



# **2M AJ Acuity Assembly Instructions**

## *Up Your Game! Fly AJ Aircraft*

AJ Aircraft thanks you for the purchase of this airplane. Top grade materials and precision assembly have been used 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!

### **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 it to the place of purchase immediately.

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

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



Additional assembly information can be found in assembly videos on the [AJ-Aircraft YouTube Channel](#)

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



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## Features

### Specs:

- Wing Span - 72"
- Length - 78"
- AUW - 4800 grams with 1200 gram batteries (10.5 lbs)
- Electric Power – 2500-3000 Watt Motor
- 90amp ESC
- 2x 5s 5000mah LiPo
- Radio - 6 Channel receiver
- 2 Mini (15x33x27) size Servos (Elevator)
- 3 Standard (20x40x34) size Servos (Ailerons & Rudder)

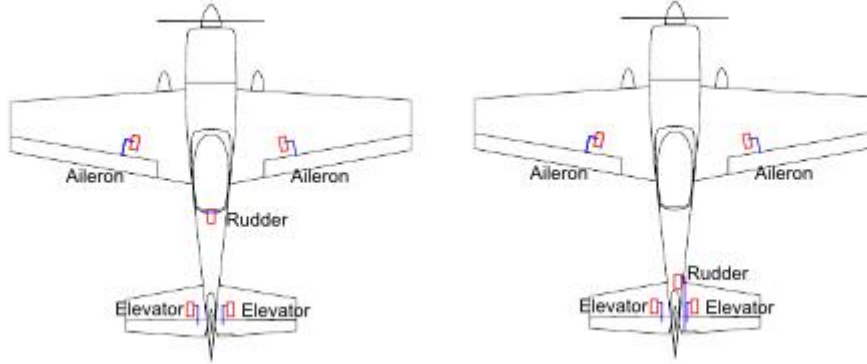
### What's in the box:

- 2M Acuity Airframe
- Fiberglass Cowl & Wheel Pants
- Carbon reinforced landing gear mount
- Pre-hinged control surfaces (not glues)
- Removable rudder and stabilizers
- Carbon main gear and tail wheel
- G-10 control horns
- Dual ball links for all connections
- Carbon wing tube & stab tube
- Cloth wing bags
- Light weight foam wheels
- Complete hardware package
- Genuine Ultracote Covering



## Optional Configurations

You have the option of using a pull-pull rudder servo or a push-pull rudder servo setup. Fasteners, control horns and servo connecting rods are provided for optional rudder setups.



## Recommended Items for Completion

- AJ Aircraft AJ5230-20P/205KV 12S
- 20x13 2 blade prop or 19.5x13 3 blade prop
- Jeti Mezon 90HV Lite
- (2) x Thunder Power 5s 5000mah LiPo
- Futaba BLS171 servos on Ailerons/Rudder
- Futaba BLS173 servos on Elevator
- (4) x 6" Servo Extensions for the Ailerons and Rx to Wing
- (1) x 12" Servo Extension for the ESC to Receiver
- (2) x 48" Servo Extension for the Elevator
- (7) Servo Connector Safety Clips
- 3.25" or 82mm Spinner

## Tools Needed

Blue Painter's Masking Tape  
Thin CA Glue  
30 Minute Epoxy  
Denatured Alcohol  
Paper Towels  
Removable Thread Locker (Loctite 242, Blue)  
Metric & Imperial Allen Wrenches  
Hobby Knife & Fresh Blades  
Covering Iron (Trim Iron)

Clamps  
Small Flat File  
Electric Drill w/ Assorted Small Bits (1/16", 5/64")  
Small Flat Blade Screwdrivers  
Small Phillips Screwdriver  
Sandpaper (150-220 Grit)  
Pliers  
Measuring Tape & Ruler



## Covering

The covering on your Laser 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 seams. 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.

Genuine Ultracote covering in 4 color scheme choices:

- Red/Blue (True Red HANU866, White HANU870, Midnight Blue HANU885, Silver HANU881)
- Yellow/Blue (True Red HANU866, White HANU870, Bright Yellow HANU872, Silver HANU881)
- Competition Red (True Red HANU866, White HANU870, Midnight Blue HANU885, Cub Yellow HANU884, Black HANU874)
- Competition Blue (True Red HANU866, White HANU870, Midnight Blue HANU885, Cub Yellow HANU884, Black HANU874)



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 reshinking issues later.

## Wings

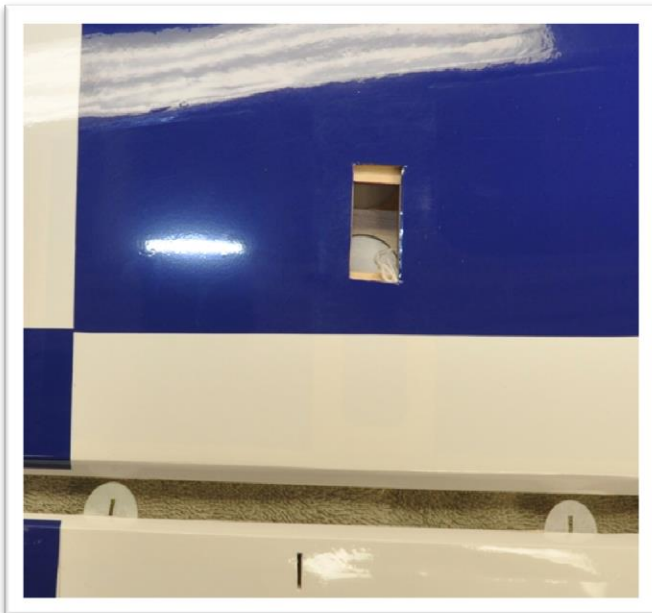
Carefully locate the aileron servo pocket. Shining a light through opposite side of the wing will help highlight the pocket location. The pocket is about 10" (255mm) from the wing root.



Use a new hobby knife blade to cut through 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 (if it's attached) and temporarily secure it out of the way. Do not pull it out of the wing!

Use an iron to seal 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. About 4 15/16" (125mm) from the edge of the aileron.) Use a covering iron to bond the covering in the area the control horn will sit. Trim the covering away to expose the slots. Be sure not to cut through to the top side covering.



The hinges should already be glued into the ailerons. Give each of them a little pull to ensure they are securely attached. It's better to find a loose hinge now rather than during a flight.



The wings are already slotted for the hinges. Use a covering iron to secure the covering along the edge of the wings and ailerons. Look at the wing hinge slots closely. Make sure the covering will not interfere when gluing the hinges. Cut away any covering that covers the hinge slot.



Slip each of the aileron hinges into the wing. Align the end of the aileron to the wing tip.



Push the aileron tight against the wing closing the gap between the two of them. Move the aileron to its maximum desired deflection (About 15°). Notice that the hinges may pull out slightly. Experiment with the hinge position finding the best fit before gluing.



Apply a piece of tape next to each hinge. This will help you locate the hinges when you begin gluing them.



Check the aileron position at the hinges and wing tip again before gluing.

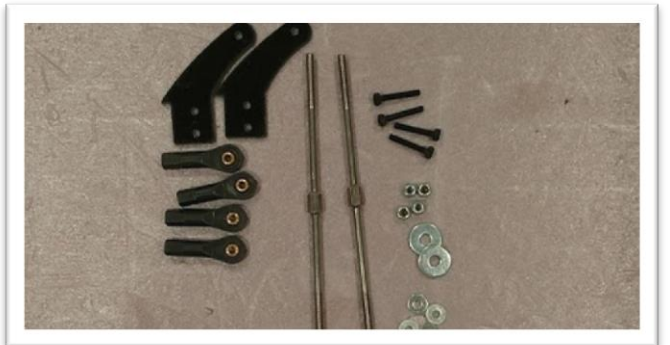
Start with the hinge near the wing tip. Flex the aileron slightly and apply a few drops of thin CA glue to one side. Flex the aileron to its maximum desired position. Then glue the opposite side.



Close the gap between the aileron and wing to the desired position at the fuselage end of the wing half. Flex the aileron slightly and apply a few drops of thin CA glue to both sides of the hinge. Again, move the aileron back and forth to check its position. Once the end hinges are securely positioned you can apply a few drops of thin CA to both sides of the remaining hinges.



Use the control horns from the "Wings" part bag.



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



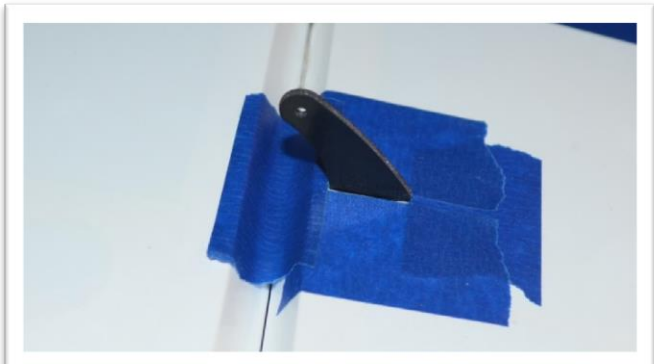
Test fit the control horn in the slot. Trim or file the slot as needed to achieve a snug fit.



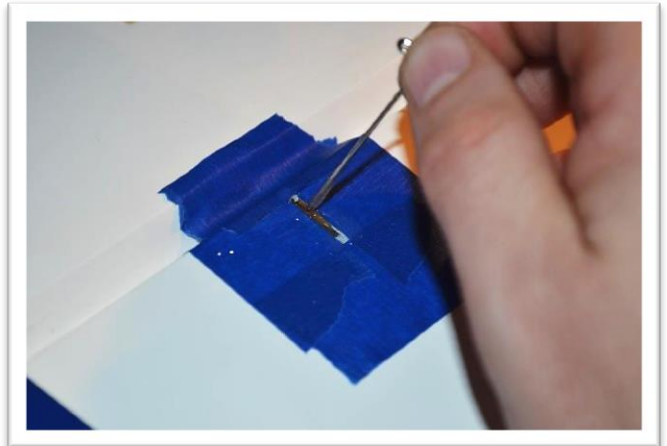
The control horn should go in all the way in until the shoulder contacts the aileron. The linkage hole in the control horn should be aligned with the hinge centerline.



With the control horn in position apply masking tape around it. This will help keep excess epoxy off the wing covering.



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



Apply epoxy to the control horn and insert it into the slot. Wipe away excess epoxy using a paper towel and denatured alcohol.



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.



With the servo installed mark the mounting hole locations. 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 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.)



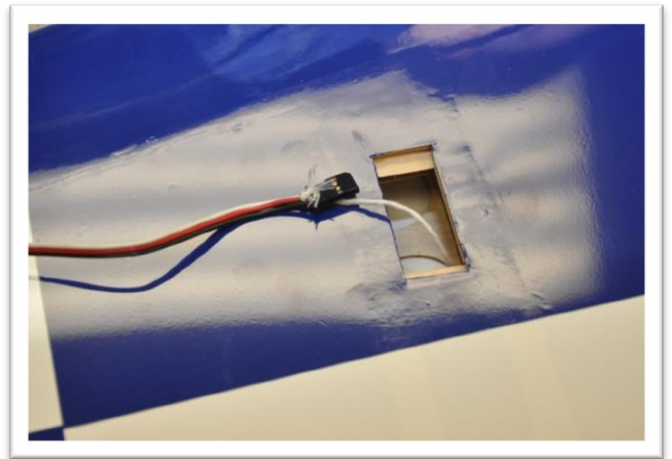
Connect the servo to a receiver and power supply. Turn on your transmitter. Set trim and sub trim to zero. Install a servo arm on the servo about perpendicular to the servo's side. Use the transmitter's sub trim to make it exactly perpendicular to the side of the servo.



Attach a servo extension and a safety clip to the servo.



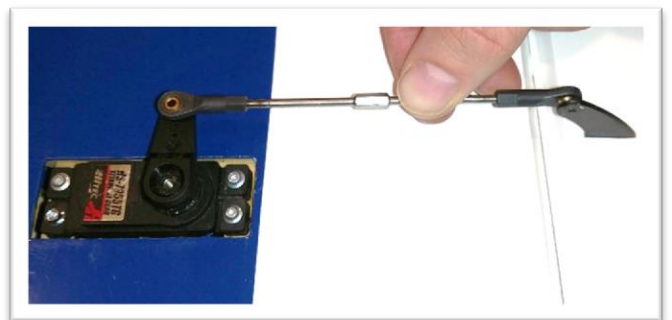
Attach the servo wire to the installation string and gently pull the wire through the wing as you insert the servo into the wing.



Reinstall the servo.



Thread 2 ball links onto a turnbuckle connecting rod. Notice that one end of the rod has a right hand thread and the other end has a left hand thread. Adjust the length to about 108mm evenly centering the rod between the ball links. It does not have to be exact. The turnbuckle allows you to adjust the length while it is assembled.



Connect a ball link to a servo and the aileron control horn. Use 2mm socket head screws, flat washers and nylon lock nuts. (Using a 2mm tap to cut threads into the servo control horn produces the best connection.) (The brass ball in the link is offset. The larger reveal side should be against the control horn.)



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. (Turn on the transmitter, receiver and servo while making adjusting to the connecting rod. This will keep the servo in its correct position.)

## Landing Gear

Landing gear parts bag contents are shown below.



The landing gear screws are supplied installed in the fuselage. Remove the 6, M4 socket head screws.



Carefully locate the landing gear slot in the side of the fuselage just below the leading edge of the wing location. Make a cut in the center of the slot and at the corners. Use your trim iron to fold and attach the covering into the slot.



Slip the landing gear through the slot. Notice that there are right and left hand parts. The landing gear should be swept back.



Use 6 flat washers from the landing gear parts bag with the screws removed earlier to attach the landing gear. Add a drop of removable thread locker to the screws during assembly.



File a flat on the wheel axels perpendicular to the axel wrench flats.



Install a wheel on the axel with a wheel collar. Position the collar set screw over the flat you filed.

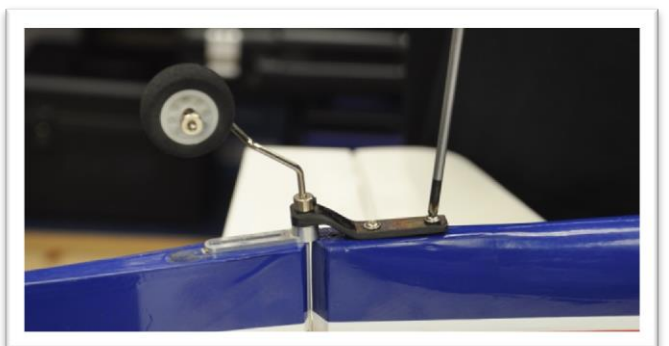


Insert the wheel and axel into the wheel pant, then into landing gear. Align the wheel pant indentation with the landing gear. Add a nylon lock nut and tighten.



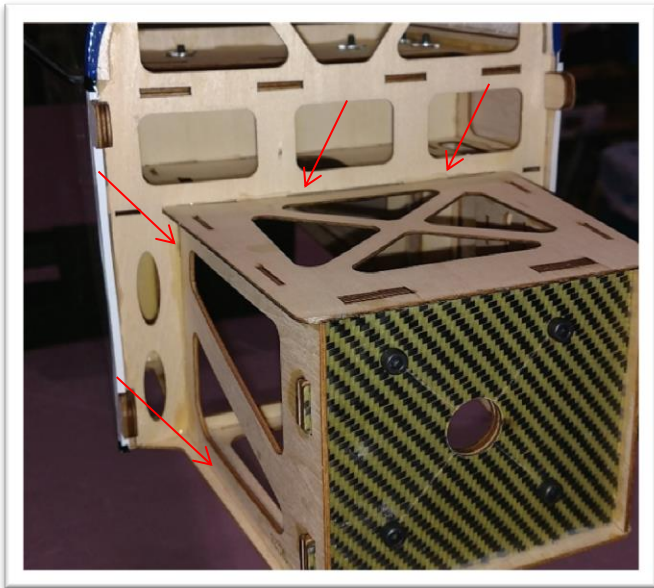
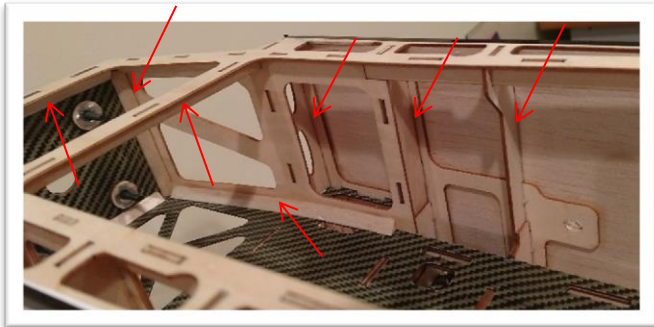
Install the tail wheel after the rudder installation.

Install the tailwheel using 3 wood screws. Position the joint of the tail wheel assembly directly over the rudder hinge line and mark the position of the screws. Turn the screws into the fuselage and rudder. Remove the screws, add a drop of thin CA glue to each hole to strengthen the wood, and reinstall the screws. (Do not fully tighten the tiller arm screw. The slot in the tiller arm allows the screw move accounting for any misalignment between the assembly & rudder.



## Fuselage

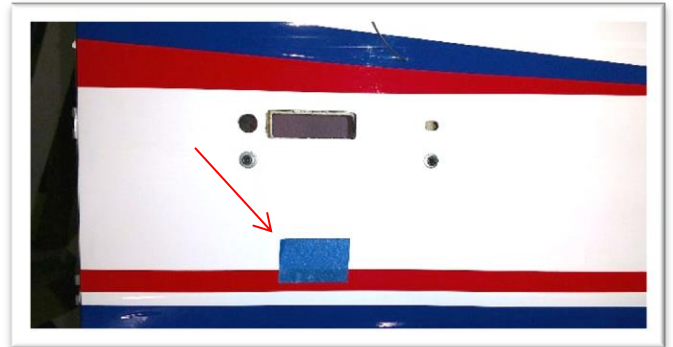
Inspect the fuselage for any interior joints that may have loosened as a result of shipping & handling. Apply thin CA glue as needed. Apply thin CA glue around the joints of the fuselage core, firewall, fuselage formers, and rudder servo tray to strengthen.



At the tail of the fuselage you will find a hole for the horizontal stabilizer tube, screw holes, alignment pin holes and a rectangular pocket to access servo wires. Use an iron to seal the covering around the edges of the pocket before trimming. Use a new hobby knife blade to cut through the covering and trim the openings.



There is a servo pocket on each side of the fuselage. This pocket is intended for a push pull rudder setup. If you plan to use a pull-pull cable setup DO NOT cut the pockets open. If you intend to use a push-pull rudder setup cut open the pocket on either the left or the right.



## Rudder

The rudder control can be configured as a push-pull system or as a pull-pull cable system. See the configuration options listed on page 3.

### Push-Pull Rudder Control

The rudder is built with control horn slots for the push-pull control system and the pull-pull control system. The blue masking tape indicates the control horn locations. The push-pull control horn slots are located near the bottom of the rudder.



Remove the rudder by sliding out the hinge pin. Trim the covering from the control horn slot and follow the same installation process used for ailerons.

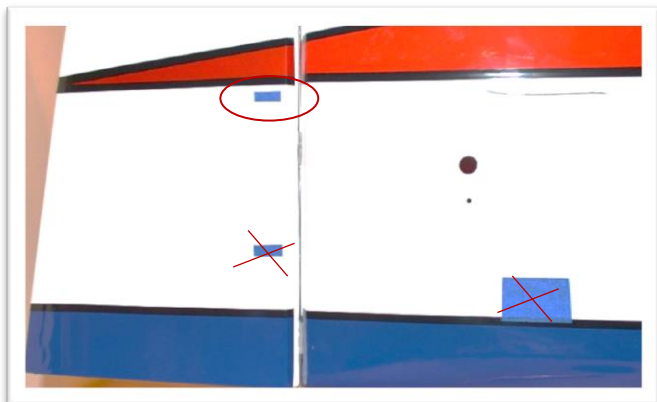


The pull-pull cables can be removed, and the covering will need to be patched.

### Pull-Pull Rudder Control

The rudder is built with control horn slots for the push-pull control system and the pull-pull control system. The blue masking tape indicates the control horn locations. The pull-pull control horn slots are located higher up on the rudder.

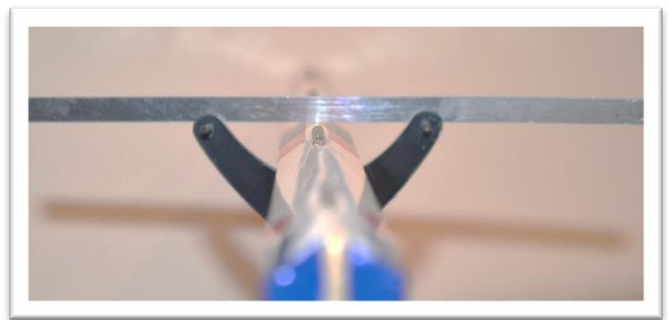
Remove the rudder by sliding out the hinge pin. Trim the covering from the control horn slot on both sides of the rudder.



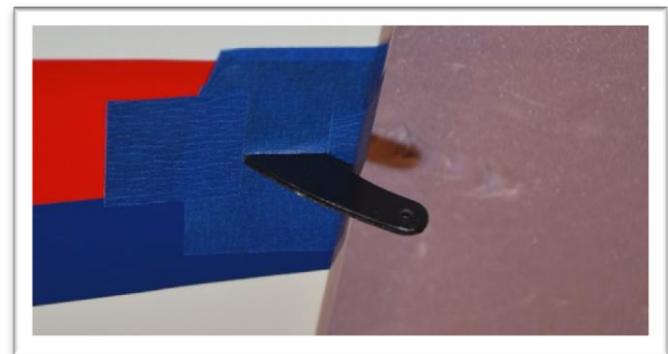
Use sandpaper to roughen up the end of the control horn so the epoxy will adhere better.



Tests fit the control horns to the slots. Use a file to modify the slot as needed. The control horn should be symmetrical about the hinge line. A straight edge laid across the control horn cable holes should be square to the rudder centerline.



Apply masking tape around the control horn slot on both sides of the rudder.

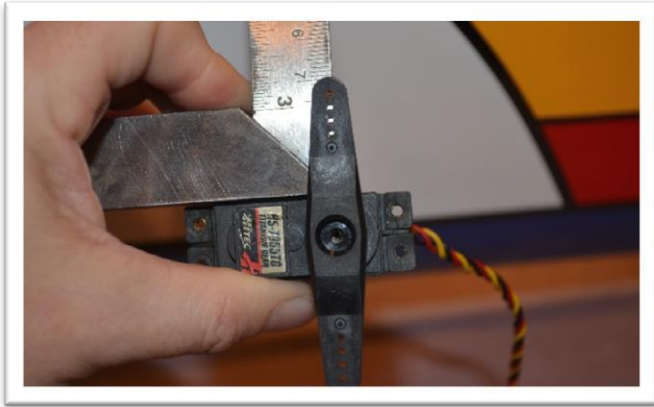


Use 30 minute epoxy to glue the control horns in place. Check the alignment, peel the masking tape away, and clean up with alcohol.

Check the alignment again and set aside for the epoxy to cure. (When setting aside to dry position the rudder and control horn so gravity does not reposition the control horn for you.)

Reinstall the hinge pin and rudder onto the fuselage.

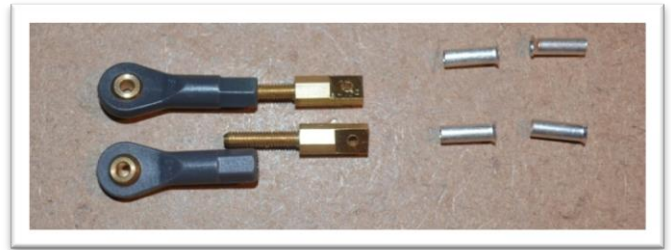
Connect the servo to a receiver and power supply. Turn on your transmitter. Set trim and sub trim to zero. Install a servo arm on the servo about perpendicular to the servo's side. Use the transmitter's sub trim to make it exactly perpendicular to the side of the servo.



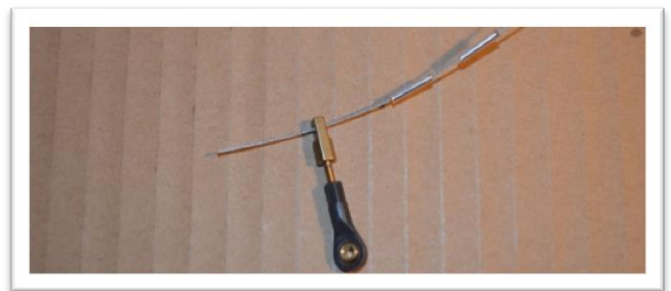
Install the rudder servo into the fuselage and pre-drill for servo mounting screws using a 1/16" drill. Install the servo with the wood screws that came with your servos. Remove the screws and servo. (Do not force the screws into the carbon fiber. The screws may snap. Drill a larger pilot hole if needed.) 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. (If you want to cover the connection with heat shrink tube thread it on the wire first.)



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



Loop around the 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 of standard pliers.

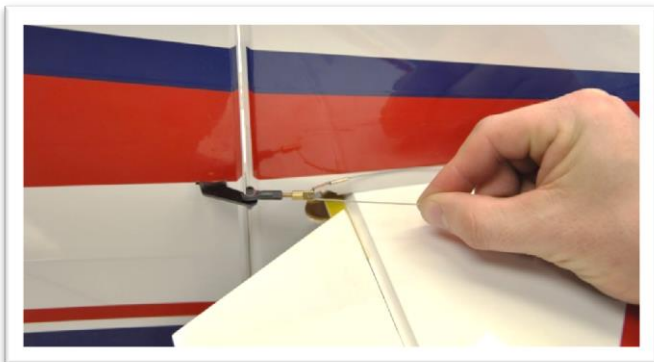


Pull the slack out of the cables and make sure the cables cross once inside the fuselage. Connect the ball links to the rudder control horn. Use a hole spacing that closely matches the rudder control horn. (Using a 2mm tap to cut threads into the servo control horn produces the best connection.)



Center the rudder in position aligned to the vertical stabilizer. Clamp a couple of balsa sticks across the rudder hinge to keep it centered.

Repeat the cable eye installation process on the rudder end of the cables with the servo powered up and centered. Pull the cable snug. You don't need to make the cable "guitar string" tight.



Remove the clamps and adjust the cable lengths to center the rudder by turning the cable eyes into the ball links.

## Elevator

The elevators are pre-hinged but are not glued.

Slip each of the aileron hinges into the wing.

Apply a piece of tape next to each hinge.

Align the end of the elevator to the wing tip.

Close the gap at the hinge line.

Flex slightly and apply a few drops of thin CA glue.



Trim away the covering over the slot on the bottom side of the horizontal stabilizer.



Glue the elevator control horn in place using the same process used to glue the ailerons in position.



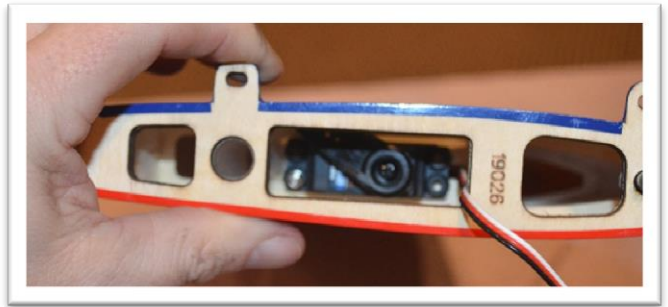
The horizontal stabilizer will hold a 15x33x27mm servo with 4 mounting screws such as the Futaba BLS173VS. (Some filing to adjust the servo slot may be needed.) Add a few drops of thin CA glue around the mounting holes to harden the wood.



Connect the 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 about perpendicular to the servo's side. Use the transmitter's sub trim to make it exactly perpendicular to the side of the servo. (Attaching the servo arm to the servo before installing in the horizontal stabilizer is typically easier.)



Fold the servo wire towards the top of the servo. Rotate the servo control horn to fit into the horizontal stabilizer. Tip the servo so the wired end goes in first.

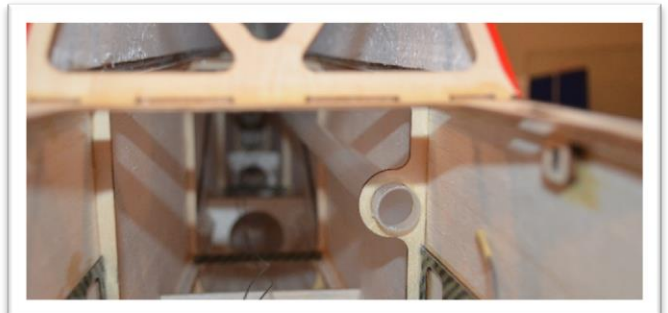


Thread 2 ball links onto a turnbuckle connecting rod. Notice that one end of the rod has a right hand thread and the other end has a left hand thread. Evenly centering the rod between the ball links.

Connect a ball links to a servo and the elevator control horn. Use 2mm socket head screws, flat washers and nylon lock nuts. (Using a 2mm tap to cut threads into the servo control horn produces the best connection.)



Feed the elevator servo wire extensions through the fuselage conduit and out the side of the fuselage.

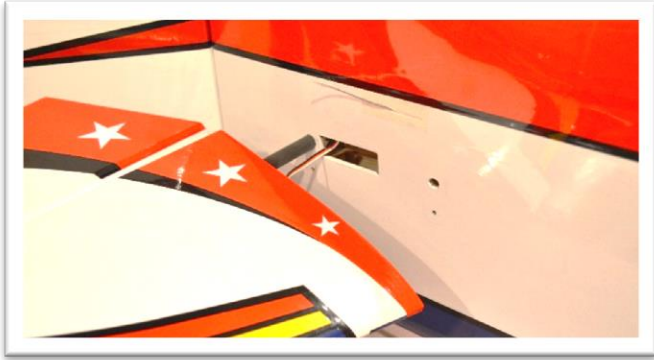


Connect the extension to the elevator servo using a safety clip to secure the connection.





Slide the carbon fiber horizontal stabilizer tube through the fuselage. Then slide on the horizontal stabilizer.

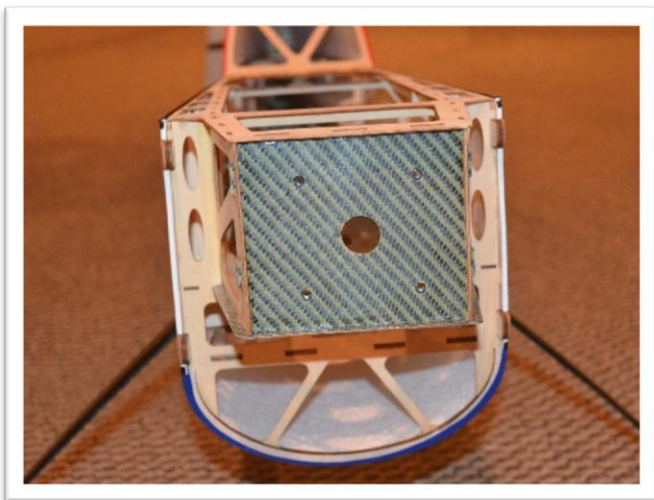


Use a 4-40 socket head cap screw and a flat washer to secure the stab in position.



## Electric Motor

The firewall is pre-assembled with 4mm thread inserts installed on a 75mm diameter bolt circle.



When using the AJ 5230-20P-205KV motor standoffs are not needed. However you will need to use the 5mm shaft spacer that comes with the motor. Bolt the motor directly to the firewall using 4mm socket head cap screws and flat washers. Apply a drop of removable thread locker when installing the motor screws.



If you are using another motor you may need to use motor standoffs. The cowl length is 3 7/16" (87mm) from the firewall which will help you plan your motor spacing.



Use nylon zip ties or a hook & loop strap to secure the ESC to the bottom of the motor box. We recommend putting a small piece of foam between the ESC and motor box to dampen vibrations. (62" Acuity shown)



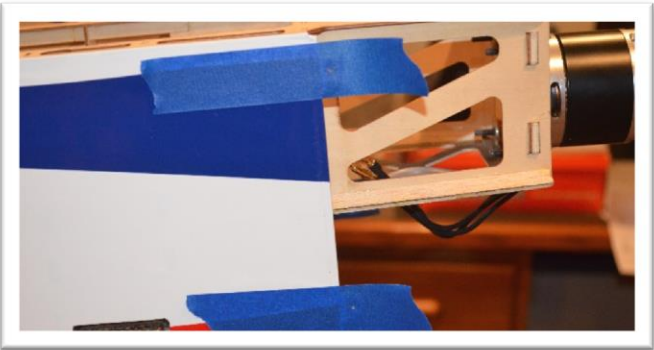
## Cowl & Canopy

The cowl will be mounted using 4 wood screws through side of the fuselage just in front of the firewall.

Drill a 1/16" hole in the center of the 4 cowl mounting tabs. Apply thin CA glue the hole to harden the wood around the hole.



Place tape over the holes and past the front of the firewall. Use a pin to poke through the tape locating the mounting hole on the tape. Peel the tape back away from each hole but leave it attached to the fuselage.



Place the cowl, canopy, and spinner back plate in position. Center the cowl around the spinner back plate leaving a clearance gap. Position the cowl with the fuselage and the canopy. Securely tape the cowl in position when you've found the best possible fit.



Drill a 1/16" hole in the side of the cowl at the locations marked in the previous step. Do not drill through the wood tab on the fuselage.



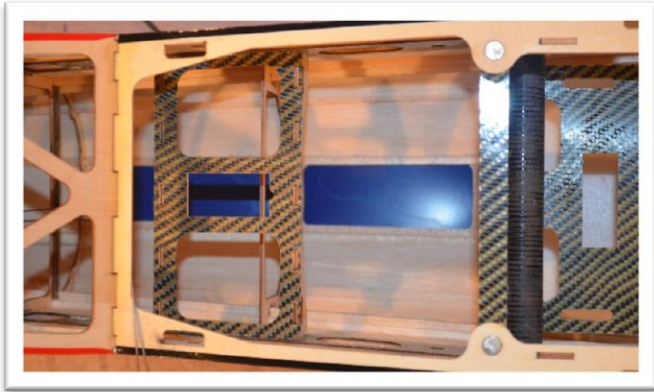
Remove the tape and finish mounting the cowl with wood screws.



Finish mounting your prop and spinner.



There are 2 areas in the bottom of the fuselage below the rudder servo that can be cut open to provide air flow for motor and speed controller cooling. Use a covering iron to seal the edges of the areas. Cut through the center of the covering. Fold it to the inside of the opening and attach it using a covering iron.



Secure the canopy in position with 3mm socket head cap screws and flat washers.



Slide the T-Canaliser through the canopy.



Measuring from both sides center the T-Canaliser in the canopy.



Measure from the horizontal stabilizer on both side and adjust as needed to ensure that it is parallel with the horizontal stabilizer.



Tape the T-Canaliser in position when you have found the perfect position. Remove the canopy and install 3 wood screws to fasten the T-Canaliser to the canopy.



The final step for assembly is attaching the wings.

Heat the area around the large slot to attach the covering. Trim the covering from the slot for access to the aileron servo wire. There is a hole just forward of the slot for the wing thumb screw. Trim the covering from this hole too.



Slide in and center the carbon fiber wing tube.



Slide the wings onto the carbon fiber tube and secure using the thumb screw.



## Radio Installation & Setup

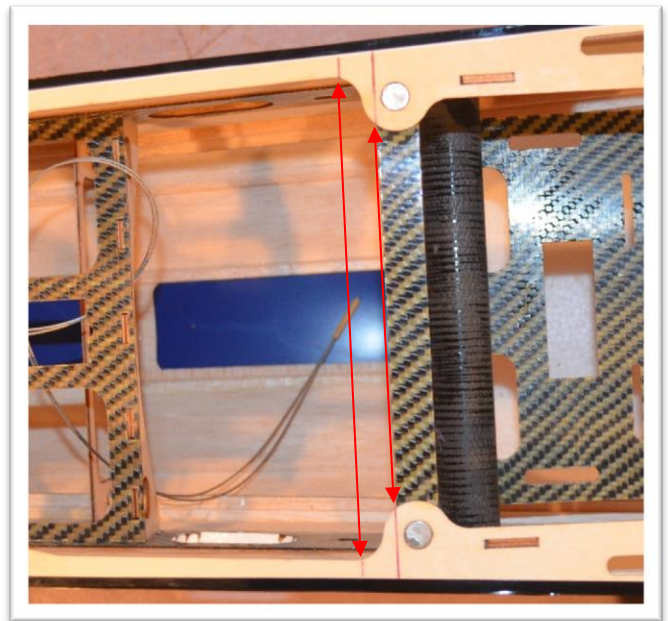
Your receiver can be mounted anywhere in the airframe. A piece of foam rubber should be used between the fuselage and the receiver to dampen any vibration.

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

Control Throws		
Elevator	10° Up	13° Down
Aileron	12° Up	12° Down
Rudder	15° Left	15° Right

Take the time to properly balance and trim your aircraft.

The center of gravity range is located from the back edge of the carbon fiber fuselage support to 10mm back.



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.

## *Enjoy your new plane!*

We at AJ Aircraft sincerely hope you enjoy flying the 2M AJ Acuity. Feel free to create a support ticket at [aj-aircraft.com](http://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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*Andrew with the 62" Acuity.*