73" AJ Raven

Assembly Instructions

Congratulations

Whether you're looking to go out and go 3d huckin' or lay down a smooth-as-butter precision flight, the 73" Raven is for you! The wings have been thoroughly refined to allow precision flying, while not sacrificing any 3d characteristics. The Raven can be assembled with a double taper wing which provides better tracking precision. Or, you may choose the "Edge" wing for slower stall speeds, low and slow 3D flying. Generously sized control surfaces give you excellent authority at all speeds. The Raven features an awesomely light but strong airframe and a light wing loading that will handle anything you want it to.

Building the airplane is very straight forward. The rudder cables are pre-installed, and the hinges are pre-glued. AJ Aircraft goes the extra step to make it easy to get this bird in the air in no time flat. High quality parts including dual G10 fiberglass control horns, carbon fiber wing tubes and heavy duty ball-links and turnbuckles ensure you won't need to spend more money replacing cheap hardware.

Can't decide which power system to add to your Raven? The electric setup gives the ability to strap batteries (8-12s) in and just go fly. You can expect around 6-7 minute flight times with great power and ultra-reliability. Love the smell of burning gas in the morning? Power your airplane with a 30-40cc 2 cycle gasoline engine. With a 16oz Fortitude tank you will see flight times approaching 15 minutes! AJs' personal pick for this 73" a 12s electric setup, ultra-floaty and a great flight envelope. Whichever you choose, we're sure it'll put a smile on your face every time you fly it!

Up Your Game! Fly AJ Aircraft

AJ Aircraft thanks you for the purchase of this airplane. Top grade materials and precision assembly has gone into this to make this a top quality aircraft. Following the directions closely, will assure you many hours of thrilling flight. Two years of design, development and testing has gone into this airframe. We hope you're as happy with it as we are!

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WARNING!

AJ Aircraft's extensive testing ensures a high quality kit that has gone through many stages to provide you with a safe, reliable, airframe. Poor assembly will lead to an unsafe model and therefore the instructions must be followed closely. Should you have any questions, please do not hesitate to contact us. The safe operation of this model is your responsibility and yours alone. If you are a beginner or have never flown a model of this size and power you should attempt it with the help of an experienced pilot. This product should not be considered a toy, but rather a sophisticated, working model that functions much like a full-scale airplane. Because of its performance capabilities, this product, if not assembled and operated correctly, could cause injury to you or spectators and damage to property.

This aircraft should be flown in accordance to the AMA safety code. It is highly recommended that you join the Academy of Model Aeronautics in order to be properly insured and to operate your model at AMA sanctioned flying fields. If you are not willing to accept all liability for the use of this product please return if to the place of purchase immediately.

AJ Aircraft does not accept responsibility or liability for damages resulting from use of this product.

Contents

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Before starting, read through the entire set of instructions to familiarize yourself with the process.

If there's ever a question, contact AJ Aircraft. 734-244-4015

Features

Specs:

- Wing Span - 73"
- Length - 68.5"
- Height - 20"
- Wing Area
  - Double Taper Wing (1027 sq in)
  - Straight Leading Edge Wing (1019 sq in)
- AUW (dry) - 10.5 lbs.
- Gas Power
  - Engine - 30cc - 40cc
- Electric Power
  - Motor - 2400+ Watt 8S/12S
- IMAC Legal!

What's in the box:

- NEW - Carbon-Kevlar plywood construction!
- NEW - Carbon-Kevlar reinforced landing gear mount!
- NEW - Carbon-Kevlar reinforced firewall!
- Carbon fiber main landing gear
- Carbon fiber tail gear
- Carbon fiber main wing tube
- Pre-hinged, glued and sealed aileron control surfaces
- Pre-hinged rudder and elevator
- G10 fiberglass control horns
- Ultralight foam wheels
- Heavy duty steel axles
- Quick install, durable fiberglass wheel pants
- Pre-run rudder pull-pull wires (pushrod also included for push-pull option)
- Extra hardware bag with spare parts
- Optional SFGs included
- Foil main wingbag
- Removable rudder
- Canister muffler tunnel with mounts
- Pre-drilled & rubber lined landing gear cuffs
- Firewall drilling templates for common engines
- High quality ball links & turnbuckles for all control surfaces
- Velcro for fuel tank or battery restraint

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Recommended Items for Completion

- Power System
    - Electric Motor (If you choose to go electric.)
        - 2400+ Watt 8S/12S or Equivalent
        - 100-120 Amp ECS
        - 12" ESC (Servo) Wire Extensions
        - 8s-12s Battery
        - Prop suited for the motor you choose. (20x10, …)
        - 3.5" (89mm) Spinner
    - Gas Engine (If you choose to go gasoline.)
        - 30-40cc
        - Standard sized metal geared throttle servo.
        - Ignition Shut Off
        - Ignition/Receiver Battery
        - 12-16 oz Gasoline Safe Fuel Tank
        - Gasoline Safe Fuel Line
        - Fuel Dot
        - Fuel Filter
        - 2x 12" Servo Wire Extensions
        - Prop suited for the engine you choose. (20x8, 20x9…)
        - 3.5" (89mm) Spinner
- Aileron Servos
    - 2x 250 oz/in Metal Geared, (Hitec HS-7955TG Recommended)
    - 2x 6" Servo Wire Extensions (to receiver)
    - 2x 1.5" Servo Arm for 3D Aerobatics (Or a heavy duty servo arms for sport flying.)
- Rudder Servo
    - 1x 250 oz/in Metal Geared, (Hitec HS-7955TG Recommended)
        - 2.5" Double Servo Arm for a Pull-Pull cable setup.
- Elevator Servo
    - This model can be configured with 1 or 2 elevator servos.
      250 oz/in Metal Geared, (Hitec HS-7955TG Recommended)
    - 1.5" Servo Arm for 3D Aerobatics (Or a heavy duty servo arms for sport flying.)
    - 24" servo wire extensions (1 or 2)
- Radio System
    - 5 or 6 channel full range radio system
    - Power Switch
    - Receiver Battery
    - Vibration padding for receiver and receiver battery.

> AJ flies this airframe with the following equipment:
>
> AJ5230-20P/205KV 12S
> Falcon 20x10 prop
> Jeti Mezon 120 or Castle Ice 100 ESC
> (2) Thunder Power 6S 3300 mAh Elite 55C LiPo main packs
> Castle Pro BEC
> Thunder Power 2S 2100 mAh G8 Pro-lite+ 25C
> Futaba 9177 servos on Elevator/Rudder
> Futaba 9452 servoc on Ailerons

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Tools Needed

Blue Painters Masking Tape	Small Flat File
Thin CA Glue	Small Round File
30 Minute Epoxy or	Electric Drill w/ Assorted Small Bits
Polyurethane Glue (Gorilla Glue)	Small Flat Blade Screwdrivers
Denatured Alcohol	Small Phillips Screwdriver
Paper Towels	Sandpaper (150-220 Grit)
Removable Thread Locker (Loctite 242, Blue)	Needle Nose Pliers
Metric & SAE (fractional) Allen Wrenches	Measuring Tape & Ruler
Hobby Knife & Fresh Blades	
Covering Iron (Trim Iron)	

Optional Configurations

The Raven can be assembled with a double taper wing which provides better tracking precision. Or, you may choose the "Edge" wing for slower stall speeds, low and slow 3D flying.

Edge Wing   Double Taper Wing

This model is designed for a gasoline engine or an electric motor. Fastener, servo hardware, and electric motor mounting box are provided for optional setups. You also have the option of using 1 or 2 elevator servos. The rudder will use a pull-pull cable system.
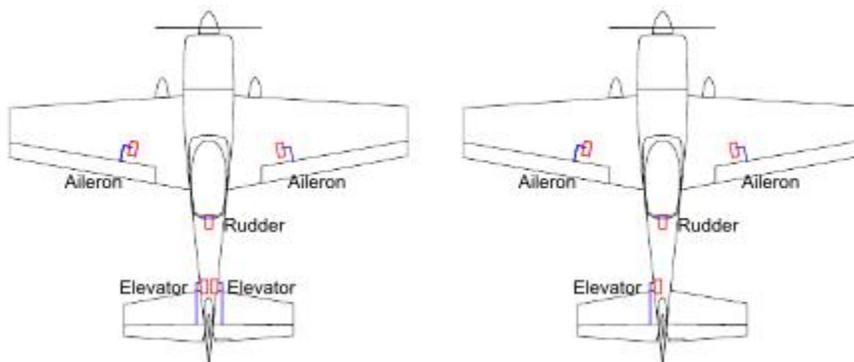
Inspection

We believe we offer the highest quality kits available. However, you may find some minor blemishes, fractures or joint separations in the construction of our models. Many of these can be easily repaired by backing up the joint with balsa sheet or hard balsa sticks without affecting the performance or appearance of the aircraft.

Take the time to inspect the components of the aircraft. Inspect the fuselage for any interior joints that may have loosened as a result of shipping & handling. Apply thin CA glue around the joints of the fuselage core, firewall, fuselage formers, and rudder servo tray to strengthen. Allow glue to wick down into joints but be careful to not allow CA glue to drip or puddle on covering material. Periodically inspect joints as you fly your airplane. Vibration and repetitive extreme maneuvers my cause a joint to loosen over time.

Covering

The covering on your airframe may have developed loose areas through temperature and humidity changes between manufacturing and shipping. This may also occur during the summer heat. The covering may require retightening a few times during your first summer of flying.

Take a few minutes to go over all of the seams making sure all edges are secure, then proceed to shrinking any area that may need tightening. (Use an iron on all seam edges. Use a heat gun on open areas and sheeted areas. An iron can be used in open and sheeted areas but hold the iron slightly above the surface. You don't want press the covering into the wood. Using an iron sock will reduce scratches.

- All airframe components are covered in genuine Ultracote covering.
- Red Scheme (True Red HANU866, White HANU870, Silver HANU881, Charcoal Pearl HANU846)
- Lime Scheme (Apple Green HANU903, White HANU870, Silver HANU881, Charcoal Pearl HANU846)

At 200-220°F (93-104°C) the adhesive on UltraCote® becomes active allowing the covering to be attached to the model. While 220° will fully bond the covering to the model it is well below the temperature that causes UltraCote® to shrink.

At 300°F (149°C) the initial shrinking of UltraCote® begins.

At 350°F (176°C) UltraCote® reaches its maximum shrinking point. Raising the temperature above this point will not cause further shrinkage.

Use as little heat as needed. Using too much heat may cause reshrinking issues later.

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Wings

The ailerons are pre hinged and glued to the wing. Firmly tug at each hinge point to ensure hinges are installed properly. It's better to find a loose hinge now rather than during a flight.

Carefully locate the aileron servo pocket. (Shining a light through opposite side of the wing may help highlight the pocket location.) Use a new hobby knife blade to cut though the covering. Cut from the corners of the pocket towards the center of the pocket so the covering can be folded in.
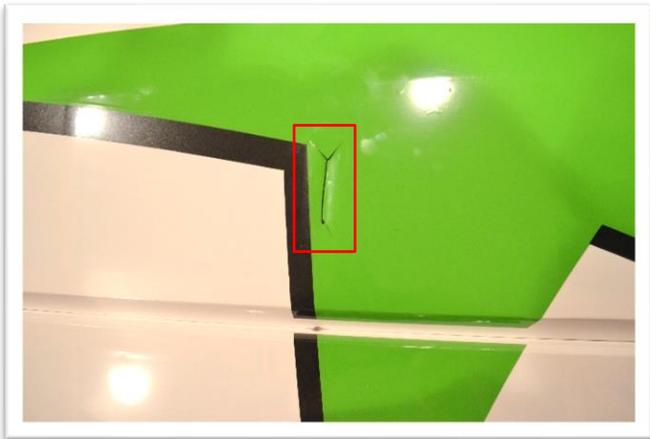
Gently snap off the servo wire installation string and temporarily secure it out of the way. Do not pull it out of the wing.

Use a trim iron to seal the bottom surface of the wing around the servo pocket. Fold the cut covering under the wing sheeting and attach it to the inside edge of the pocket.
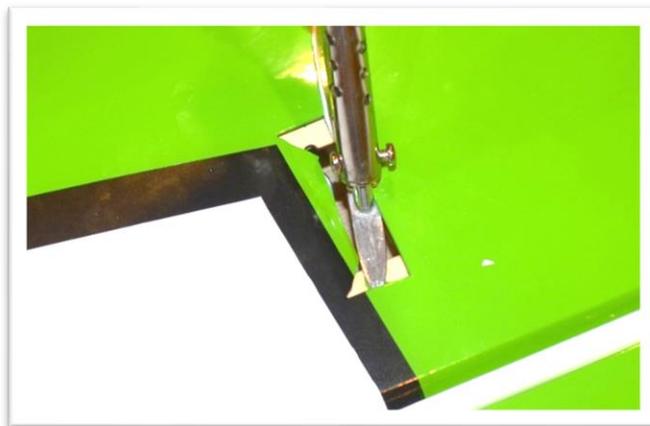
Carefully locate the aileron control horn slots. Use a covering sealing iron to bond the covering in the area the control horn will sit. Trim the covering away to expose the slots. Be careful you don't cut through to the top side covering.

Use the control horns from the "Wings" part bag. Test fit the control horn in the slot. Trim or file the slot as needed to achieve a snug fit. Make sure the shoulder of the control horn is fully seated down against the control surface.


Check the alignment of the control horn to the hinge center line. The linkage hole in the control horn should be aligned with the hinge centerline.

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With the control horn in position apply painter's masking tape around the control horn base. Put the tape up to the base edge. Not under or over it.
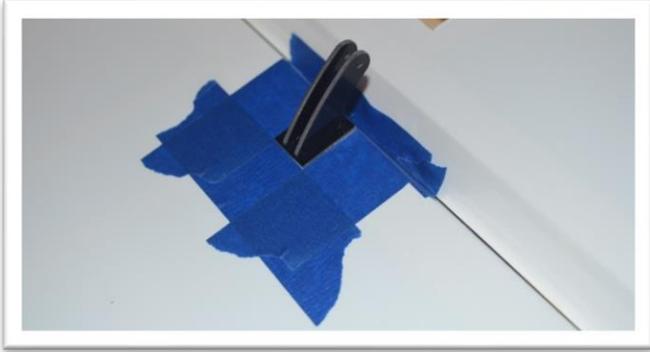

Assemble a rod end to the control horn using a supplied 2mm machine screw and nylon lock nut. Assembling the ball link to the control horn at this step will help keep the control horn halves parallel during installation later.
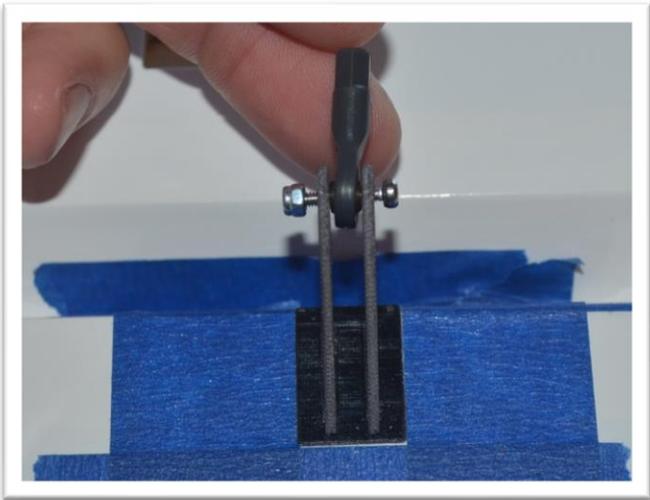
Remove the control horn leaving the tape in position. Using a new hobby knife blade and lightly cut through the covering but not into the balsa sheeting.

Cut inside the tape edge about 1/16".
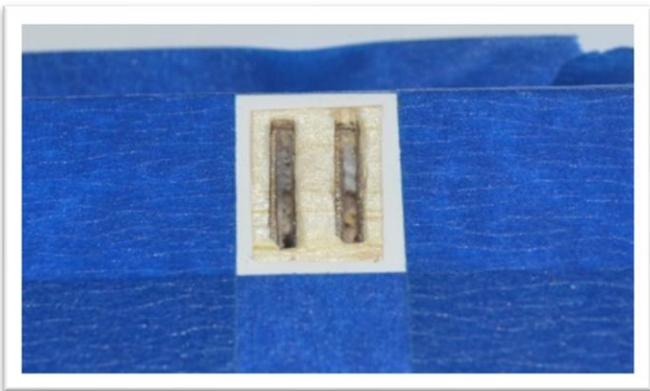
Use sand paper to roughen the lower portion of the control horns on both sides. Roughen one side of the base plate. This will help the epoxy bond to the control horn parts.
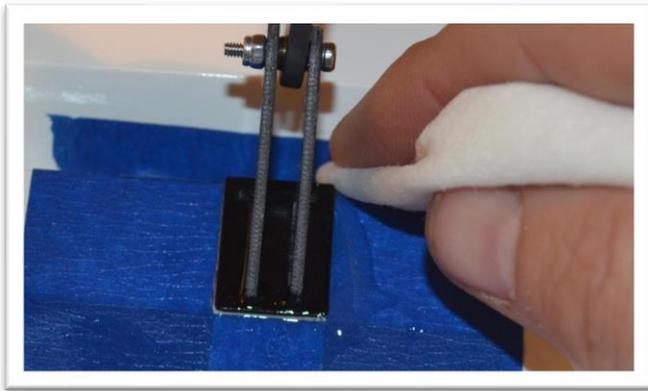

Apply epoxy to the slots in the aileron. Use a pin to help push some epoxy in.
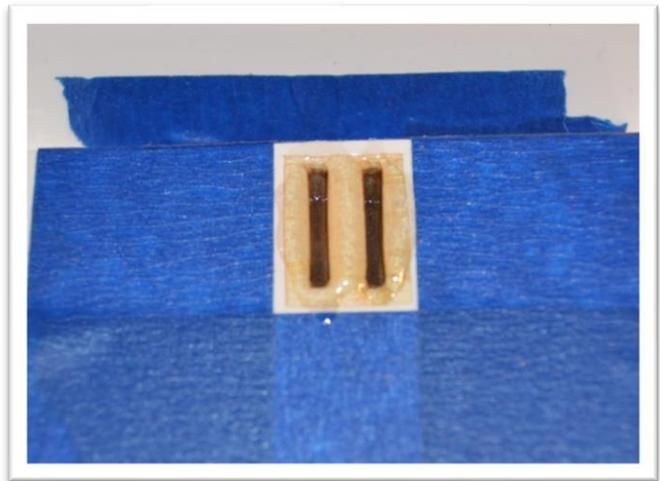

Apply epoxy to the control horn assembly and insert it into the aileron slots.
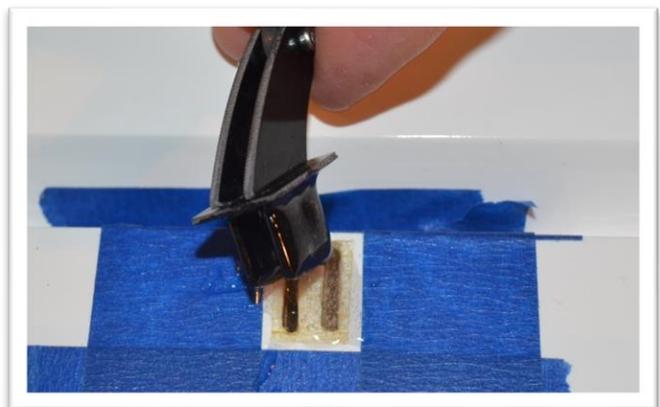
Wipe away excess epoxy using a paper towel soaked with denatured alcohol. Use an upward rolling motion as you wipe the excess epoxy to lift it from the surface. This helps reduce smearing the epoxy.

Check the alignment along the hinge line as you did when you test fit the control horn. Reposition as needed.
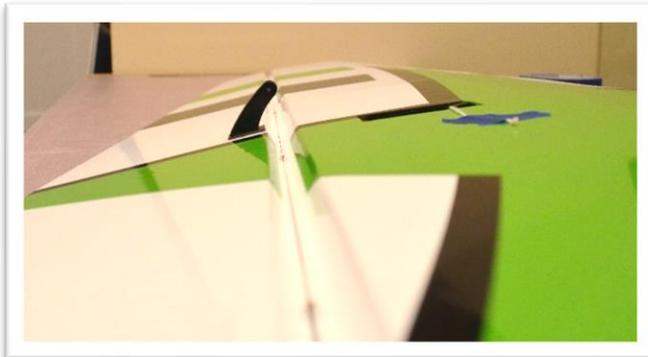
Allow the epoxy to partially cure. Peel away the masking tape after the epoxy is securely holding the control horn in place and still soft enough to easily remove the tape. Set the wing aside and let the epoxy fully cure.

Connect the servo to a receiver and power supply. Turn on you transmitter. Set trim and sub trim to zero. Install a servo arm on the servo approximately perpendicular to the servo side. Use the transmitter's sub trim to make it perpendicular.

Attach the servo wire to the installation string and gently pull the wire through the wing as you insert the servo into the wing. (Depending on the length of the servo wire provided it may be necessary to install a servo extension wire before installing through the wing.)
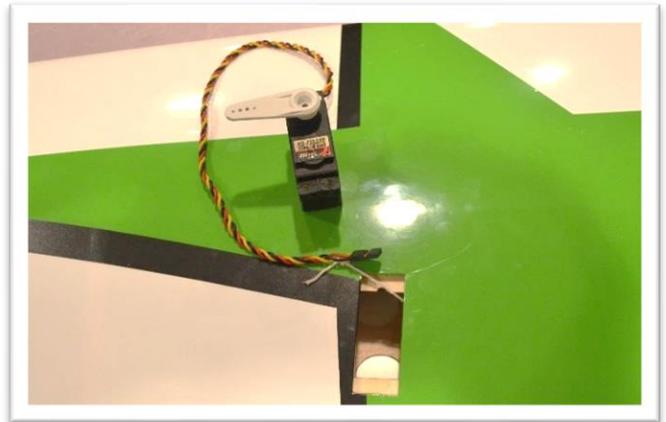

Pre-drill for the servo mounting screws using a 1/16" drill bit. Install the servo with the wood screws that came with your servos. Remove the screws and servo. Apply a drop of thin CA glue into each mounting screw hole. This will harden the wood around the screws and provide a more secure installation. (Allow the CA glue to dry before reinstalling the servo.)

Thread 2 rod ends on to a turnbuckle connecting rod engaging half the threads into the rod end. Notice that one end of the rod has a right hand thread and the other end has a left hand thread. This allows you to adjust the connecting rod without removing it.

Connect the connecting rod to the servo control arm and the aileron control horn using 2mm machine screws, locking nuts and a flat washer at the servo control arm. (Turn on the transmitter, receiver and servo while making adjusting to the connecting rod. This will keep the servo in its correct position.)
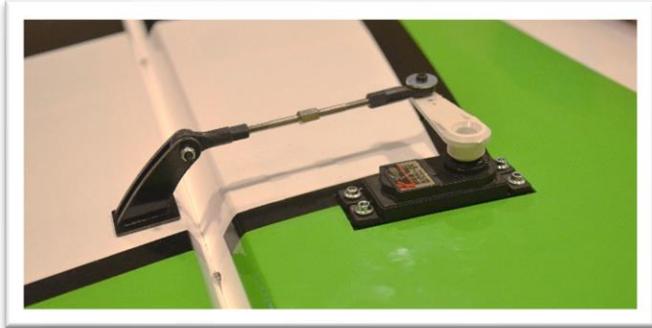
Adjust the position of the aileron to the wing by turning the turnbuckle. You do not need to disconnect it from the servo or control horn.
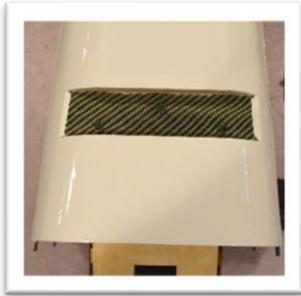
The side fore generators simply bolt onto the wing with 4-40 machine screws. Carefully locate the 2 mounting holes trim away the covering. The wing tips have a blind nut installed beneath the covering. Use a hobby knife to trim away the covering. (Use the holes in a spacer plate to help locate the holes in the wing tip.) Assemble the spacer plate and the side force generator to the wing with the supplied screws and washers.

Landing Gear

Use the landing gear fasteners (4mm) located on the bottom of the fuselage along with 3 flat washers located in the landing gear package to assemble the landing gear. Add a drop of removable thread locker to the screws during assembly.

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Drill pilot holes in the wheel pants for wood screws. Drill through the holes in the landing gear and through to the inside of the wheel pant.
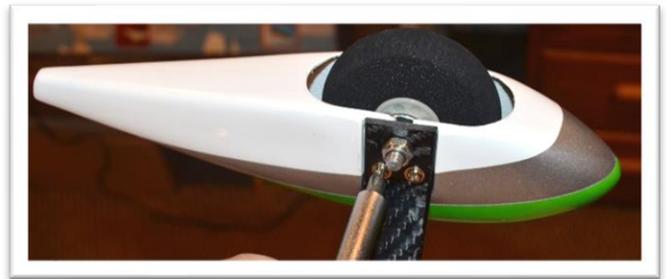
Place the wood filler block over the landing gear. We suggest using a piece of white covering or clear packing tape to hold the filler block in position.

Install the landing gear cuffs with the holes towards the bottom of the airplane. Use a flat blade screw driver with a gentle twist to help slide the cuff over the landing gear. locknut to the axel and tighten. Make sure you can still get to the wheel collar set screw.

Ensure all set screws are tight on the pre-assembled tail wheel assembly.

Use the landing gear fasteners (4-40) locate on the bottom of the fuselage along with 2 flat washers located in the landing gear package to mount the carbon fiber landing gear. Add a drop to removable thread locker to screws during assembly.

Fuselage

Carefully locate the mounting holes for the wing and trim away the covering. There will be 2 holes for wing alignment pins, 1 hole for the wing bolt, and a slot to pass the servo wire through. Shine a flashlight through the fuselage to highlight the holes if you have trouble locating them.


Carefully locate the horizontal stabilizer pocket. Use a trim iron to seal the covering around the edges of the pocket before trimming. Use a new hobby knife blade to cut though the covering.

Review the servo configurations as described on page 4 before cutting the covering over the servo pockets. Below the horizontal stabilizer slot there is a servo pocket on each sides of the fuselage. Cut only one of them open if you plan to use 1 elevator servo. Cut one open on each side if you plan on using 2 elevator servos. Use a sealing iron to attach the covering around the opening before cutting.

Slide the horizontal stabilizer through the fuselage pushing it all the way forward. Center it side to side.
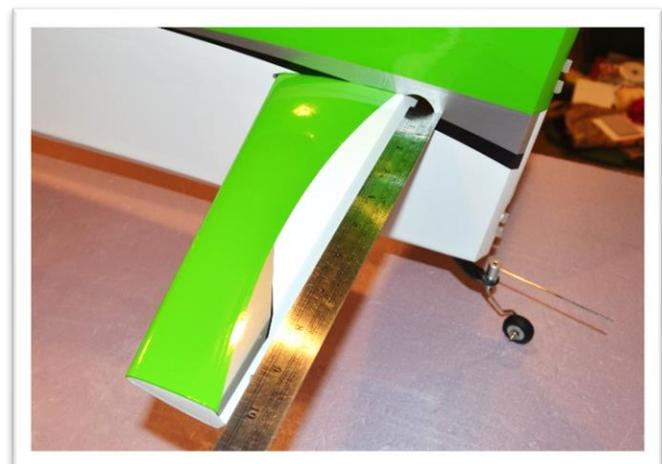
Install and center the main wing tube. Look at the plane from the back forward to make sure that the horizontal stabilizer is parallel with the wing tube. Notice that the horizontal stabilizer is tapered which may obscure the actual alignment. If the stabilizer is not aligned use shims or sand inside the pocket until it's parallel.

Push the horizontal stabilizer all the way forward in the pocket. Position the stabilizer parallel to the main wing tube. Adjust the stabilizer until the measurements to the wing tube are equal on both sides. Continue checking the stabilizer to ensure it is still centered as described above. Extra time spent here will go a long way to improve the flight characteristics of your airplane.

Once the horizontal stabilizer is positioned glue it in place with thin CA glue. Wick glue in on both sides, top and bottom. The use of an applicator tip is suggested to control the flow of thin CA and get it exactly where you want it.

Elevator

The hardware provided may be used to control elevator halves with 1 or 2 servos.

Before you cut any covering on the elevator make sure you have the correct half. If you cut open the servo pocket in the left of the fuselage make sure you are working with the left elevator.

Install the elevator control horn using the same process as you did when assembling the ailerons.

Use a covering sealing iron to bond the covering in the area the control horn will sit. Trim the covering away to expose the slots.


Test fit the control horn halves in the slot individually, then as an assembly. The fit should be snug.

Check the alignment of the control horn to the hinge center line as you did with the wing. The linkage hole in the control horn should be aligned with the hinge centerline.

With the control horn in position apply painter's masking tape around the control horn base. Put the tape up to the base edge. Not under or over it.

Assemble a rod end to the control horn using a supplied machine screw and nylon lock nut. (Assembling the ball link to the control horn at this step will help keep the control horn halves parallel during installation.)
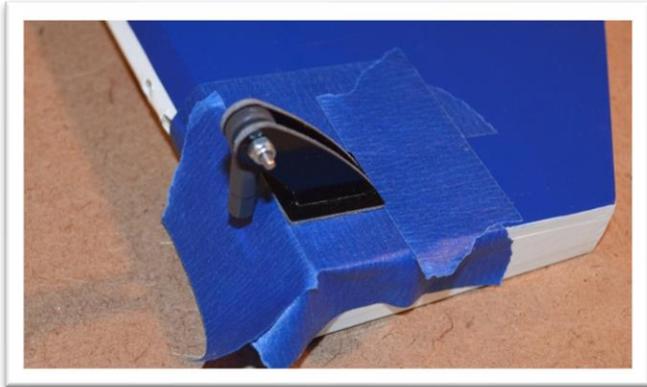
Remove the control horn leaving the tape in position. Using a new hobby knife blade lightly cut through the covering but not into the balsa sheeting. Cut inside the tape edge about 1/16".
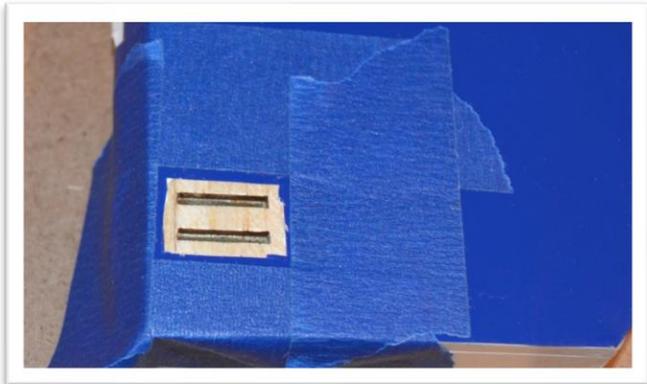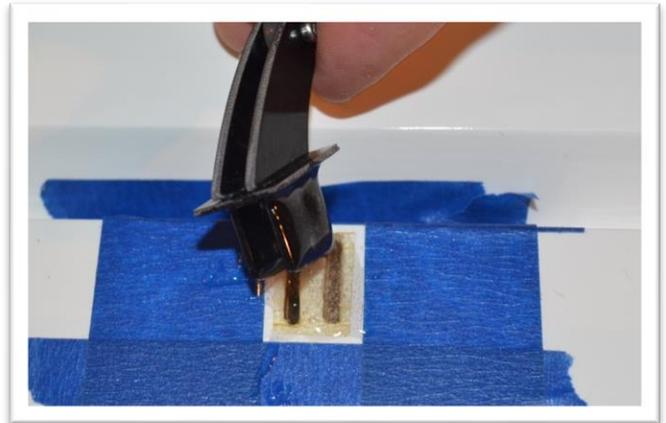

Use sand paper to roughen the lower portion of the control horns on both sides. Roughen one side of the base plate. This will help the epoxy bond to the control horn parts.
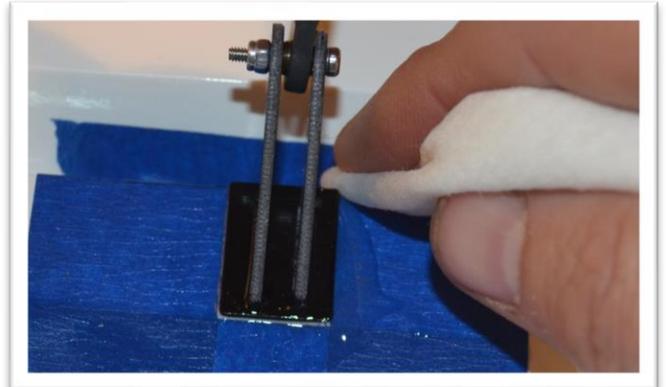

Apply epoxy to the slots in the elevator. Use a pin to help push some epoxy into the slots.

Apply epoxy to the control horn assembly and insert it into the elevator slots.

Wipe away excess epoxy using a paper towel soaked with denatured alcohol. Use an upward rolling motion as you wipe the excess epoxy to lift it from the surface. This helps reduce smearing the epoxy.


Check the alignment along the hinge line as you did when you test fit the control horn. Reposition as needed. Allow the epoxy to partially cure. Peel away the masking tape after the epoxy is securely holding the control horn in place and still soft enough to easily remove the tape. Set aside and let the epoxy fully cure. (Repeat on second elevator half if you will be using 2 elevator servos.)

Roughen up the jointer plate for the elevator halves with a piece of sand paper so the epoxy will adhere better. (The joiner plate is not used if you plan to use 2 elevator servos. Steps related to the jointer plate can be skipped)

Test fit the elevator joiner plate to each elevator half. Insert the joiner plate into both halves and look down the hinge line. It should be straight. If not use a small file and adjust the slots a little at a time. (Do not glue it yet.)
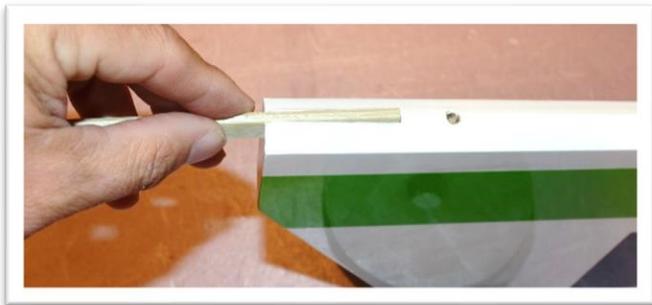
Insert hinge pins into the elevator halves and the horizontal stabilizer. Check the fit and gap at the hinge line. You may need to adjust the hinge holes to minimize the gap.

A small round file can be used to give the hinges some clearance. Cleaning out the holes will also help you close up any gap. Turn a 1/8" drill into the holes by hand.

Test fit pieces together and adjust as needed so you get a good fit between the elevator and the stabilizer. Check the hinge gap and the gap at the counter balance. Make sure there is clearance between the elevator joiner plate and the fuselage. Hold half of the elevator aligned to the leading edge of the stabilizer and ensure the opposite elevator half is also aligned. Sand or shim the elevator joiner plate until both halves are aligned to at the leading edge of the stabilizer.

Practice assembling the elevator, hinges and jointer plate together without glue, so things go smoothly when you glue it all together.

Apply petroleum jelly (Vaseline) to the center hinge pin portion of each hinge. This will help prevent glue from getting into the hinge when gluing then into the elevator. Avoid getting petroleum jelly on the barbed portion of the pin. If you do clean it off with alcohol.
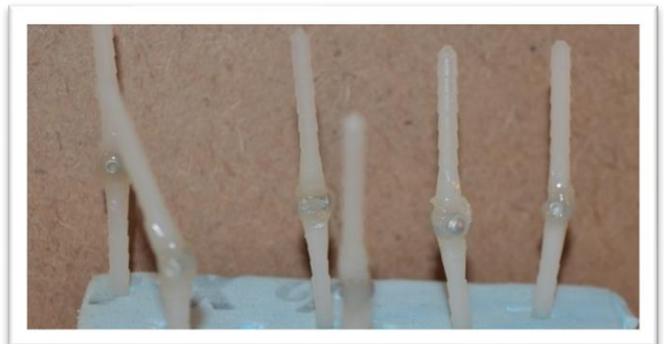
Use painter masking tape to prevent glue from getting where you don't want it.
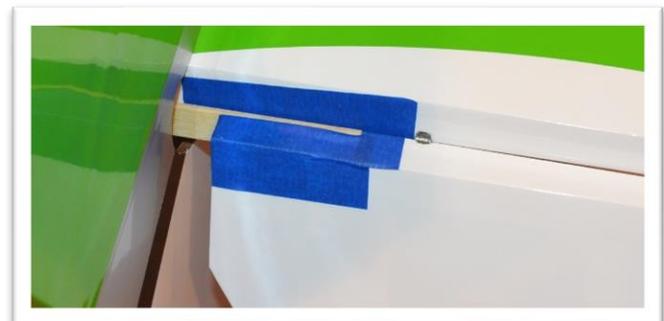
We suggest using 30 minute epoxy for the elevator jointer plate and polyurethane glue for the hinges. (Add a drop of water to each hinge hole if using polyurethane glue like *Gorilla Glue*. This type of glue activates with moisture.)

- Begin the final assembly of the elevator by adding glue to the horizontal stabilizer hinge holes then insert hinges. (If using *Gorilla Glue* it will only take a few drops per hinge. Use a pin to push the glue into the hole.)
- Add epoxy to the joiner slot and glue to the hinge holes of one half of the elevator then partially slide it onto the hinges.
- Insert the jointer plate through the fuselage then into the elevator half.
- Add epoxy to the joiner slot and glue to the hinge holes of the second elevator half then slide it onto the hinges and jointer plate.
- Push both elevator halves into position and wipe away any epoxy that has squeezed out.
- Watch for glue expanding around the hinges and wipe away with alcohol as needed.
- Move the elevator up and down to make sure it has full travel. It won't hurt to apply additional petroleum jelly to the hinges.
- <u>Tightly</u> tape the gap between the horizontal stabilizer and the elevator counter balance while the glue and epoxy dry.
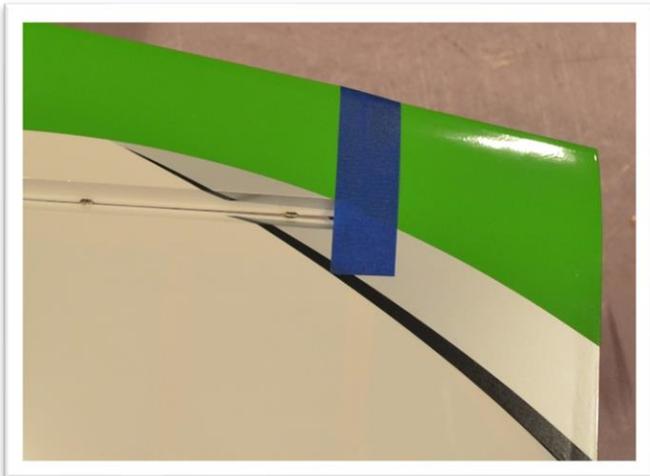
Carefully remove "masking" tape before the epoxy fully sets. But do not remove the tape at the stabilizer and elevator counter balance until epoxy is fully cured.
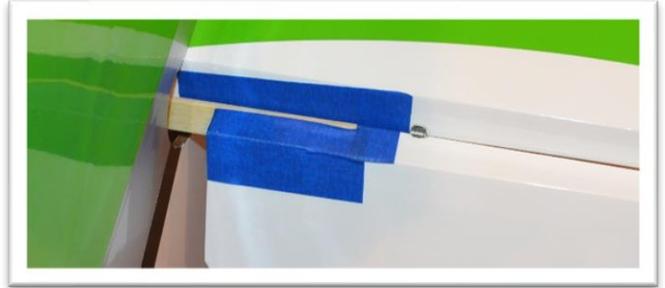
Attach a 24" servo extension onto the elevator servo lead and use shrink wrap or a safety clip to secure the connection.
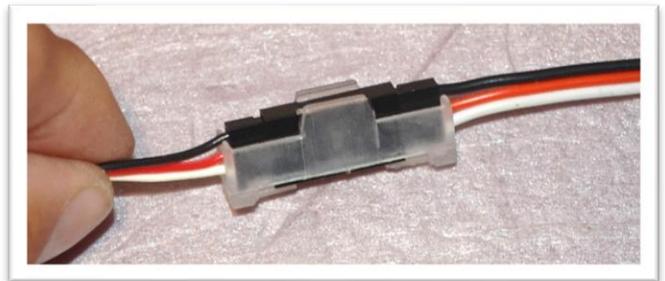

Connect the elevator servo to a receiver and power supply. Turn on your transmitter. Set trim and sub trim to zero. Install a servo arm on the servo approximately perpendicular to the servo side. Use the transmitter's sub trim to make it perpendicular.

Install the servo into the fuselage and pre-drill for servo mounting screws using a 1/16" drill. Install the servo with the wood screws that came with your servos. Remove the screws and servo. Apply a drop of thin CA glue into each screw hole. This will harden the wood around the screws and provide a more secure installation. (Allow the CA glue to dry before reinstalling the servo.)

Assemble a connecting rod and ball link and to elevator ball link. Check the length of the assembly to the servo arm with the elevator aligned with the stabilizer at the leading edge. Once the correct length of the assembly is found connect it to the servo arm using the provided machine screws washer and lock nut.
(Turn on the transmitter, receiver and servo while making adjusting to the connecting rod. This will keep the servo in its correct position.)
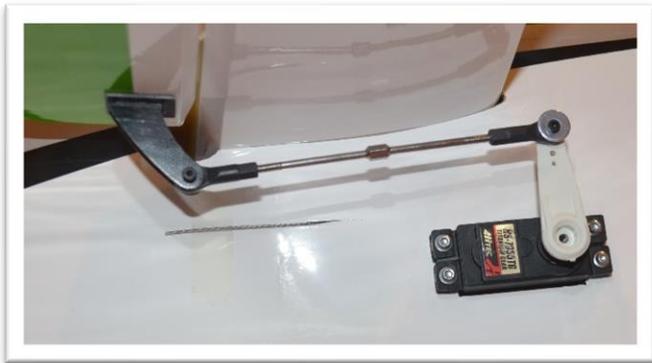
Rudder

Cut the rudder covering to expose the control horn slots on both sides of the rudder as you did for the ailerons and elevator. Test fit the control horns, mask off the area surrounding the control horns and use a fresh knife blade and cut the covering as you did with the ailerons and elevator.

Use sand paper to roughen up the control horns so the epoxy will adhere better. Assembly the control horns with a ball link and brass cable eye. Thread the cable eyes about half way into the ball link.

Tests fit the control horns to the slots and align with the hinge line. The control horns should be symmetrical about the hinge line.


Use 30 minute epoxy to glue the control horns in place. Check the alignment, peal the masking tape away and set aside for the epoxy to cure.

Slide the tail wheel guide through the ball link eye which is pre-installed at the bottom of the rudder.

Align the rudder hinges to the vertical stabilizer hinges. Insert the rudder hinge pin through the top of the rudder then through each of the hinges.
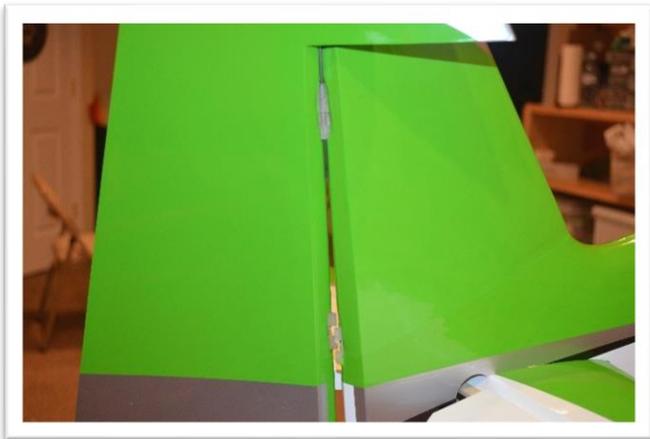
Insert the rudder servo into the fuselage pocket with the drive spline towards the front of the fuselage. The holes for the servo mounting screws are pre drilled. Install the servo with the wood screws that came with your servos. Remove the screws and servo and apply a drop of thin CA glue into each mounting screw hole. This will harden the wood around the screws and provide a more secure installation. (Allow the CA glue to dry before reinstalling the servo.)
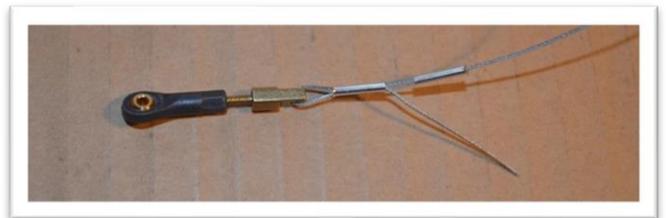

Tread the brass cable eyes about half way into the ball links.

Start the cable assembly at the servo end inside the fuselage. Thread on 2 crush sleeves and the brass cable eye. (Many people also thread on some heat shrink tube to cover the assembly to give a finished look.)

Loop around the cable eye and go back through the first crush sleeve.

Loop around the first crush sleeve and back through the sleeve again. Slide the second sleeve over the tail.


Adjust the loops and crimp the sleeves with the non-serrated surface plyers.

Connect the ball links to the rudder control horn using a socket head screw, nylon lock nut and a washer. Pull the slack out of the cables and make sure the cables cross once inside the fuselage.

Center the rudder and position it aligned to the vertical stabilizer. Tape the rudder to the vertical stabilizer to hold it centered.
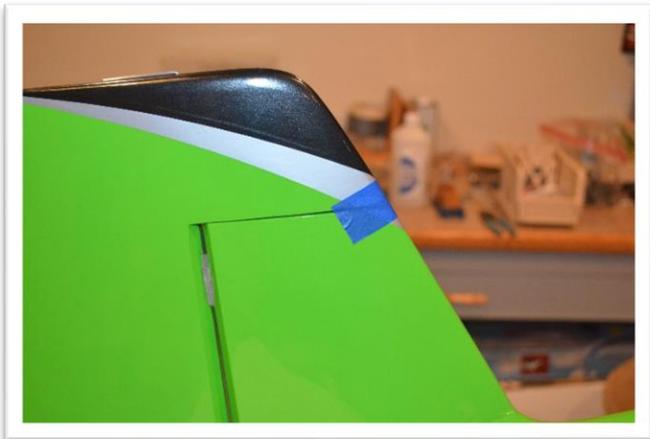
Repeat the cable eye installation process on the rudder end of the cables with the servo powered up and centered. Before you crimp the crush sleeves make sure the cable is not looped around the cable eye at the servo end. Pull the cable snug. You do not need to make the cable a guitar string tight.
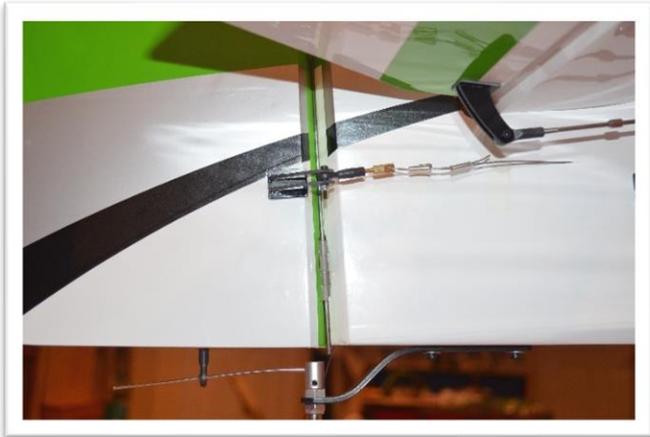
Remove the tape from the rudder/vertical stabilizer. Adjust the length of the cable by turning the brass cable eyes to center the rudder and achieve the desired cable tension.

Electric Motor

The firewall is pre drilled with a 70mm wide x 55mm hole pattern. The marked centerlines offset to account for the built-in thrust angle.

Use 4mm bolt and washer on the front and a nylon lock nut and washer on the back to secure the motor box to the fire wall. Apply removable thread locker to the bolts during assembly.

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Use an "X" mount with a mounting bolt circle of 75mm to mount your motor. Use the 4mm bolts and washers. Add removable thread locker during installation.

The prop backer plate should be 84-85mm from the motor mounting box. This will provide clearance between the cowl and the motor backer plate.

The prop backer plate will be 160-161mm from the fuselage firewall.

Cowl & Canopy

Apply painters' tape over the mounting tabs to transfer the mounting locations to the cowl. Push a pin through the tape and hole in the mounting tab.

Peal back the tape to uncover the mounting tabs and install the cowl but leave the tape on the fuselage. Tape the cowl into position centering it to the motor using your spinner's back plate as a guide and aligning it to the top edge of the firewall.
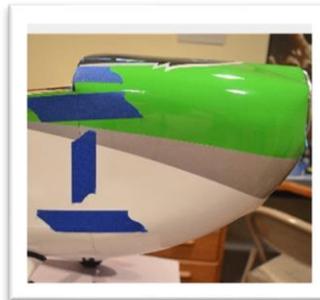
Drill a 1/16" hole in the cowl through the locating holes you created in the tape.

Use 3mm wood screws to mount the cowl.

Remove the cowl and apply thin CA glue to the mounting tabs and screw holes. (Allow plenty of time for the CA glue to dry before reinstalling the cowl.)

Trim the covering in on the fuselage exposing the canopy mounting holes.

Enlarge the hole in the canopy mounting tab to receive the 3mm blind nuts. Use a washer and machine screw to draw the blind nut into the canopy mounting tab.

Secure the canopy to the fuselage with the 3mm thumb screws and flat washers.

Use nylon zip ties to secure the ESC to the bottom or side of the motor box. We recommend putting a small piece of foam between the ESC and motor box to dampen vibrations.

Place hook and loop tape to the battery tray and your battery. Loop hook and loop straps around the battery. We recommend using at least a 1" strap if you intend to do high G, 3D maneuvers.
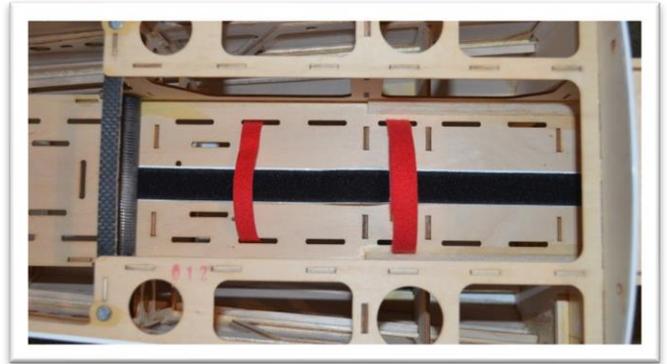
Gas Engine

Many of the following pictures are of the 73" AJ Laser with is very similar in construction to the Raven.

The firewall is marked with the centerline offset to account for the built-in thrust angle and drilled with a 70mm wide x 55mm hole pattern. This will position the prop in the center of the cowl.

Drill the mounting holes for your engine then temporarily mount it engine standoffs. (A DLE35RA is shown on the 73" AJ Laser which is very similar..)

Bolt the engine standoff to the firewall from the back.

The distance between the prop backer plate and the firewall should be 160-161mm. This will provide space between the spinner and the cowl.

Check for clearance between the firewall and the carburetor. This distance should be noted in your engine's manual. If you don't have at least the recommended space cut an opening in the firewall so the carburetor can get air.

Mark the locations for the throttle linkage and fuel line to pass through the firewall. (It may be possible to rotate the throttle arm on the carburetor which will give you options for servo placement.) Plan the placement of the throttle servo then drill through the firewall as needed.

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The placement of the throttle servo is dependent on the engine you choose to use. The servo can be mounted in the front of the fuselage in many cases. (If you choose this location drill 5 holes through the top of the engine box so servo mounting screws and the servo arm screws can be accessed.)

The servo could also be mounted to the side for the fuselage by adding a couple pieces of hard balsa or spruce.
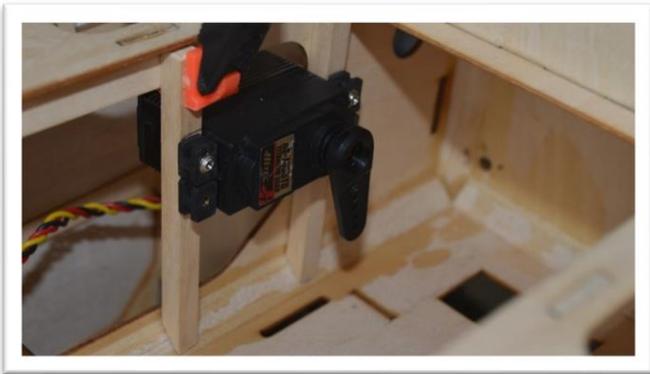
The engine ignition is typically mounted to the fuselage firewall, the side, or top of the engine box.

Cut the cowl as needed to clear the engine head, spark plug and muffler. Cut a large opening at the rear of the cowl to keep your engine running cool. Mount the cowl as described above on page 20.

We suggest using a quality 16 oz (500cc) fuel tank suited for gasoline such as Fourtitude, Dubro, or Sullivan. Begin assembly by bending the longest copper tube as a vent line. (Bend it a little at a time to prevent collapsing the tube.) Slide on the smaller stopper pressure plate with the tapped hole in it. Slide on the rubber stopper. Then slide on the larger pressure plate. Insert the 2 remaining copper tubes for a fill line and the carburetor supply line. Loosely add the machine screw to hold the assembly together. Slide the clunk (fuel pickup) onto the fuel line then slide the fuel line onto one of the copper tubes.

Insert the assembly into the fuel tank and check that the clunk if free to move around. Rotate the tank side to side and upside down to ensure the clunk does not get stuck. If cluck does not move freely in all positions trim a little off the fuel line and try it again. When you have established the correct length of the fuel line you can tighten the stopper screw.

The fuel tank vent line should loop up over the tank then exit through the bottom of the airplane. The fill line should be capped by a fuel dot. The carburetor supply line should run to a fuel line filter then through the firewall to the carburetor.
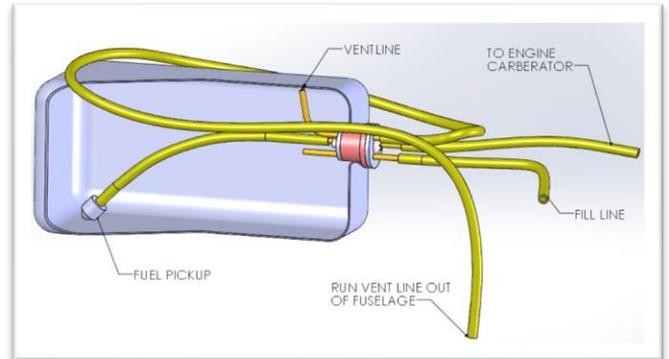
Position the fuel tank in front of the wing tube. Placing a piece of foam under the tank will prevent fuel foaming from vibration. Secure the tank using the hook and loop straps running through the slots on the plywood tray. We recommend using at least a 1" strap if you intend to do high G, 3D maneuvers.

Radio Installation & Setup

Take the time to properly balance and trim your aircraft.

Use the suggested throws below as your starting point then fine tune to your flying preferences after your first few flights.

Your receiver can be mounted anywhere in the airframe. Behind the wing tube works well on this fuselage. A piece of foam rubber should be used between the fuselage and the receiver to dampen any vibration.

You can adjust your CG depending on your flying style.

If you fly aggressive 3D aerobatics, you'll want to find a more of a neutral CG. When its flown level inverted it requires little to no elevator input to maintain altitude.

If you enjoy sport & precision aerobatics you'll want a slightly nose heavy CG.

To test the CG fly left or right at about 3/4 to full throttle and pull to a 45 degree up-line. Roll inverted and let go of the elevator stick. A correct nose heavy CG will slowly arc to the level. A neutral CG should nearly hold the up-line. And a tail heavy CG will steepen the up-line.

While the final setup is of personal preference, these are some general guidelines to make your first flight a success.

Control Throws		
Low Rates		
Elevator	15 degrees	30% Expo
Aileron	15 degrees	30% Expo
Rudder	15 degrees	30% Expo
Mid Rates		
Elevator	30 degrees	40% Expo
Aileron	30 degrees	40% Expo
Rudder	30 degrees	40% Expo
High Rates		
Elevator	45 degrees	50% Expo
Aileron	45 degrees	50% Expo
Rudder	Max Throw	50% Expo
Center of Gravity		
1" in front of the wing tube (+/- 1/2")		

Enjoy your new plane!

We at AJ Aircraft sincerely hope you enjoy flying the Raven. Feel free to create a support ticket at aj-aircraft.com if you have any problems, questions, or suggestions. Once you get a few flights in, we would greatly appreciate your review submitted to our web site! See you at the field!

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