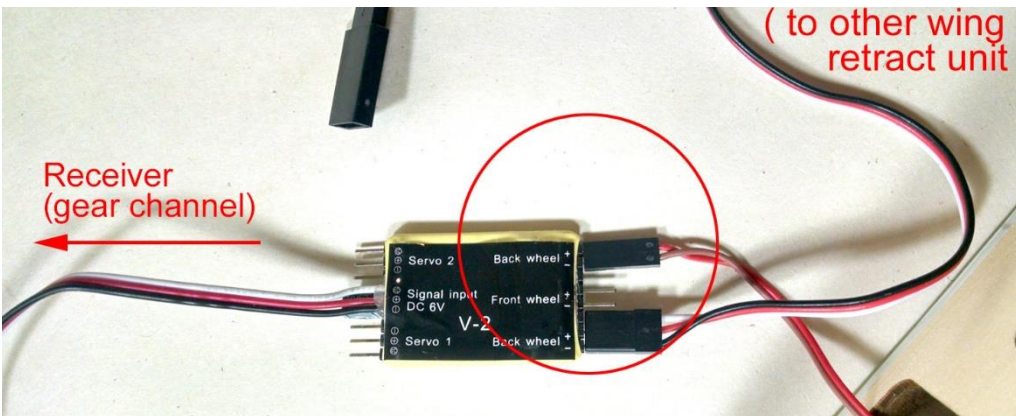
Note: Be mindful of the wire to the retract unit when removing, only pull the landing gear out far enough to perform the work needed.



Using a 1.5mm hex driver, remove the set screw from the base of each side of the landing gear. Place a drop of blue thread locker to the set screw and screw back into place.



Screw landing gear back into place.



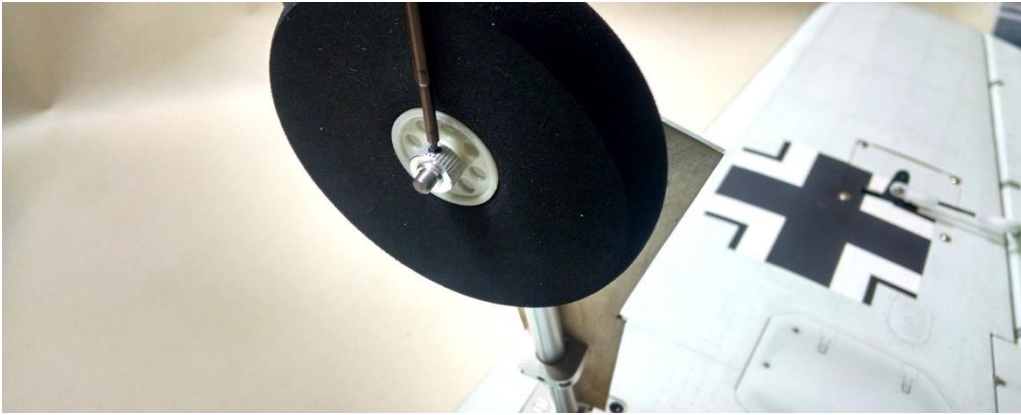
Connect the retract unit to the landing gear controller, and the controller to your receiver's gear channel.

Note: Make sure the polarity of the connector is correct.

The controller needs to be cycled to learn its position and arm. Use your radio to open the retract unit.



Using a 1.5mm hex driver, remove the set screw from the gear leg holders, one at a time, and give a drop of blue thread locker.



Using 1.5mm hex driver, remove the wheel collar from the landing gear, and remove the wheel.



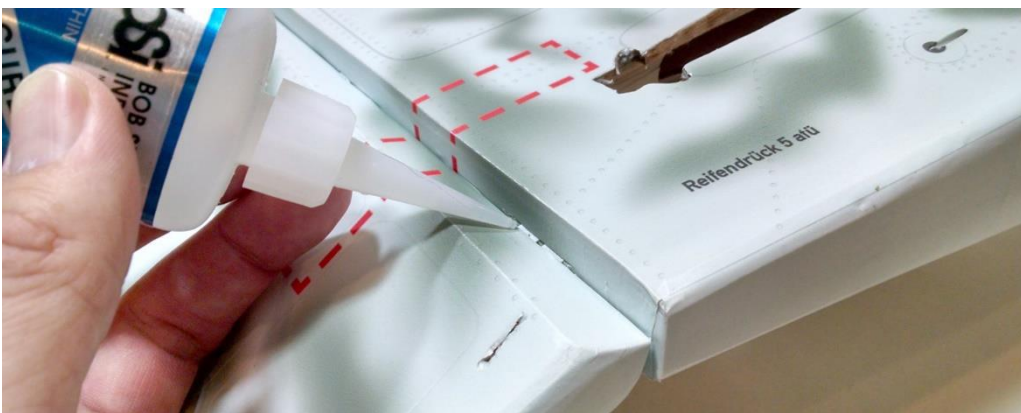
Using a pair of pliers, remove the landing gear axle, and add a drop of blue thread locker.

Screw axle back into place, mount wheel and wheel collar. And yes, the set screw on the wheel collar could also use some blue thread locker 😊

If you only have one wing complete at this point, now would be the time to repeat the steps for the opposite wing. Retract landing gear, cycle them a few more times because it is amusing to watch, and then set aside as we assemble the fuselage.

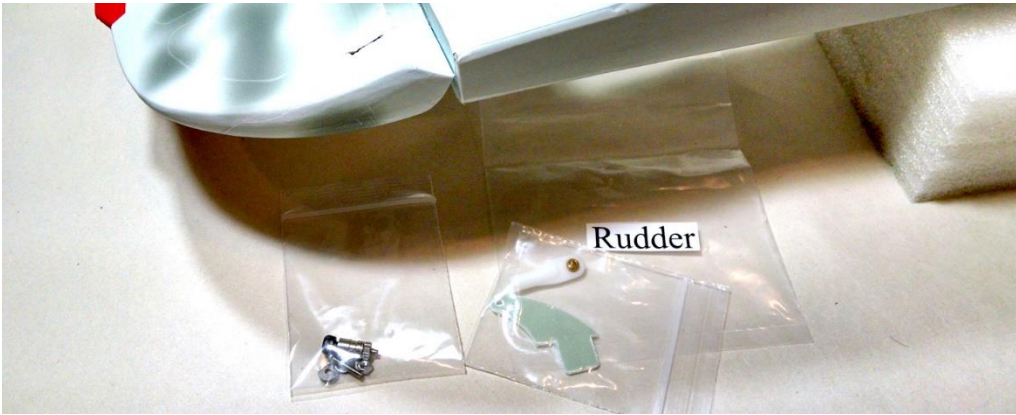


As we did with the ailerons, locate the rudder, and place pins through the center of the hinges.

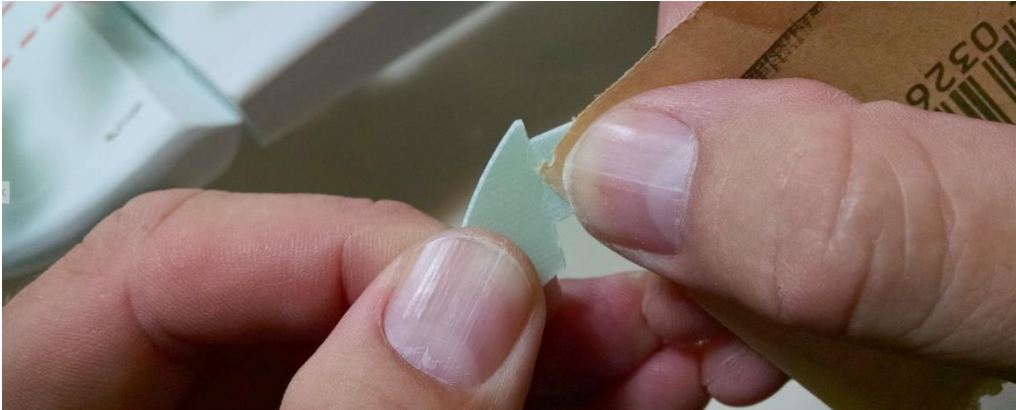


Slide the rudder and hinges into place, making sure that the rudder aligns properly to the top of the fin and the bottom of the fuselage.

Remove the pins, deflect the rudder, and apply a couple of drops of thin CA to the hinges.



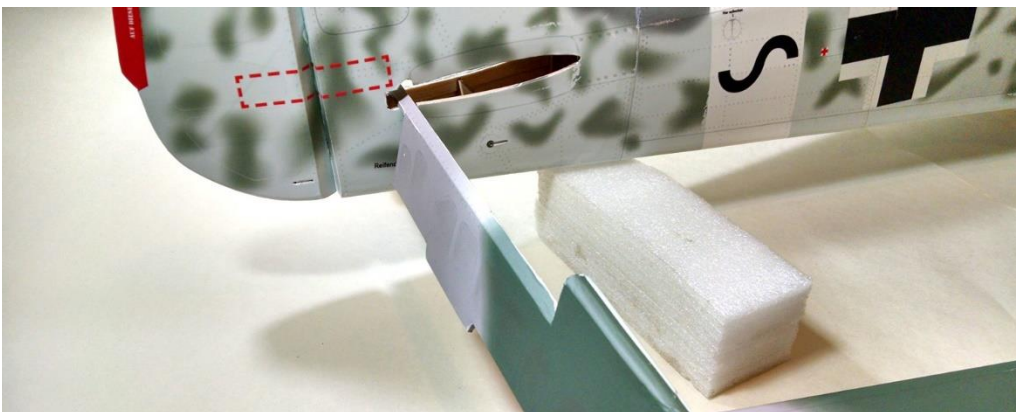
Locate the rudder hardware pack.



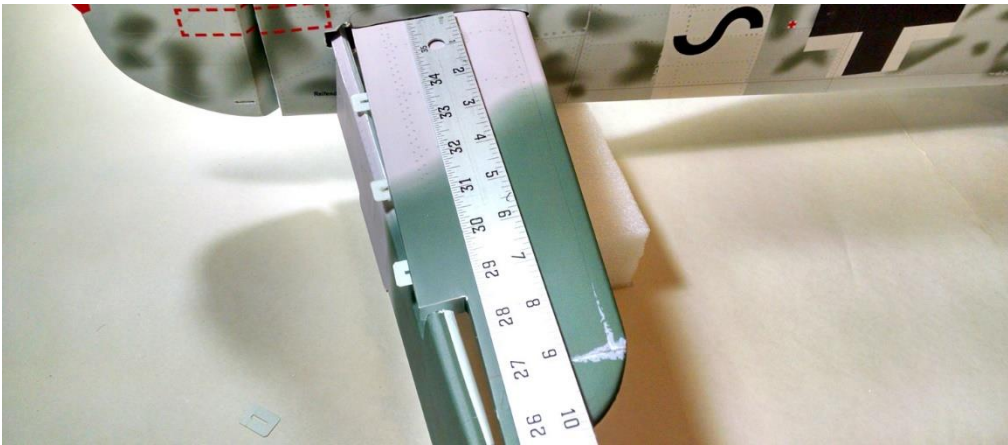
Rough up the tab of the control horn with coarse sand paper.



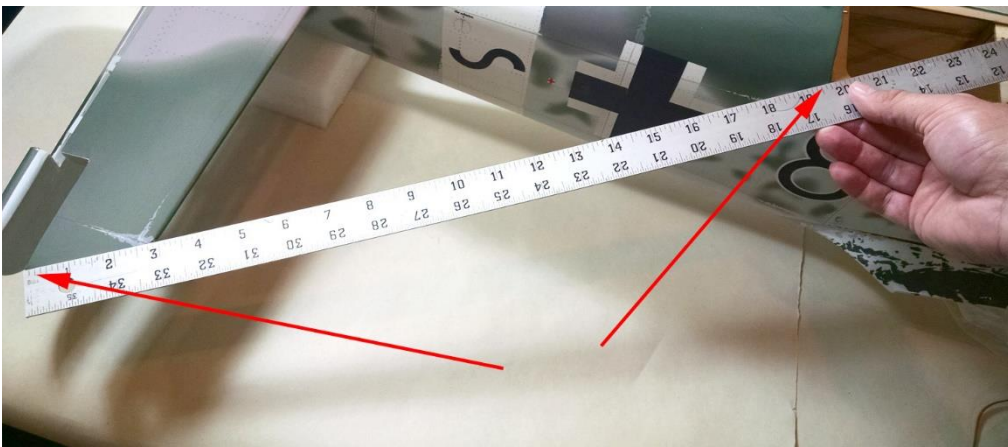
As with the ailerons, apply epoxy glue into the hole of the rudder and the tab of the control horn. Slot into place, and clean away any excess glue with a paper towel soaked in denatured alcohol (methylated spirits).



Slide the elevator through the hole in the fuselage as shown.

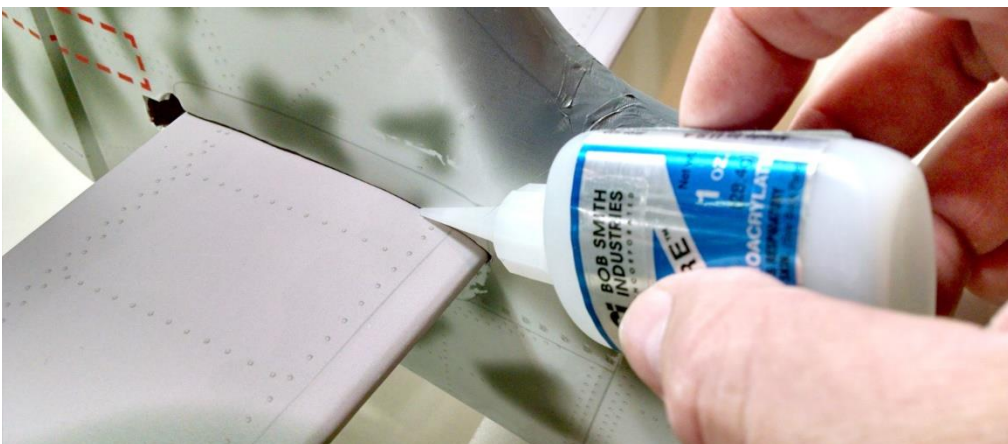


Slide the stabilizer into place, and use a rule or tape measure to make sure it is centered.



To make sure that the stabilizer is straight, measure from the corner of the stabilizer to the rear of the canopy bay. Do this on each side and adjust the angle of the stabilizer until even.

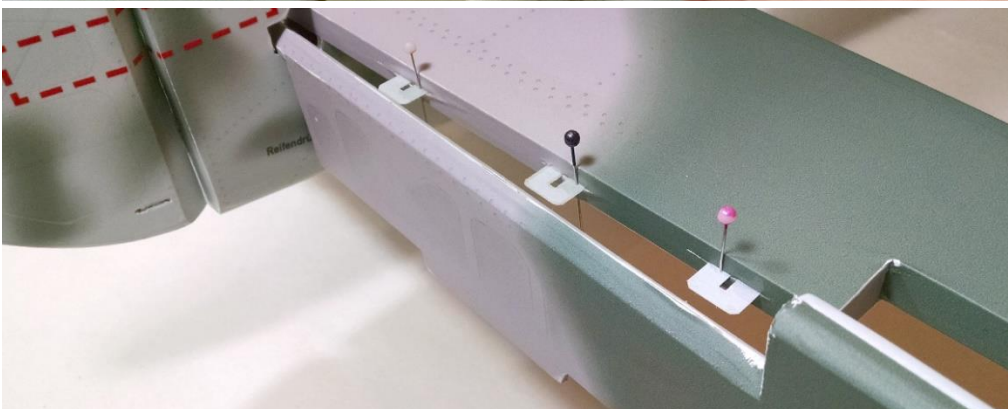
Measure this more than twice, including the step above of measuring it is centered. Moving the stabilizer after it is glued is not recommended.



Using thin CA, add a run of glue along each side of the top of the stabilizer.

Allow the top to dry before doing the same to the bottom.

Note: It is recommended to take your time with this step and allow the glue to dry before doing the bottom. Taking your time helps prevent the CA from running.



Add pins to the center of the hinges and insert into the stabilizer. Then slide the elevator onto the hinges.



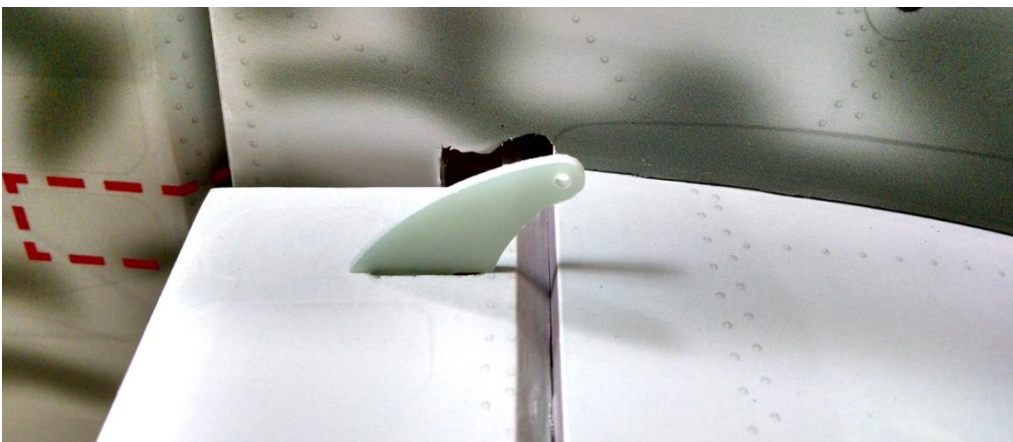
Deflect the elevator, and add a couple of drops of thin CA to the hinges.



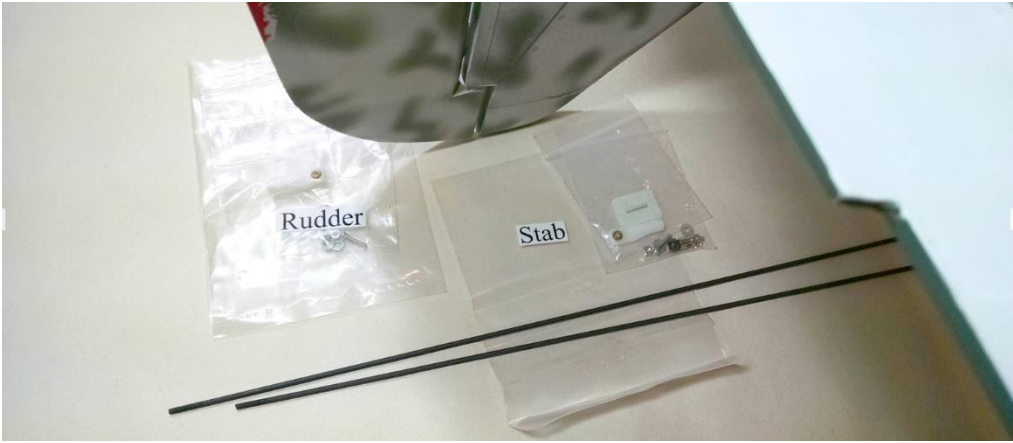
Locate the "Stab" hardware pack.



Sand the tab of the control horn with coarse sand paper.



Apply epoxy to the hole and tab of the control horn, and insert into the slot. Clean any excess glue with paper towel and denatured alcohol (methylated spirits).



Locate the pushrod and ball link hardware.

Note: The longer pushrod is for the rudder side, and the shorter pushrod is for the elevator.



Screw a ball link onto the shorter rod for the stabilizer, and slide into the fuselage. Using the 2mm screw and nut, bolt the pushrod to the control horn. Finally, add a drop of thin CA or thread locker to the nut.



Repeat the process of pushrod assembly for the rudder.



Locate the tail wheel hardware pack.



Position the bracket so that the center of the pivot is over the hinge line as shown. Screw the bracket into place with the two screws provided. Screw the steering arm into the base of the rudder as shown.

Remove the tail wheel bracket and add a drop of thin CA to each screw hole. Allow to dry and screw back into place.



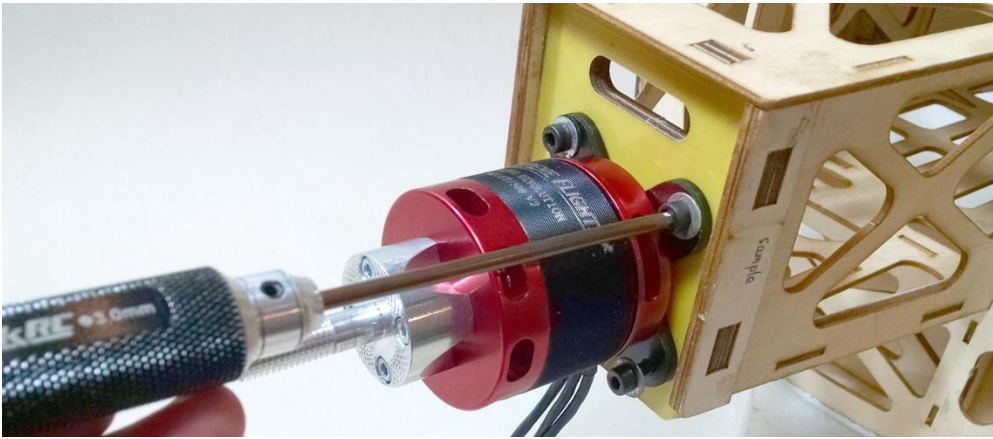
Use hardware that came with your servo to mount elevator and rudder servos. The hardware packs for "Stab" and "Rudder" contain the links to connect the pushrods to the servo arms as shown.



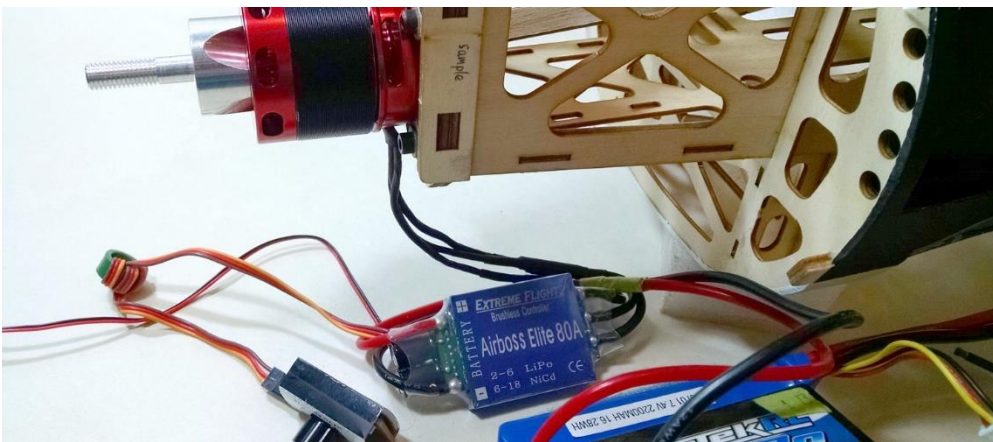
The "EZ link" for the servo arm is assembled as shown.



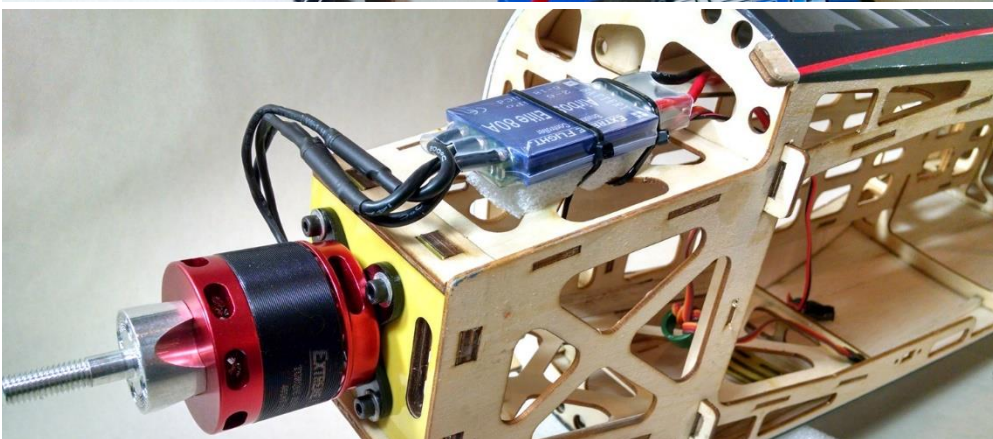
Gather your power system components, and the motor mount hardware pack.



Using a drop of thread locker on the bolts, bolt the motor to the firewall using a 3mm hex driver.

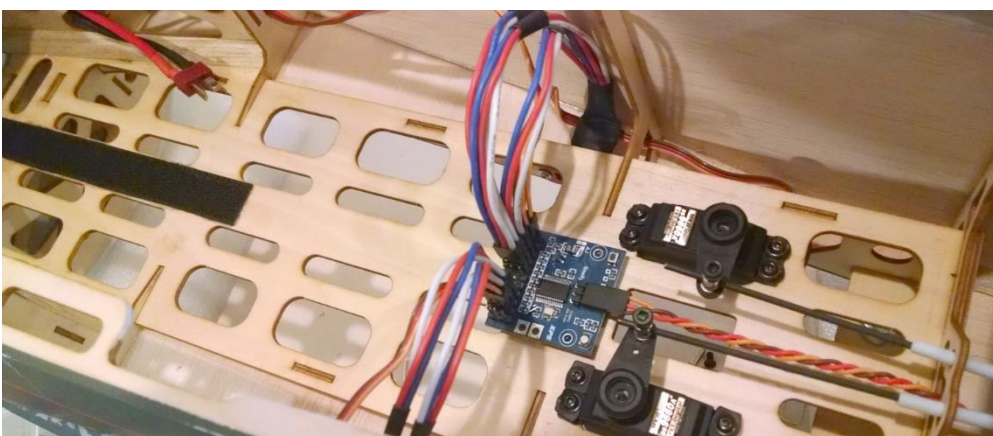


Connect the motor to your speed control, battery and radio system to test the direction of the motor.



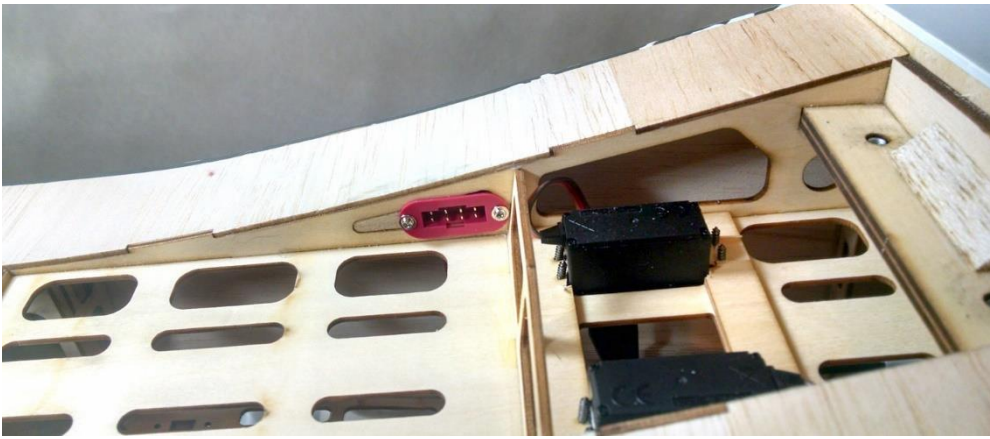
Thread the battery wires and radio wire through the former. Mount the speed control to the side of the motor box so that it receives good air flow.

Photo shows a mount using zip cable ties and small amount of foam padding.



Follow guidelines from your radio manufacturer to mount your receiver and connect electronics.

Apply Velcro to battery tray for securing battery pack.



A handy accessory is this surface mount plug that connects up to three servos. One each side of the fuselage makes assembling the model at the field nice and easy.

Available where all awesome airplanes (Extreme Flight) are sold ☺



With some low adhesive painters tape, mark the location of screws for the cowling as shown (the center of the tabs).



Place the canopy on the fuselage, and tape the cowling on. Locate the "Cowling & Canopy" screws.



Make sure that the front is centered on your motor, and has the appropriate spacing for the propeller to spin clear of the cowling.

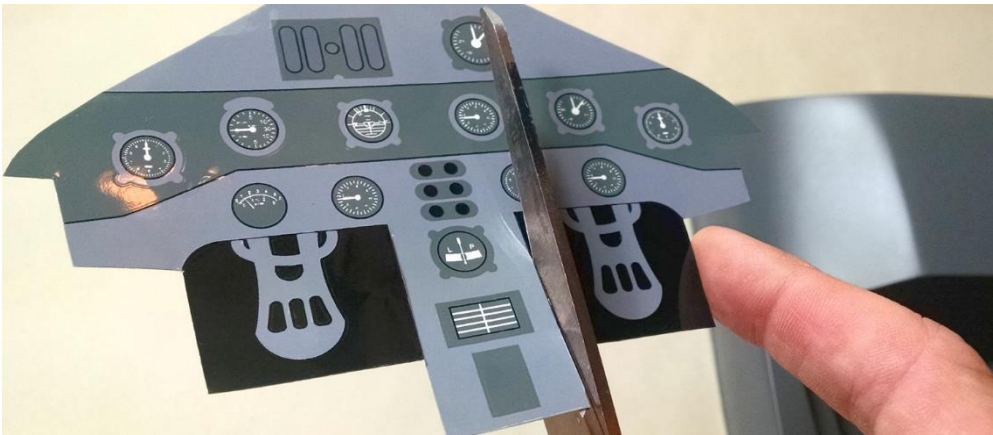


Make sure that the machine gun slots are in line with the top of the fuselage.



Drill the holes for the screws through the cowling, and screw in the screws with a philips head driver.

Remove the screws and the cowling to add a drop of thin CA to the screw holes. Put cowling and screws back on.



Using scissors or a knife, cut out the canopy detail decals.

Cut the inside edges of the foot holes as shown here.



Apply the decal to the canopy insert.



As a reference, add a piece of tape in line with the rear of the canopy insert.



Along the corner, cut off the front and back of the canopy insert.



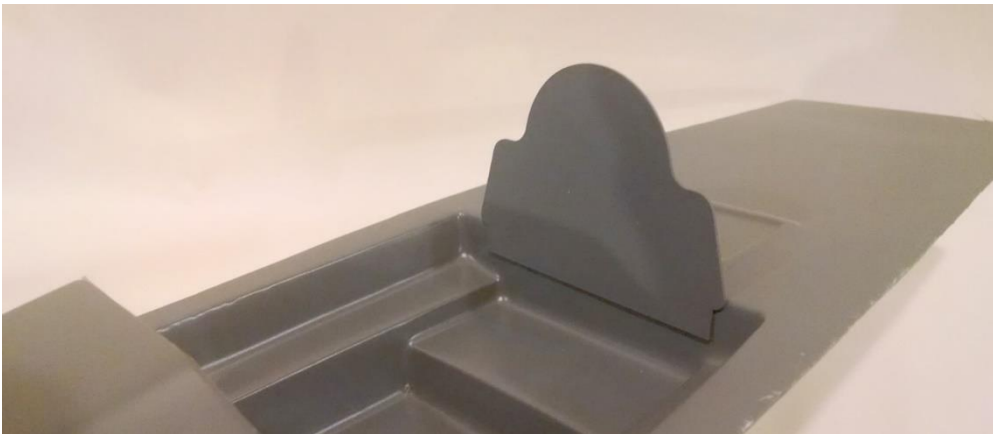
Cut off the sides of the insert along the tape and the corner of the insert.



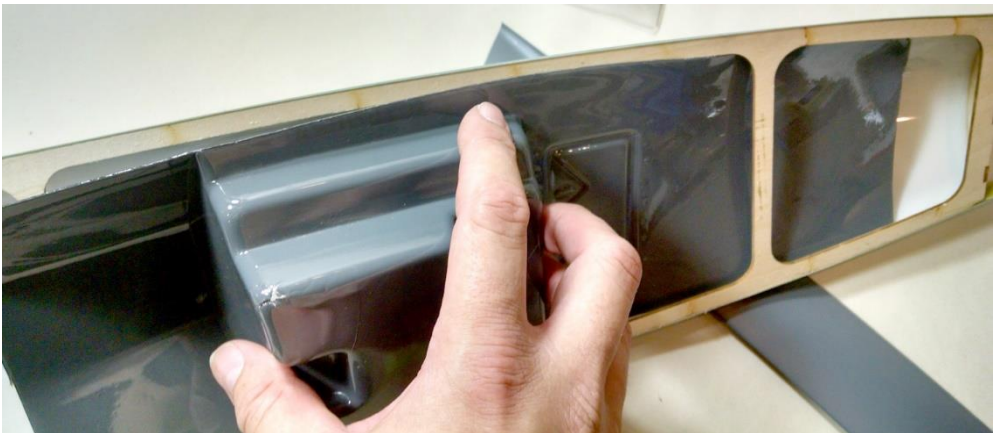
To make inserting into the canopy easier, cut this corner triangle off the insert, about 1/2 inch / 12mm at the front to the corner of the instrument panel as shown.



Locate the seat piece, and apply plastic compatible adhesive (a contact adhesive is being shown here, applying glue to the seat as well as the rear of the cockpit area).



The seat glued in place.



Slide the insert into the canopy as shown.



Either glue or tape the front of the insert to the canopy. If you want to revisit later to add more details (pilot, control yoke, etc) then tape will make that task easy.



Completed canopy with insert details.



The final step, wing attachment. Slide the wing halves onto the carbon fiber wing tube, making sure to connect the landing gear controller.

Locate the covered ply plate and the wing attach bolts. In the "Main Wing" hardware kit. With a 3mm hex driver, fasten the wing into place.

Setup

Center of Gravity

The recommended range for maiden flight is 4" to 4.25" (100mm – 18mm) measured from the leading edge where the wing meets the fuselage. For convenience, a handy way to balance the plane without the canopy is the photo below: hang the model from the side rails using a scrap piece of wood cut to length. Recommended balance point using this method is 1/4" (7mm) in front of the switch screw hole.



Using recommended equipment, the FW-190 will take a large range of battery options. 6S 3300mah LiPo battery will sit all the way forward. Larger packs can be slid back to suit.

Control Throws and Exponential

Setting appropriate control throws is an important step, although you can adjust to your personal taste once used to flying the model. The below rates are how many of us fly the model, and a good start before refining the setup to your liking. Low rate settings are closer to scale roll rates, and the high rates are closer to what is typically enjoyed in a well-mannered sports model.

You will find this FW190 model to be very solid in flight without bad habits; the perfect fun sports model with refined scale presentation.

Ailerons

Low Rates: 8-10 degrees throw – 15% expo
High Rates: 25 degrees throw – 40% expo

Elevator

Low Rates: 10 degrees throw – 20% expo
High Rates: 28 degrees throw – 50% expo

Rudder

Low Rates: 12 degrees throw – 15% expo
High Rates: 20 degrees throw – 50% expo

Flaps

Mid Flap: ~25 degrees – 4% down elevator mix

Full Flap: ~50 degrees – 7% down elevator mix

Flying with flaps

Because an elevator mix is required for level flight with the flaps down, it is advised to not use the flaps for the maiden flight. Test and tune your “flap -> elevator” mix setting at altitude with about 1/4 throttle. A “flaps up”, landing is easy, but when the mix is nicely tuned, you won’t believe that warbird can land so easy.

Flaps And Gear Doors Have A “VNE”

VNE is a full scale aviation term that means “Velocity, Not Exceed”. The gear doors and flaps are designed for use at lower airspeeds. Leaving them deployed and flying at high speeds will increase the risk of losing them.

For the continued enjoyment of your FW-190A, we highly recommend only lowering the landing gear and flaps when flying at half throttle and below.

Final Steps

After you have completed all of your radio setup, take the model outside and install your propeller. Test run your power system in a safe manner. Be sure to check the motor manufacturer’s recommendations for help in selecting a prop.

We believe this FW-190 to be the best flying warbird available, with all the details of a model that is three times the weight that has none of the great flying habits. The best advice is always to burn through lots of battery packs and above all have fun! We have had a blast during the development and testing stages of this aircraft and sincerely hope the FW-190 provides you with as much joy and excitement as it has for us.

See ya at the flying field!

~ AcesHigh