Congratulations on your purchase of Precision Aerobatics

Warning – This is not a toy!

Be sure you have read and understood this entire manual before you assemble this model

Do not overlook the warnings and instructions enclosed herewith or those provided by other manufacturers, and the official AMA (Academy of Model Aeronautics) Safety Code (see at the end of this manual). They were designed to assist you in preventing damage or injury.

The instructions below are our suggestions only on how to assemble this model. There are other ways and methods to do so.

Precision Aerobatics has no control over the final assembly, the materials and accessories you use when assembling this kit or the manner in which the assembled model and the installed radio system and electronic parts, are used and maintained. Thus, no liability is assumed or accepted for any damage resulting from the use of the assembled model aircraft or from this instruction manual including but not limited to direct, indirect, incidental, special, and consequential damages. In no event shall Precision Aerobatics' liability exceed the original purchase price of this kit.

BY THE ACT OF ASSEMBLING AND OPERATING THE ASSEMBLED MODEL YOU ASSUME AND ACCEPT FULL LIABILITY FOR YOUR ACTIONS.

Radio controlled model aircraft that are not properly assembled, operated and maintained can cause serious damage to body and property. If you are not an experienced pilot and airplane modeller you must use the help of an experienced pilot or preferably an authorized flight instructor who will assist you with the assembly and flying of this model.

SAFETY NOTES:

1. Before assembling and flying this model read carefully any instructions and warnings of other manufacturers for all the products you installed or used on your model (especially radio equipment and power source).
2. Check thoroughly before every flight that the airplanes components are in good shape and function correctly. If you find a fault do not fly the model until you have corrected it.
3. Radio interference caused by unknown sources can occur at any time without notice. In such a case, your model will be uncontrollable and completely unpredictable. Make sure to perform a range check before every flight. If you detect a control problem or interference during a flight, immediately land the model to prevent a potential accident
4. Youngsters should only be allowed to assemble and fly these models under the instruction and supervision of an experienced adult.
5. Do not operate this model in a confined area.
6. Do not stand in line with, or in front of a spinning propeller and never touch it with any object.

Precision Aerobatics quality control team checks each plane before it leaves the factory to ensure that each kit is in fine condition. We have no bearing on the condition of any component parts damaged by use, modification or assembly of this model. Inspect the components of this kit upon receipt. If you find any parts damaged or missing, contact the hobby shop who supplied this kit immediately. All warranty claims to be submitted within 30 days of purchase and include the original dated receipt. This warranty is extended to the original purchaser only. We do not accept the return or replacement of parts on which assembly work has already begun. Precision Aerobatics reserves the right to change this warranty at anytime without notice.

NOTE:
Although we have done most of the work for you and not much assembling work left in completing the model and getting it ready to fly **we urge you to read the manual thoroughly.**
We have spent weeks in preparing the manual making it as detailed as possible, and you will find in it many tips and suggestions that will help you get the most out of your plane, in the safest way possible.
We hope you'll find the manual helpful and that you'll enjoy your new model.

Precision Aerobatics Team

Equipment selection

At Precision Aerobatics we have gone to great lengths developing the XR-61 in order to provide you with an aircraft like no other. We have used many unique production techniques including our revolutionary PA FiberFusion® to create the lightest, strongest aircraft possible. The extensive engineering and usage of carbon fiber along with our never ending quest to reduce weight ensures the XR-61 is one of the lightest aircraft in its class, with an incredibly low wing loading. These factors contribute to the outstanding flying characteristics of the XR-61.

Throughout our extensive flight testing program we have trialed many different combinations of equipment in order to obtain the best possible performance from the airframe. We noticed a direct relationship between the drive system chosen and the aircraft performance and handling characteristics. It is our desire that your XR-61 should have the same amazing capabilities as our designer envisioned and test pilots experienced. For this reason we have developed a number of our own **Integrated Performance Airframe-Drive Systems®** or **iPAs®**.
Note: All the flying videos available on our website use, exclusively, the iPAs recommended gear which can give you a good idea on the high performance you can achieve.

The XR-61 was designed around the following gear. Please be aware that any deviations from these recommendations will result in degraded flight characteristics.

- **Motor** - PA Thrust 60 Revo 24 pole with Rotorkool® technology (PA Item #AC-1887) 213gr, brushless motor (using a motor that is larger or more powerful than that specified can result in damage to the motor box or failure of the airframe).To find more details on the Thrust 60 Revo visit **www.ThrustMotors.com**
- **ESC** - PA Quantum 70 Pro Programmable Brushless ESC with built in Switching HV SBEC (6.0 / 7.4 / 8.0v) (PA Item # AC-2190HV).
- **Batteries** – 2 packs of PA V3 2600mAh 30-60C 3S (11.1V) Lithium Polymer (Item #AC-2336 or AC-2336-2 for 2pak special) connected in series to create a 6s pack (22.2v), or a single 6s PA V3 2600mAh 30-60c 6S pack (22.2v) (Item #AC-2359), Discounted package of four 3S Lipo packs is also available (Item # AC-2336-4).
  Note: different batteries will vary the motor's power output and amp drawn and might be under power or push the motor beyond its limits. If using none-PA packs use a watt meter to verify that the output power and amp drawn are within the Thrust 60 Revo range with the specified propeller. Please refer to the Thrust 60 data sheet available on www.Thrustmotors.com
- **Connectors** – use original Amass XT60 or Ultra Deans plugs only. We found that using cheap copies can cause problems of conductivity and restriction of higher current flow resulting in serious loss of power.
- **Servos** – We recommend 4x NXT-100 HV digital servos or similar quality digital mini Servos all around (PA item # AC-2332).
- **Extension lead** – German made, thin gauge flexible extension lead for EP models 2M/6.5ft (PA item # AC-1713).
- **Micro Receiver** – Four or more channels full range FM or PCM or any full range 2.4Ghz (e.g. Spektrum AR6210 receiver).
- **Spinner** - 2.17" lightweight pre-cut PA Carbon Fiber spinner (PA code # AC-2219). Perfectly matches the XR-61 cowl shape, retain optimum CG and avoid unnecessary weight.
- **Propeller** – It is essential to allow good air flow (using the supplied air scoops and installing the gear per the instruction manual) over the motor, ESC and batteries regardless of chosen propeller.

  VOX 15x8 wood (PA Item #AC-2114) **-** Provides excellent power for sport flying, 3D and precision flying, and yet is still very capable of high energy maneuvers. It has a slightly faster top speed compared to the 16x7, but offers an easier to manage throttle response. It also offers longer flight times. Note: Because of the decreased prop diameter, it might provide slightly less prop wash in slow 3D, but it's light weight gives quick spool up for easy exits out of tumbles, blenders and knife edge spins. Excellent prop for any style of flying.

  VOX 15x10 wood (PA Item #AC-2121) **-** For those specifically looking for high speed / high energy flying and is also very good for windy days. This prop's strong point is high energy tumbles. It is still very good for slow 3D but you can expect the throttle response to be slightly sluggish in slow 3D, while the higher pitch gives an impressive top speed.

  VOX 16x7 wood (PA Item #AC-2116) **–** The choice for those looking for the best slow and low 3D performance. It provides maximum prop wash, which means the best control possible during slow 3D and rolling harriers. It is a very good all-around prop, with a slightly slower top speed compared to the other props, but offers excellent 3d stability. It is still very capable of high energy. Please note: The larger diameter creates higher gyroscopic forces, which can make for some really interesting tumbles!

  Because these 3 propellers really change the way the plane flies, we recommend getting all 3 to determine which one you like best. During our flight testing we kept switching between these 3 props as they are all excellent choices.

Note: It is important to accurately balance your propeller prior to installation as poorly balanced propellers are inefficient and cause vibrations which are detrimental to your model and motor. A video showing how to check and balance your prop is available on our website. Use only propellers that are adequately sized to be within the specified limits of your motor.

Warning: Plastic APC "E" props of equivalent sizes are **NOT recommended** for any of the PA planes as they generate a lot of vibrations being out of balance. They also flex and will draw much higher amps compared to the Vox props at the same sizes being less efficient. Using them instead of the recommended Vox propellers can lead to a motor box failure!!

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DISCLAIMER - AIRFRAME LIMITATION
The XR-61 is designed for extreme aerobatics and 3D maneuvers and has robust construction that was thoroughly tested. However due to the extreme thrust produced by the Thrust 60 Revo, the low flight weight of the model and its large control surfaces, it is vital for the user to exercise discretion while executing high stress maneuvers so as to avoid over loading the airframe.
EVERY airframe may it be an RC model or a full scale aircraft has its maximum limits. Your XR is not an exception. The XR is also specifically designed to operate using the recommended gear described above. Keeping within the design limitations greatly depends on your flying style and IS YOUR RESPONSIBILITY. Please read the Official Academy of Model Aeronautics National Model Aircraft **Safety Code** at the end of this book.

Pre-Assembly

Before you commence assembling please inspect the contents of the kit for any damage that may have occurred during transport or a suspected manufacturing defect. If you suspect any component is damaged please contact the shop from which you purchased the model immediately. Do not commence the assembling of this kit.

We go to great lengths to ensure all components are manufactured free of warp or twist, however, due to high temperatures on the long journey in a container and changes in humidity it is possible for small amounts of warp or twist to develop. It is important at this stage to inspect for warp. Start by taping the ailerons in the neutral position at the wing root and look down the length of the ailerons to ensure they are perfectly straight. The ailerons should be neutral at the wing tip (profile view), as they are at the wing root. If the aileron appears to be either deflected up or down at the tip (known as wash-out or wash-in), it must be removed by gradually twisting in the opposite direction and carefully applying heat to the wrinkles on the covering film (ideally with a hobby iron). Start at a very low temperature and gradually increase until the wrinkles begins to shrink. Different films respond to heat in different ways and excessive heat will damage the covering. Repeat this process until the aileron is perfectly straight with no twist visible. Do **NOT** use a heat gun as it affects a much greater area which may cause an unwanted warp in other areas and burn the covering.
Inspect all sharp edges of the covering trims to verify they are sealed down. If there are loose edges that peel off, use an iron to lightly seal them down, especially pay attention to wing and elevator tips (TE &LE).

Ensure the elevator is not twisted by checking that both elevator counterbalances line up perfectly with the stabilizer leading edge. If one counterbalance is slightly deflected up or down while the other side is neutral, the slight twist can be removed in the same manner as the ailerons by gently twisting in the opposite direction and applying heat to the film where it wrinkles. It is important to ensure that this step is completed prior to installing the stabilizer/elevator on the model.

Any small bubbles or wrinkles in the covering film can also be removed with a small hobby iron, **however extreme care must be taken, as it is possible to introduce warp to an otherwise straight part while removing wrinkles.** Start at low temperature and gradually increase it. Use the iron **front tip** and **only** over the wrinkles to avoid warping other areas!

Tip: As most parts of the XR-61 will be assembled using epoxy, it is recommended to have some Denatured Alcohol and paper towels handy for the occasional quick clean ups during the build.

Note: If you are having difficulty removing the hatch off the fuselage, it is possible that the radical climate changes caused the magnets to fuse. In this case do not apply excessive force as that can result in breaking the hatch, instead, use a sharp blade to separate them.

Avoid keeping the hatch off the fuselage for long periods of time as it may develop some warp due to its length and climate changes. Do not leave hatch/canopy out in the sun as it may warp as well.

Note: Through the manual - all left/right/rear indications are from pilot view

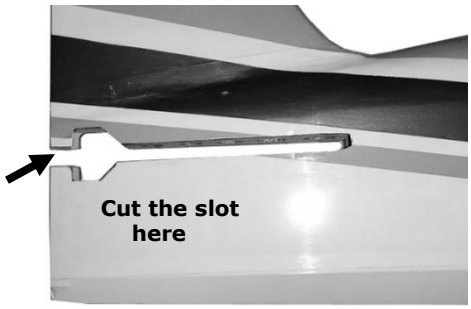
You may also watch "PA Build" videos available on our website, however, don't skip this instruction manual.

Making the Openings

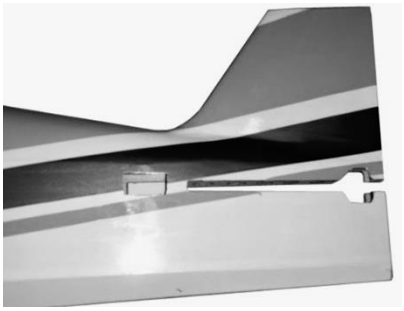
Start by ironing around the edges of all the openings to be made to ensure the covering does not peel back later. Next make the following openings in the covering film, as shown in the photos- aileron servo cables, wing bolts, elevator servo (cutout one side only), rudder pull-pull wire exits, landing gear, cooling air exit, stabilizer slot and aileron servo bays.
Tip: To prevent making accidental mistakes in the openings, use a pin or blade to pierce a hole in the opaque covering from the inside to mark the location of the openings before cutting from the outside.

Note: There are two identical sets of servo openings on each side of the fuselage. Choose the side per your preference. Elevator servo should be mounted on one side of the fuselage (upper opening).
Make sure to cut the elevator control horn slot in the correct side of your servo final position.

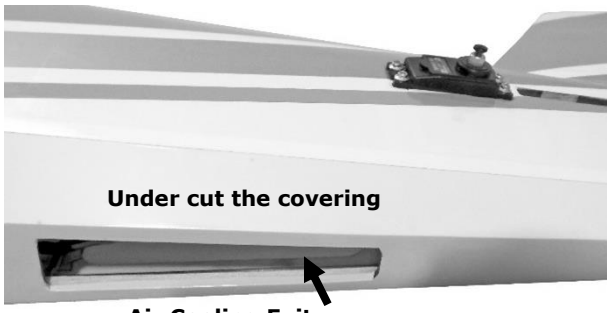
With the exception of the aileron servos, the easiest way to make the openings is by 'cutting' the film with the heated end of a paperclip (to heat use a cigarette lighter or a candle) or with a very sharp modeling knife. For the ailerons' servo bays, under cut the covering around the bay by leaving a 3mm overhang all around then carefully tuck the edges down and seal it with the iron. This will prevent the covering from pulling out and wrinkle in the future. As an option, you may also use this method for the landing gear bay, cooling exit and fuselage servo bays.



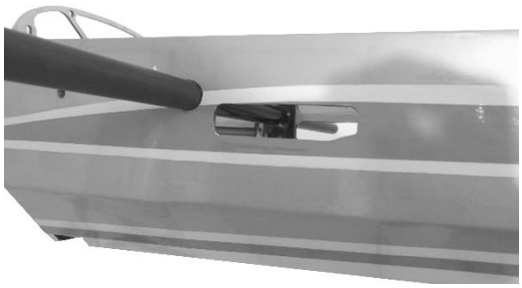
Stabilizer slot



Elevator Servo Opening



Air Cooling Exit



Fuselage openings

Landing Gear Bay

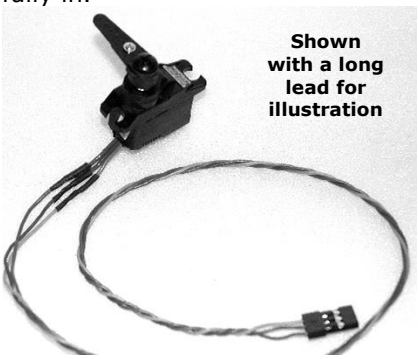
Aileron servo installation

The aileron servos require a pair of 63mm/2.5" extension leads. We recommend extending the leads using a good quality lightweight servo extension to save on weight, avoid RF noises and voltage drop (PA Item Code AC-1713 is a German made low resistance flexible Extension Lead and is included in the iPAs Pro package).
Cut the servo lead close to the servo case. Expose each cable end, then solder each to the extension lead according to the colors. Insolate the cables with a shrinking tube over **each** of the soldered cables (fit them on before soldering the wires).

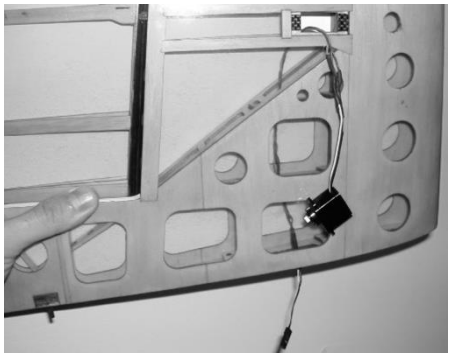
If wings are removed often for transportation you may want to consider making two short extension leads that are permanently plugged to the RX and dangle out of the fuselage. In this case the existing servo leads do not require any modification.

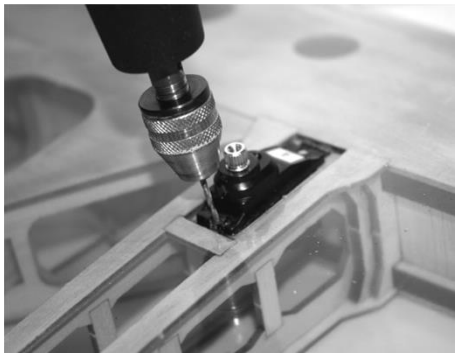
Feed the cable through the servo opening and out through the wing root opening. Insert the aileron servos with the output shaft closest to the aileron. In case of tight fit don't force the servo in, instead use a fine file to slightly enlarge the opening. Mark the centre of the mounting tab hole to drill.

Drill mounting holes for the servo screws using a sharp 1.5mm (1/16") drill bit. Ensure that the screw holes are exactly centered. We recommend a fully threaded after market screws (without smooth portion).
Do not use excessive force as this may damage the servo tray. Screw and unscrew the mounting screws and then apply a drop of thin CA into each of the holes to set the thread. Once the CA has cured install the servo.
Tip: Carefully "tap" the screws in by making a full turn in and then backing out by ¼ turn and repeat until the screw sits fully in.



PA Lightweight servo extension


Feed the extension lead through


Drill the mounting holes with care

Warning - we recommend **not to use** the rubber grommets and eyelets supplied with the servos as this method of mounting will introduce excessive flex of the servo case under flight loads and will cause a lost of resolution in control ("blowback" of the control surface). The best method is hard mounting of the servos (tail and aileron servos) with aftermarket screws without the grommets and eyelets.

Note: We keep a tight production tolerance on the ailerons' hinging system to avoid any slop/play. If they deflect roughly do know that the high torque servos won't have an issue deflecting them, however, if you wish to have a friction free aileron, you may "shave" the balsa rib, using a sharp modeling knife at the spot where it binds (through the hinge slot).

Aileron control linkages

First select the two identical CF pushrods (113.5mm/4.47") and the control horns from your hardware pack to begin preparing them for installation. Note that the aileron control horns are the identical pair from the hardware pack of four CF control horns.

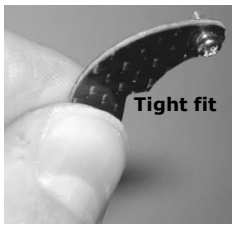
Lightly sand the base of the CF control horns to allow better gluing surface. Next slit the opening for the CF horns on the Aileron. Test fit the CF horn. If the fit is too tight; do not force the horn in. Instead, use a blade to carefully enlarge the opening until a perfect fit is achieved. Do not epoxy the CF horn at this stage.

Locate the metal clevis from the hardware pack and use a paper rag soaked in denatured alcohol to thoroughly clean the inside of the hole where the CF rod inserts. Install the metal clevis to the aileron horn. The aileron's horn hole is slightly undersized. Use a fine needle file carefully to **slightly** enlarge the hole to get a precise slop-free fit. Test fit the mounting bolt a few times during the process. **Take your time** to do so because oversized hole would cause undesired slop. Do the same with the CF servo arms' mounting hole.


Install clevis

Secure the bolt with Loctite


File mounting hole



Test fit bolt


Rudder **Aileron** **Aileron** **Elevator**

Screw the clevis bolt and test for a smooth bind free movement. Do not over tighten to avoid "clamping" the fork of the clevis on the CF control horn. If binding occurs, lightly sand the sharp edges (sides) of the CF horn until smooth bind-free movement is achieved. Once satisfied, apply green or red permanent Loctite. You may also install the metal clevis for the elevator at this stage.

Next, use epoxy over the control horn base and inside the aileron slot to glue the CF horn in and ensure that the horn was inserted **all the way in** and is perfectly 90 degrees perpendicular to the control surface. There will be a bit of epoxy

excess once the control horn is slid into the slot. Do not wipe it off as it will create a solid base to the horn. Use a piece of masking tape to hold the CF horn in position until the glue sets. Ensure adequate epoxy is applied to cover the holes at the base of the horn (once dry it acts as fixation pins).
Note: epoxy allows time for adjustment after the horn has been inserted while CA is prone to set too rapidly and may also cause stains to the covering film.

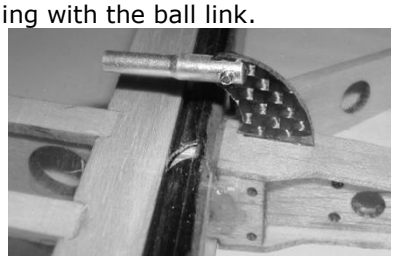
With the servos centered in neutral, temporarily install the plastic servo arm. Find the best position of the servo arm which yields 90 degrees to the servo case. That ensures linear and symmetrical throws in both directions without the need of excessive TX sub-trims and servo travel adjustments to one direction. Once satisfied, cut off the other three unused arms using a nail clipper.

In order to achieve maximum control throws for 3D and to ensure proper linkage geometry we recommend using PA Carbon Fiber servo arms (PA Item Code AC-2305). Note that these are not included with the kit. If you have them, install them now. You may wish to do so for the elevator servo at this point too.
The CF servo arm's hole is also slightly smaller to achieve a tight slop-free fit. You may need to enlarge the hole a bit to fit the ball link M2x8mm bolt in a similar way as you did with the aileron control horn.
Locate the plastic ball link and install it onto the CF servo arm with the ball on the **bottom side** of the servo arm. Install the aileron ball link in the servo arm **outer** mounting hole.
The order of assembly is M2x8mm bolt/ball link/CF arm/nut. Apply permanent Loctite to secure the nut.

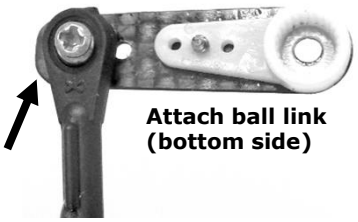
Note: some Loctite may run over the horn preventing the clevis from swiveling freely. Swivel the clevis rapidly a few times to get rid of any excess Loctite and if needed use a modeling knife to clean the horn surface.

Tip: we recommend trimming off (with a nail clipper) the plastic tab of the ball link so it will not rub against the plastic servo arm while swiveling at high angles. Also if needed, cut short the plastic servo arm (just after the anti rotation screw) to prevent it from binding with the ball link.


Trim the tab off the ball link


Test fit control horn

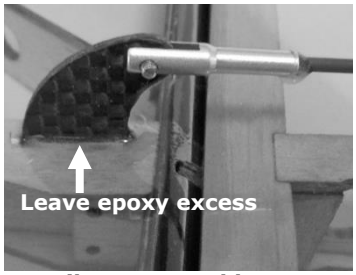

Notch pushrod end



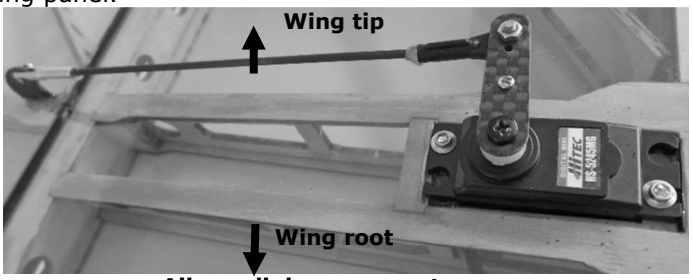
Secure the bolt with Loctite

Lightly sand, roughen and notch the ends (12mm, 1/2") of the two CF pushrods using a small triangle file to ensure a secure glue bond. With the servo arm installed and centered in neutral (90 degrees to the servo case) and the aileron taped and held in the neutral position, temporarily insert the CF pushrod into the clevis and line the other end up with the ball link. Cut short the CF pushrod to fit into the ball link, careful not to over shorten the rod! You may sand the tip to obtain an accurate fit. If done properly, you have completed a perfect linkage geometry set-up and will therefore need very minimal sub-trim adjustment when you set up your transmitter later. **Tip:** CF rod best cut off with a sharp modeling knife.

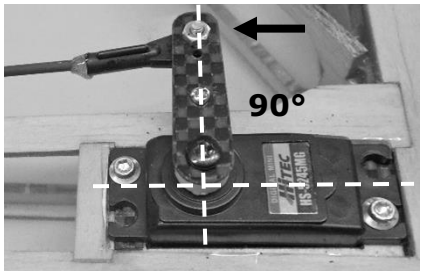
Once satisfied with the precise pushrod length and with the aileron already taped in the neutral position, apply 30 minute epoxy to one end of the pushrod and insert it into the clevis. Do the same with the ball link. Note that the pushrod should be pushed fully in and the ball link positioned **horizontally** to the clevis. Finally verify that the servo arm is also in the neutral (90°) position BEFORE the epoxy sets.
Do the same with the other wing panel.



Aileron control horn



Aileron linkage geometry

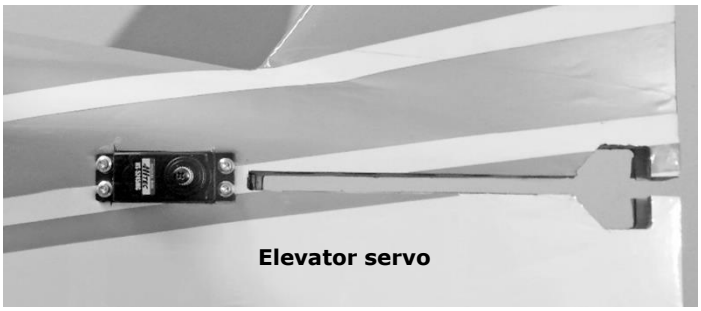


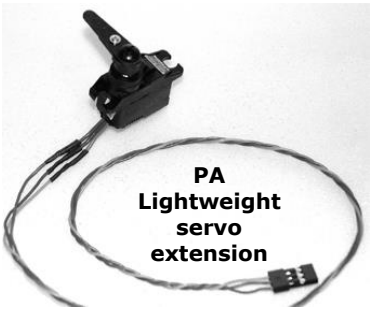
Outer mounting hole

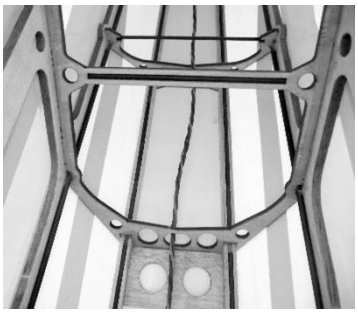
Tail section

Elevator servo installation

Prior to installing the servo, solder the servo lead extension (as described with the aileron servos). You will require a 395mm/15.55" long extension (if HS-5245MG is used). Install the elevator servo at the rear of the fuselage in the opening you previously cut in the covering film with the servo output shaft closer to the control surface as per the photo.
Carefully drill using a 1.5mm (1/16") drill bit and self tap holes as required for the servo mounting screws. The servo mounts have ply doublers glued on the inside of the fuselage; therefore applying a drop of CA into each hole is not actually required (however this can be done should the screws become loose). Run the servo leads along the bottom of the fuselage and through the bulkhead as shown in the photo. If FM or PCM RX will be used the lead can be run over the CF braces to reduce RF noises.


Elevator servo




Elevator servo lead

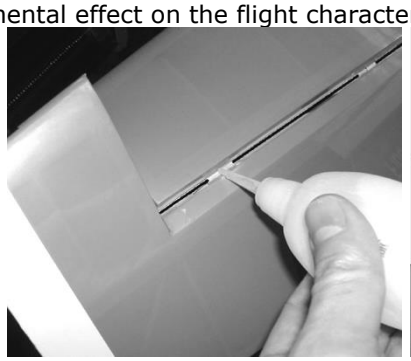
Elevator & Horizontal Stabilizer

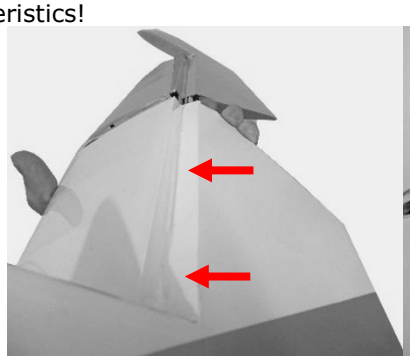
The stabilizer and elevator hinge slots are pre cut. All that is required is to set the elevator deflection and glue the hinges (four large hinges). Start by gluing the hinges into the elevator first (hinges fitted half way in).
To set the elevator deflection, fit the elevator into the horizontal stabilizer all the way in leaving no hinge gap. Ensure the hinges are aligned and centered, then deflect the elevator to approx 55° Deg up and down to set the gap. If the alignment or centering is a bit out, carefully re-cut the hinges' slots to correct as it will affect the flight performance. Ensure that the gap between the tip rib of the stabilizer and elevator counterbalance is equal on both sides. Once satisfied, apply a few drops of thin CA to both sides of the hinges (while deflected) and repeatedly deflect the elevator in a quick pace until the CA sets. Try to pull the elevator off the stabilizer to verify the integrity of the hinges gluing.

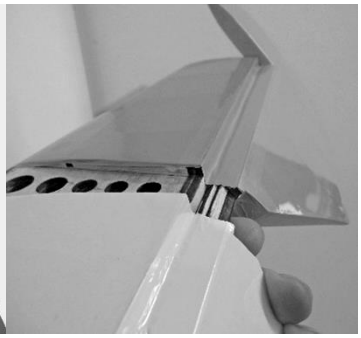
Tip: It's recommended to apply thin CA to the hinges with a pipette tip applicator supplied with your CA bottle to avoid "fogging" the covering. If fogging occurs, it can be easily removed by wiping off with a paper towel dipped in with acetone or nail polish remover.

Take the supplied white covering strip and crease it into a "V". Trim the creased covering to the length of one-half of the elevator. Align it along the hinge line (top side of the elevator). Hold it in place and starting at one end, iron it down along the length of the stabilizer (do not iron to the elevator at this stage). Deflect the control surface to maximum and iron the film into the hinge gap using the point of the iron. Now iron the strip along the elevator while fully deflected to maximum. This method ensures the gap is completely sealed while still allowing full deflection of the control surface. Do the same with the other elevator panel this time using the colored strip. Covering strips had their protection backing removed for you at the factory, however, if the film doesn't stick to the surface, double check if the backing is still on and needs to be peeled off.
Note: Sealing the elevator hinge gap is an **extremely** important step and an integral part of the XR-61 design. Skipping this step will have a detrimental effect on the flight characteristics!


Deflect the elevator to approx 55° to set the hinge gap


Gluing the elevator hinges


Place creased covering strip in the hinge gap and iron


Iron in the covering strip

The stabilizer inserts into the fuselage slot from the rear which requires the removal of the balsa at the rear of the slot. This is best done with a sharp hobby knife or a fine hobby saw. Use a ruler to draw a line extending from the slot to the rear to mark the area to be cut off.

Iron down the covering at the area to be cut and with a sharp blade or fine saw, carefully cut the balsa out. Insert the stabilizer all the way into its slot, until the elevator leading edge hits the rear of the fuselage. while elevator is in neutral position you can easily mark the final lines to cut in order to allow the elevator to fit through.
If the fit at the newly cut slot is tight do not use force. Merely widen the slot evenly using a file until the stabilizer slides through. Proceed to slide the stabilizer until it reaches the stop at the front end of the stabilizer slot in the fuselage.

Next, you will need to align the stabilizer. Temporarily insert the wing tube to the fuselage. Looking from the rear check that the stabilizer is parallel to the wing tube (tape the elevator in the neutral position).
If the stabilizer is not parallel to the wing tube, remove the stabilizer and lightly file the fuselage slot to achieve perfect alignment. The stabilizer, after filing, must sit parallel to the wing tube.
Tip: If you have difficulty to visually check the stabilizer alignment with the wing tube, temporarily install the wings (with the ailerons taped in the neutral position) to make the visual reference.

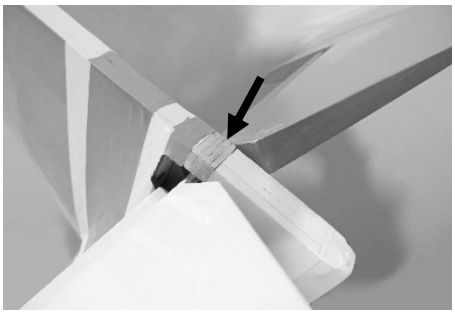
At this stage fully deflect the elevator UP and DOWN to verify there is no obstruction; If any, slightly file the fuselage opening (ONLY as needed) to allow the full deflection.

Once the stabilizer is in perfect alignment, remove it and apply a thin layer of 30 minute epoxy to the exposed balsa in the center of the stabilizer (both sides) and on the side of the stabilizer roots (Note: CA is not recommended here as it causes discoloration of the covering film and set too fast). Insert the stabilizer ensuring it is pushed fully forward into its slot and make a final check from all angles that the stabilizer is correctly aligned. If there is any gap between the stabilizer roots and fuselage make sure to keep an even gap on both sides before letting it cure. Use masking tape to hold the stabilizer parallel to the wing tube until the epoxy sets. Check and double check to ensure the stabilizer is absolutely parallel to the wing tube. Use a paper towel soaked in denatured alcohol to wipe off epoxy excess. Stabilizer root ribs will keep the correct position of the stabilizer so no alignment measurements are needed to be done.

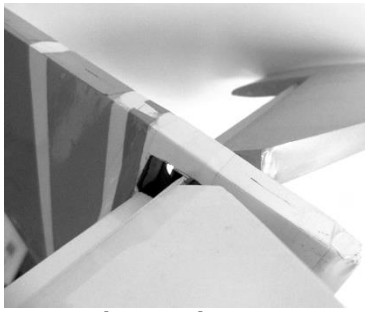
Note: While gluing the horizontal stab, it is extremely important not to place any pressure on the fuselage. Doing so can result in the fuselage being glued with a permanent twist impairing the flight performance.

Once the glue sets, remove the masking tape and slide the supplied balsa wedge into the gap you previously cut at the rear of the fuselage. Being oversize, you need to lightly sand the balsa wedge (all around) until it fits flush with the fuselage. Do not attempt to force the wedge in as this could risk inducing a permanent twist in the fuselage (as with the stabilizer). Once satisfied, glue the wedge in with CA. You may use scraps of covering material previously cut to cover the balsa wedge.

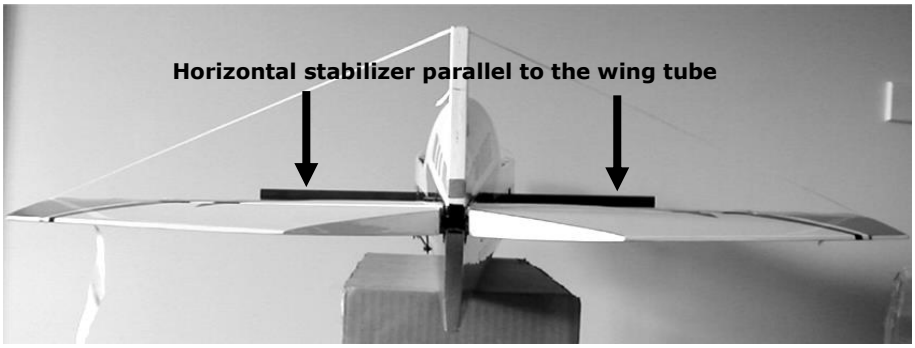
Apply epoxy to the stab center

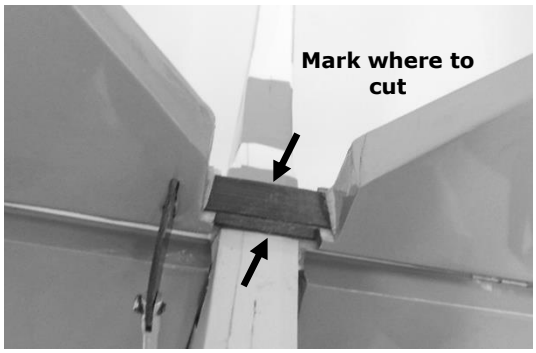


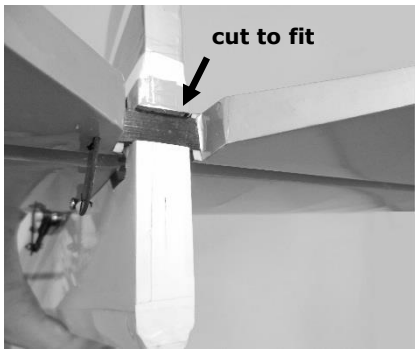
Glue in the balsa wedge

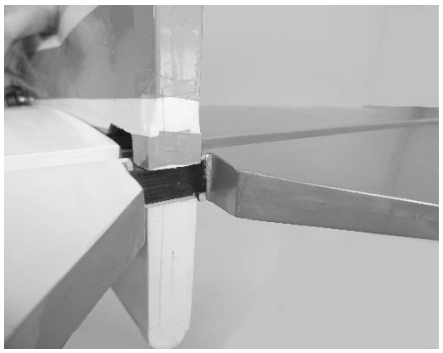


apply covering over





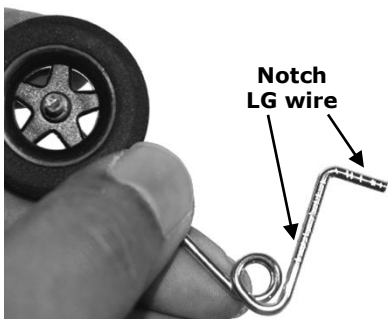


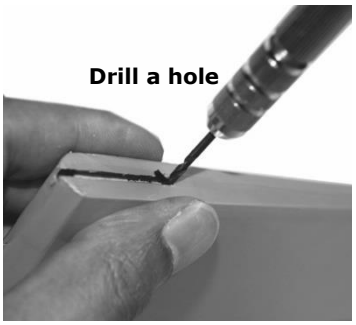


Rudder and Tail Landing Gear

Locate the groove at the bottom of the rudder closer to the hinge line. Using a sharp blade remove the covering to expose the groove. Test fit the tail LG in the groove, and mark the position of the hole to drill for the wire. Drill a hole in the marked position using a 1.5mm (1/16") drill bit. If tail LG strut doesn't fit into the groove use a fine file to correct. With the LG in place verify its alignment with the rudder and if needed correct it by bending the strut with pliers before glued in.

Create indentations in the surface of the LG wire using a triangle file. The indentations provide better surface for the glue to bond.
Flood the groove with 30 minutes epoxy and install the LG into the slot. Apply another layer of epoxy over the LG wire. Leave the assembly aside until the epoxy sets.
Note: if the wheel doesn't spin freely, wobble it a bit until it spins freely.





The fuselage/fin and rudder come with the hinge slots pre-cut at the factory. On gluing the rudder into the fuselage – fit the hinges into the rudder first (one large on the bottom and two narrow ones at the top). If they don't fit in easily use a sharp modeling knife to CAREFULY re-cut the hinge slots (avoid widening them as that can cause them to detach in flight if thin CA is used to glue them). Before applying glue place the rudder side by side with the fuselage and check the alignment of the hinges with the fuselage slots and readjust hinges if needed. Use a sharp modeling knife to carefully lengthen the slots IF needed, but make sure not to over do it. Once satisfied, apply a few drops of thin CA over each hinge to glue them to the rudder and let it cure. Then test fit the rudder into the fuselage all the way in, align the rudder counter balance with the fin leaving a small gap that allows the rudder to deflect freely, then place the fuselage on its side and fully deflect the rudder until it hits the elevator (elevator must be in neutral position. If needed use a sticky tape to hold it in neutral), then apply a few drops of CA to both sides of the hinges to fix them permanently in place.

Note: Try to pull the rudder out of the fuselage/fin to verify the integrity of the hinges gluing. Properly glued hinges will not allow the rudder to detach.

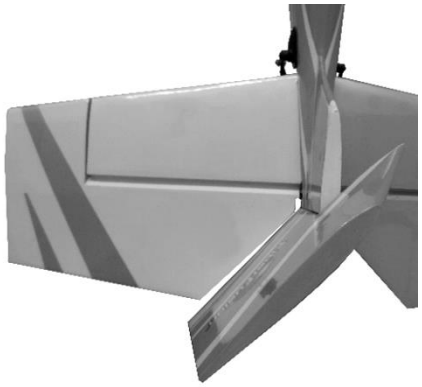
Next, seal the hinge gap with the supplied strips, to match the color scheme, in the same way you did with the elevator (the strips can be applied from either side of the rudder and should be trimmed to match the color scheme). This step is equally important for the rudder as it is with the elevator.

Once the rudder is installed, it must be checked for warp.

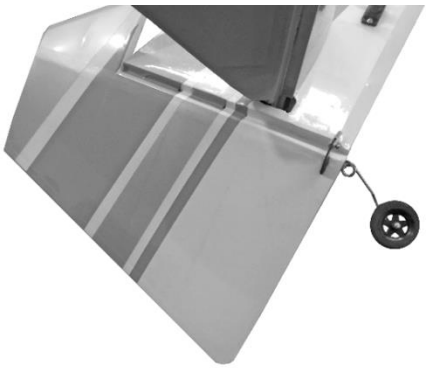
Note: although we fix warps on all parts after the covering process, due to the lightweight construction of the rudder it is normal for it to have some small amount of warp that occurred during the long journey in the container and to your doorstep. There is no need for concern as this can be easily removed.
Note that to guarantee a warp-free rudder would have meant deliberately beefing up the internal structure of the rudder which would then result in an unacceptable control surface weight penalty.

Tape the rudder in the neutral position and look from the rear to verify that the trailing edge of the rudder is perfectly vertical. If it twists to one side, carefully counter twist it in the other direction and apply heat where it wrinkles using an

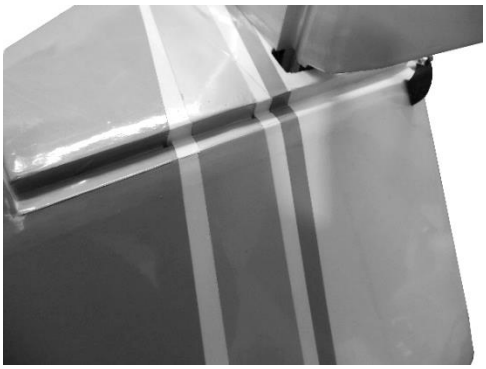
iron as you did with the ailerons and elevator. Continue until the trailing edge of the rudder forms a perfectly centered vertical line.



Deflect rudder to maximum before gluing the hinges



Place creased covering strips in the hinge gap



Seal the entire hinge gap while rudder is fully deflected

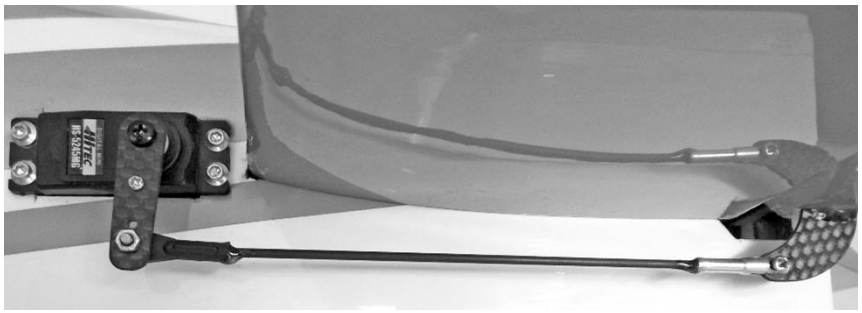
Elevator control linkages

Take the long elevator CF pushrod and control horn from your hardware pack to begin preparing them for installation as per what was previously done for the ailerons. Next, expose the slot for the elevator control horn in the correct side. The elevator pre-cut slot is located 5.5mm measured from the root rib.

Test fit the CF elevator control horn. If the fit is too tight do not force the horn in. Instead, use a modeling knife to carefully enlarge the slot until a perfect fit is achieved. Use epoxy to glue the CF horn all the way in and ensure the horn is perfectly 90 degrees perpendicular to the control surface.
Proceed to install the metal clevis, plastic ball link and CF push rod in the same manner as the ailerons.

For correct linkage geometry use the PA CF servo arms and install the **elevator** ball link in the **outer** mounting hole of the arm.

CF CNC machined elevator servo arm



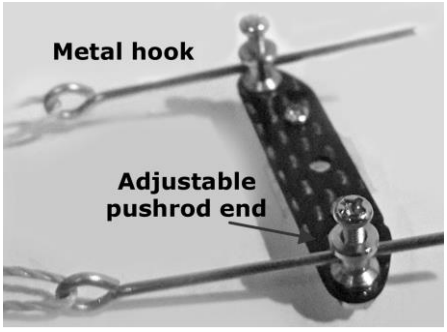
Elevator linkage geometry

CF elevator control horn and clevis

Rudder servo installation and Pull-Pull setup

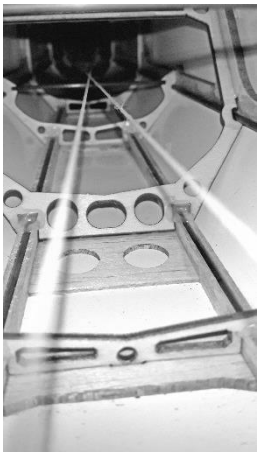
Install the rudder servo into the servo tray in the same manner as the aileron servos. Next expose the slot for the rudder control horn which is located 11mm measured from the bottom.

Install the rudder control horn in the rudder slot ensuring it is pushed fully forward, and that the horn is perfectly 90 degrees perpendicular to the control surface and it is well centered in the rudder. It is very important for a pull-pull to be symmetrical, check carefully that the mounting holes in the horn are both aligned with the hinge gap (that one hole isn't further forward than the other). Glue the horn in place using epoxy and stick a small piece of balsa behind the control horn, or simply apply a bit of epoxy into the slot behind the control horn as the slot is wider than the horn.



CF CNC machined rudder servo arm

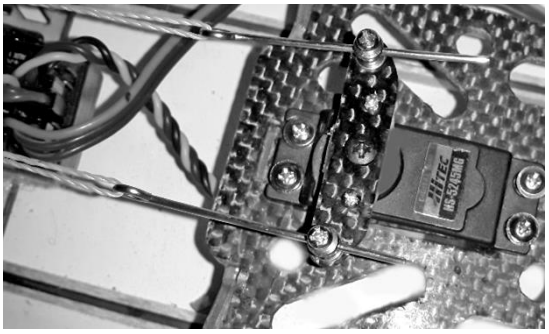
Install the supplied carbon fiber rudder servo arm to your servo by attaching it on top of a plastic servo arm using the two small screws supplied (NOTE- if your plastic servo arm has a top ring, file it down to get a flat mounting surface). Fit the two adjustable pushrod ends to the servo arm, fit them on the **top side** of the servo arm as shown in the photo. The nuts should not be fastened too tightly as the metal hooks should be able to rotate freely, if they bind in any position this will compromise the rudder control. Likewise the nuts should not be too loose as this will cause rudder control to be sloppy. If you are unable to tighten the nut sufficiently use one or two of the supplied small washers/spacer. At this stage install the metal hooks in a way that they partially (1/3) protrude from the adjustable pushrod ends (that is to allow final adjustments of the cables tension later on).
When you are happy with the linkage, apply a drop of permanent thread Loctite to the top nut to prevent it from loosening. Once it is dry we recommend applying a drop of lubricant to reduce friction between the CF arm and the adjustable pushrod ends.



Cut out two exit openings in the covering (one on each side) for the rudder pull-pull cables using the hot paperclip method (see photo). Feed the Kevlar pull-pull cables (the crimped ends) through these openings and along the length of the fuselage. The cables should pass through the larger opening of the fuselage bulkheads. Take care that the routing of these cables is clear of any obstructions. The geometry of the servo arm and rudder horn is such that the Kevlar cables should cross each other inside the fuselage.
With the rudder taped in the neutral position and the servo centered, loop the ends of the cables over the metal hooks at each end. Now, with the un-crimped ends at the control horn you can adjust the cables tension approximately, then apply a drop of CA to hold it in this position, and crimp the aluminum tubes using pliers(verify the symmetry). Final adjustments to the cables tension should be made by adjusting the metal hooks at the servo arm.

Test the pull-pull setup ensuring the cables do not bind, and are of the correct tension (too much tension will place excess strain on the servo, too little tension and the rudder will have too much play in it). As a rule of thumb, the approximate correct tension is when a bass tone is emitted when the cables are plucked in a similar way to a guitar string.


Kevlar pull-pull exit opening


Install rudder servo in the tray


CF rudder control horn

Motor Box

When assembling your XR61 or replacing your motor box after a crash, please follow these few precaution steps to verify your motor box will withstand the high torque of the Thrust 60 Revo setup.

I purposely designed the XR61 motorbox as a separate part to the fuselage. The main advantage is after a crash/mishap as the flyer only needs to replace the motorbox instead of the entire fuselage and tail section. That saves a lot of money.
It does require a little extra work but it is certainly worth it in the long run.

The motor box comes pre-glued, with the correct motor thrust angle built into the pre-drilled firewall.
CAUTION- The motor box has been designed, tested and drilled for the Thrust 60 Revo motor. Using a larger motor or using an improper propeller size or a prop adaptor which is out of true can lead to a motor box failure which will cause damage to your XR61. For technical data on the Thrust 60 Revo please visit **www.thrustmotors.com** and download the data sheet.

CAUTION- Once glued the motor box is extremely robust, however, following any crash, propeller ground strike or hard landing it is essential that the cowl be removed and all joints inspected for cracks and repaired as required. **Do NOT use any imbalanced, oversized, chipped propellers or with an off-centered hub hole as excessive vibrations can lead to premature motor box failure.**

If your motor box broke due to a crash we recommend that you don't attempt to repair it as it may fail in flight. Replacement motor box is available (see replacement parts list at the end of this manual). Instructions and video on how to replace it are available on our website (How To section).

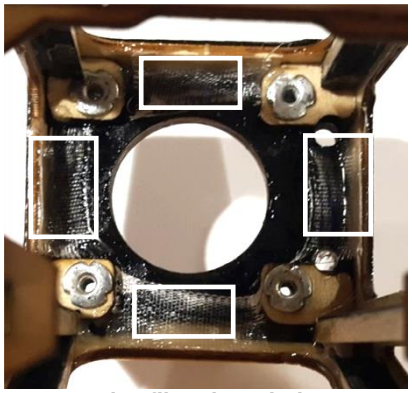
1. Prior to installation **go over all pre-glued joints** with carpenter wood glue or epoxy **(except the mounting plate!)** to ensure they are properly bonded and no gap between the parts is present so it will be able to withstand the torque generated by the powerful Thrust 60 Revo motor.

Go thoroughly over the entire motor box and verify that there are no cracks. If there is any, it must be fixed properly with epoxy.
NOTE- **DO NOT** modify the motor box or firewall. Any modification may lead to a motor box failure and will void warranty.

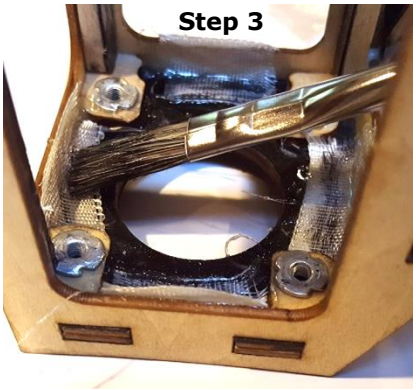
2. Verify with a ruler that the CF stringers do **NOT** protrude the rear of the motor box, otherwise the motor box will be mounted with an incorrect thrust angle which will impair the XR61 flight performance, therefore, if needed, sand/file the rear ends of the stringers flush with the motor box ply.

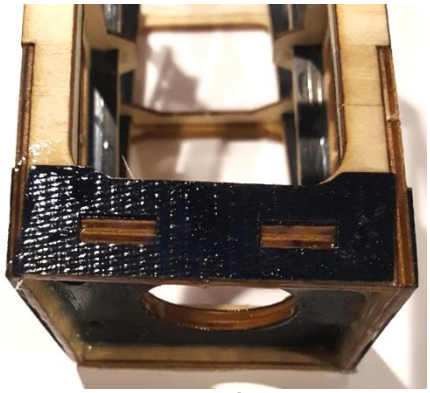
3. Cut the supplied fiberglass cloth to fit the four inner sides/corners of the mounting plate (see photos).

Apply/brush epoxy along the seams of the mounting plate (top bottom and sides) including corners. Then place the fiberglass cloth over each seam/side (**keep blind nuts clear of epoxy**) and apply a thin layer of epoxy over it to soak in. Using a flat tool, tuck in the cloth into the seam leaving no gap with the ply. Let it dry.
Note: Leave any overhanging fiberglass cloth as it will be trimmed later when dry. You may slightly dilute/thin the epoxy by adding a bit of denature alcohol into the mix. Thinner epoxy is easier to brush, however, it's not a must.

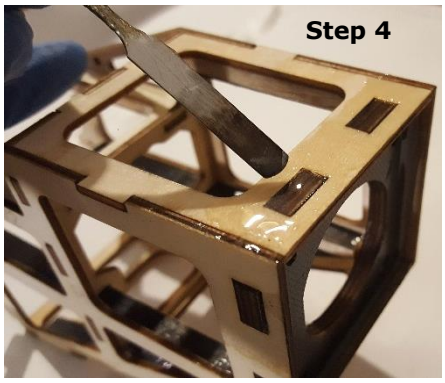

Glue fibreglass cloth

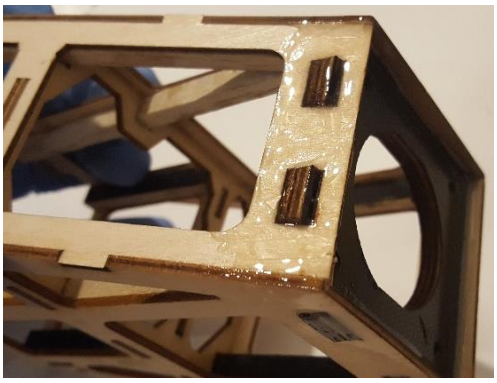
Step 3


Tuck in fibreglass cloth into seams


TOP plate

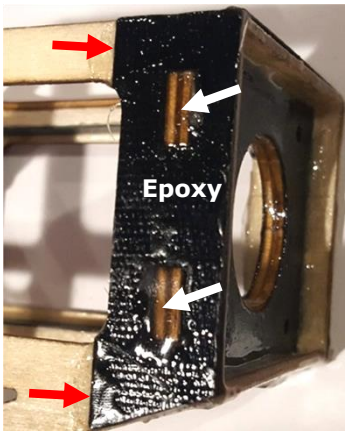

Side plate

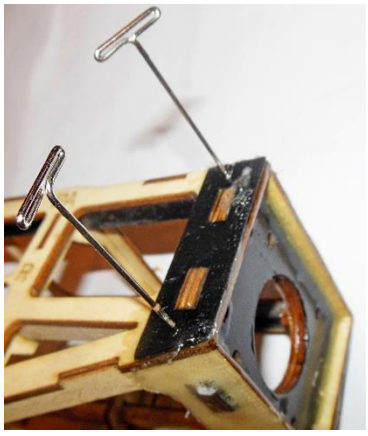




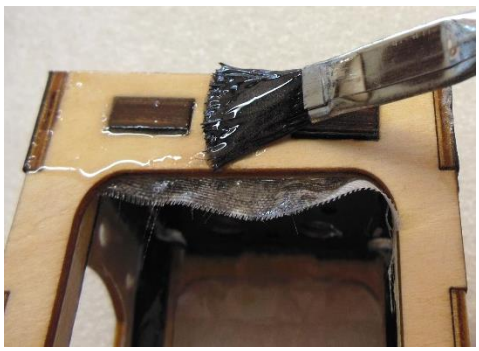
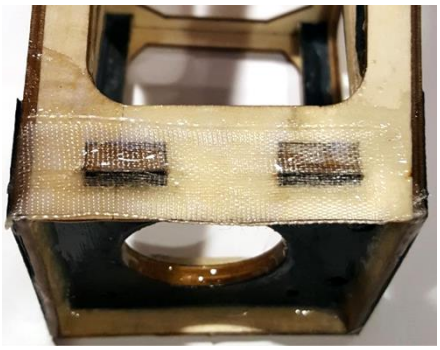
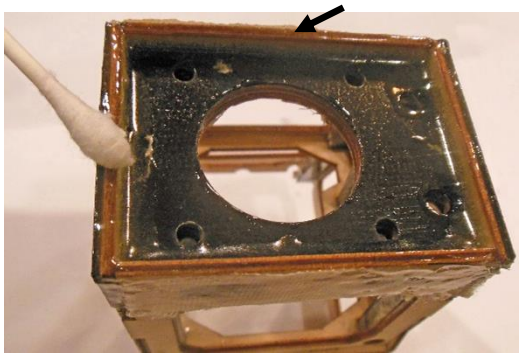

Apply epoxy over the motorbox front perimeter (including top and bottom sides)

4. Take the supplied composite plates and place them over the motor box in order to differentiate LEFT RIGHT and Top hand side. Lightly sand/roughen one side of each plate to allow better gluing surface. Apply a medium layer of slow cure epoxy (with a stick, flat tool or a brush) over the entire surface of each plate and the motor box front perimeter then place the plates over the ply and align them properly. Use a few pins or modeling clamp to hold the plates tight onto the motor box with **no gap** until the glue cures. Apply some epoxy over the mounting plate tabs and along the rear seam of the plates, especially if there is some gap between the plates and ply.





5. Cut to length the remaining fiberglass strip to fit the bottom side. Apply epoxy over the outside bottom side including corners. Then place the strip over and apply a thin layer of epoxy on top to soak in. Using a flat tool tuck the wet cloth into the seams and corners leaving no gap with the ply. Let it dry. Continue by brushing a bit of epoxy over the front frame.

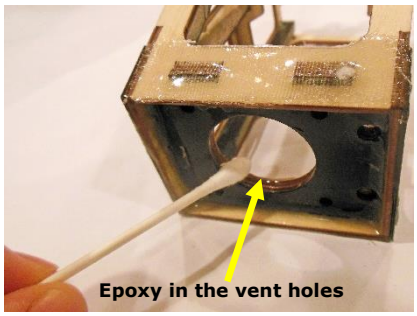




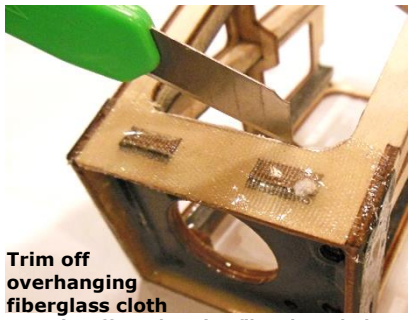
Apply epoxy (bottom side) **Place fibergl**

6. Using a cotton swab apply a thin layer of epoxy in the mounting plate vent holes except the mounting bolts' holes. wipe off any excess where the motor will be mounted.

7. Once epoxy is fully dry, use a sharp modeling knife to trim off any overhanging fiberglass cloth.

8. Next, use a round needle file to pierce a hole in the covering at the sides of the fuselage as shown in the photo in order to accommodate the long carbon rod. The motor box is held in place by three carbon pins; two short pins behind the bulkhead, and one long rod in front of it. These carbon pins fit into the pre-drilled holes in the motor box mounting lugs.
Test fit the motor box and carbon pins in the bulkhead prior to applying 30 minute epoxy.



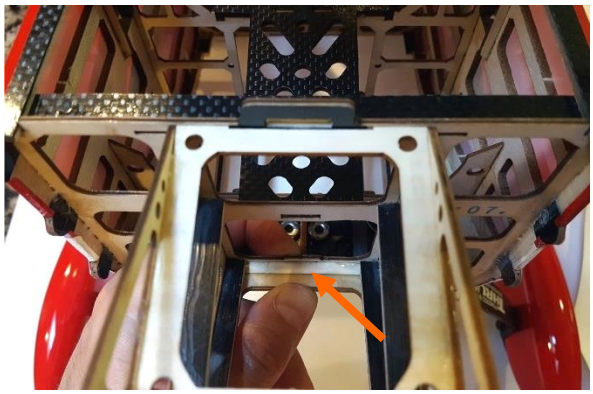
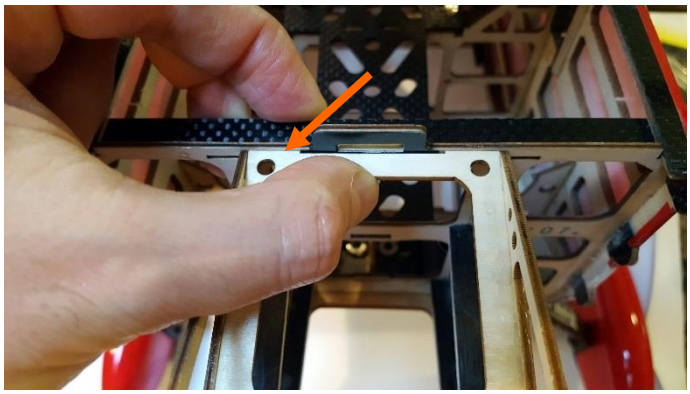


Epoxy in ALL vent holes **Trim off overhanging fiberglass cloth**

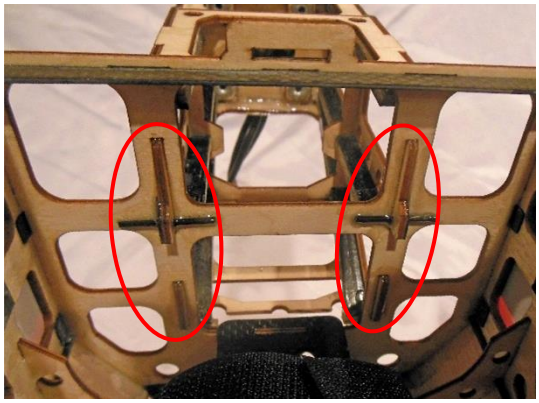
Do not force the motor box into the bulkhead slots. If it is too tight use a fine file to slightly enlarge the slots until a perfect fit is achieved. If the carbon pins are difficult to insert, use a round needle file to slightly enlarge the holes or taper

the pins. The long rod in front of the bulkhead should not protrude out the sides of the fuselage as this will interfere with the cowl. Shorten this rod if required using a file.
Next, gently work the motor box in until it sits **perfectly** flush with the fuselage front bulkhead **without any gap** present. A gap between the motor box and bulkhead will weaken the joints and change the pre-set motor thrust angle so take your time to do it right.

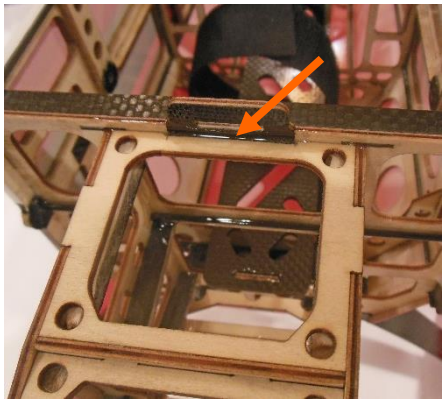
9. Once satisfied with the fit, insert the three CF pins in place.
Hold the motorbox firmly against the bulkhead to **eliminate any gap** and apply a few drops of CA to the top and bottom spots (one at a time) to "tack" it in place (see photos). Alternatively, you may use a clamp or zip ties at the center top and omit the CA. That will fix the motorbox in place while applying the epoxy. Next, run a thin bead of epoxy along the **entire seam** between the motor box and bulkhead including the CF pins. Use **only epoxy** and make sure you cover the **entire** CF rods, especially the one at the front. Spot gluing will **NOT** work and will allow excessive flex of the front bulkhead which can cause the motorbox to fail under loads.

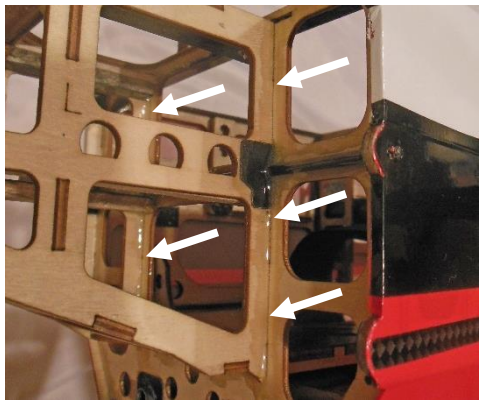
Hold the motorbox firmly with your fingers and apply a drop of CA (top and bottom) before applying epoxy



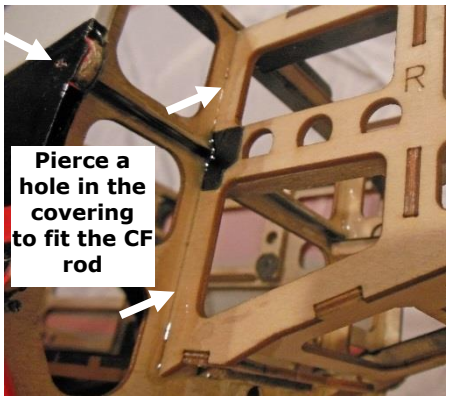
Glue motor box lugs and CF pins



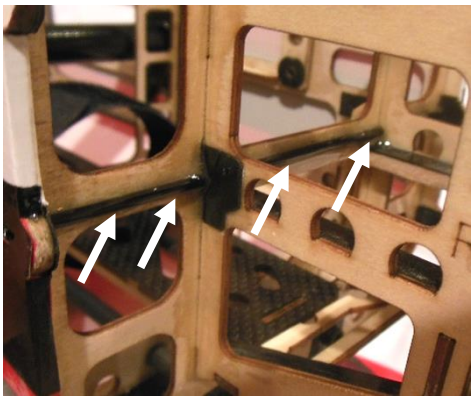
Epoxy



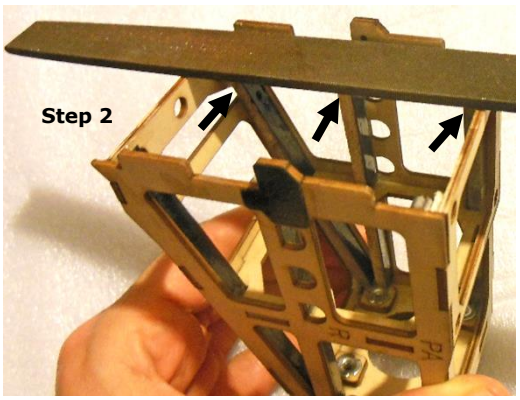
Leave no gap between motorbox and bulkhead



Epoxy ALL seams of the motor box with the bulkhead



Cover the entire CF rod with epoxy



Verify CF corner stringers do not protrude

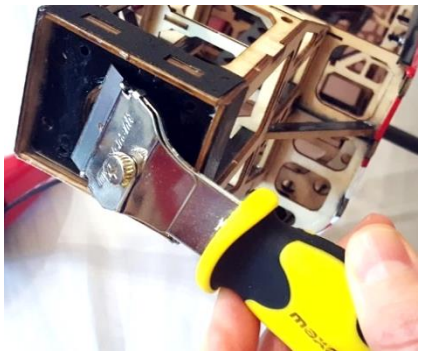
10. The last step is to install two diagonal CF braces. These braces are installed with the CF facing upwards extending at an angle from the motor box to the edge of the bulkhead. The diagonal braces should be glued on top of the "flattened" lightning holes and below the CF rod on the bulkhead as shown in the photo.

The diagonal brace contacts the bulkhead at an angle, so you should cut/file the brace's end. Temporarily place the brace in place or on top of the motor box to estimate this angle, mark and gradually file (or cut with a Dremel) and test fit until satisfied.

Test fit the brace in its position, as shown in the photos, and trim the end off if needed. Once satisfied with the length and fit of the brace, apply sufficient amount of epoxy on both gluing joints and glue the brace. If needed, use pins to hold it firmly in place. Install the second CF brace on the opposite side of the motor box in the same manner.

Motor and ESC Installation

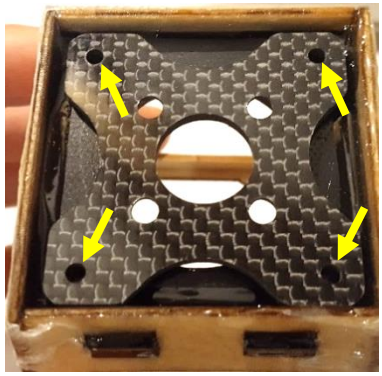
Install the Thrust 60 Revo motor in front of the firewall using the supplied hardware. **DO NOT under any circumstances enlarge/modify the motor box opening or mounting holes of the motor mount**. The motorbox is pre-drilled to accommodate the Thrust 60 Revo motor, therefore, the installation is easy. Note: if there is any epoxy over the mounting plate that may prevent the X mount from sitting flush, scrape it off with a sharp blade as it may result in an incorrect motor thrust angle.



Scrape off any epoxy

Make sure your X mount bolts are at least 14mm long. Due to the thick laminated XR61 mounting plate, shorter bolts may strip the thread and cause the motor box to fail under the extreme thrust. We strongly advice to use temporary (blue color) Loctite on all mounting bolts.
Our new and powerful T60 Revo is supplied with a CNC machined solid CF X mount for extra rigidity and weight saving.

Start by unfastening the shaft's retaining bolt, apply Loctite and refasten it firmly.
Do NOT over fasten as you may shear the bolt's head! Always use correctly sized quality tools so you don't strip the bolts.

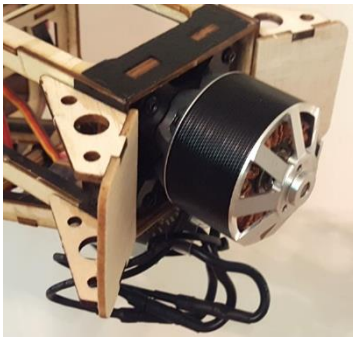


Test fit the M3 mounting bolts into the laminated firewall to clear any debris. If the fit is excessively tight, do not use force. Use a 1/8" (3mm) drill bit to clear the holes in the firewall. **DO NOT** drill into the blind nut itself.

Now, you can test fit the same bolts in the CF X mount. If tight, use the same 1/8" (3mm) drill bit or a round file to slightly enlarge the holes.

Next, test fit the counter sink motor bolts into the X mount. The bolt heads should be level or better, slightly below the X mount surface. They must **NOT** protrude above the X mount surface. If they do, they will obstruct the X mount from a flush fit on the firewall, altering the thrust angle. Incorrect thrust angle will impair the XR61 flight performance, therefore, if needed, use a 5/16" (8mm) drill bit to slightly enlarge the pre-drilled angle. Test fit during the process.

NOTE: X mount MUST sit flush with the firewall. **Do not** attempt to use washers between the X mount and the firewall as it can lead to a failure.


Install air baffles

Apply a bit of Loctite to all the bolts and install the motor onto the motorbox.

Caution: Over tightening the four motor mounting bolts may run a risk of crushing or cracking the motor mount plywood thereby weakening it. This increases the likelihood of an in-flight failure. Apply temporary (blue color) Loctite to the bolts and fasten them to a point where the motor sits firmly on the motor mount. Then add a quarter turn clockwise on the bolts to secure them.

The XR61 was designed to be flown on two individual 3 cells battery packs as per the diagram or with one 6S pack.
Prepare the ESC for installation by soldering on the cables and Deans connectors for a 6S (6 cells series) circuit configuration (refer to next page diagram). **Tip:** you may choose to add another set of Deans connector in between the ESC and the 6S battery harness if you intend to use a Wattmeter or in-flight data logger).

Warning: Our new Quantum 70 Pro ESC has a selectable SBEC voltage output. **Verify** that the voltage jumper position is set to fit your servo brand and specs! Use the ESC instruction manual to guide you with the jumper positions voltage. If using the NXT90-HV servos, set it at 7.4V. **Higher voltage will damage your servos!**

To achieve the correct Center of Gravity, the ESC should be mounted as forwards as possible underneath the motor and in front of the cowl air cooling intake. In order to do so an extension lead must be used on the ESC Rx cable. Properly solder a short extension lead to the existing cable as you previously did with the servos, or use a pre-made extension lead. Stick a thick foamed double sided sticky tape (a few layers) underneath the ESC to soft mount, then attach it **lightly** to the motor box using zip ties with the heatsink facing downward and into the airflow (see photos). NOTE: Do not over tighten the zip ties as it will increase vibrations to the ESC.

The ESC battery wires can be trimmed as needed and passed through the bulkhead on top of the battery tray.
Connect the three motor cables to the ESC. The RX lead can be twisted to reduce RF noises.

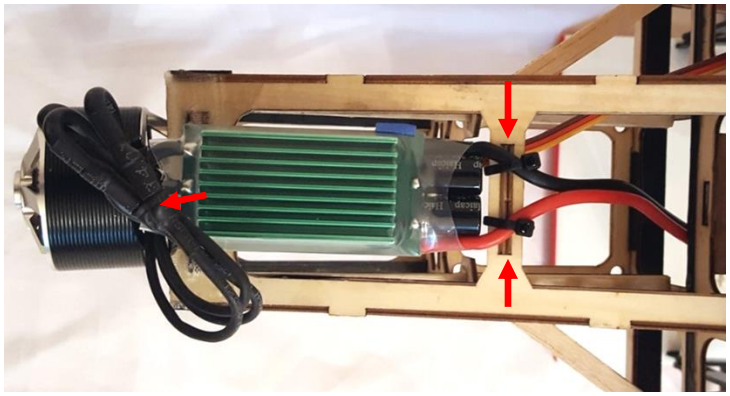
Verify the correct motor rotation direction (should spin clockwise from pilot view).
If it doesn't, power down the ESC and swap the position of any two motor cables or reprogram your Quantum ESC for reversed rotation. We strongly recommend removing the propeller as a safety precaution before powering up the ESC.


Assemble air baffles


Apply Loctite to the retaining bolt

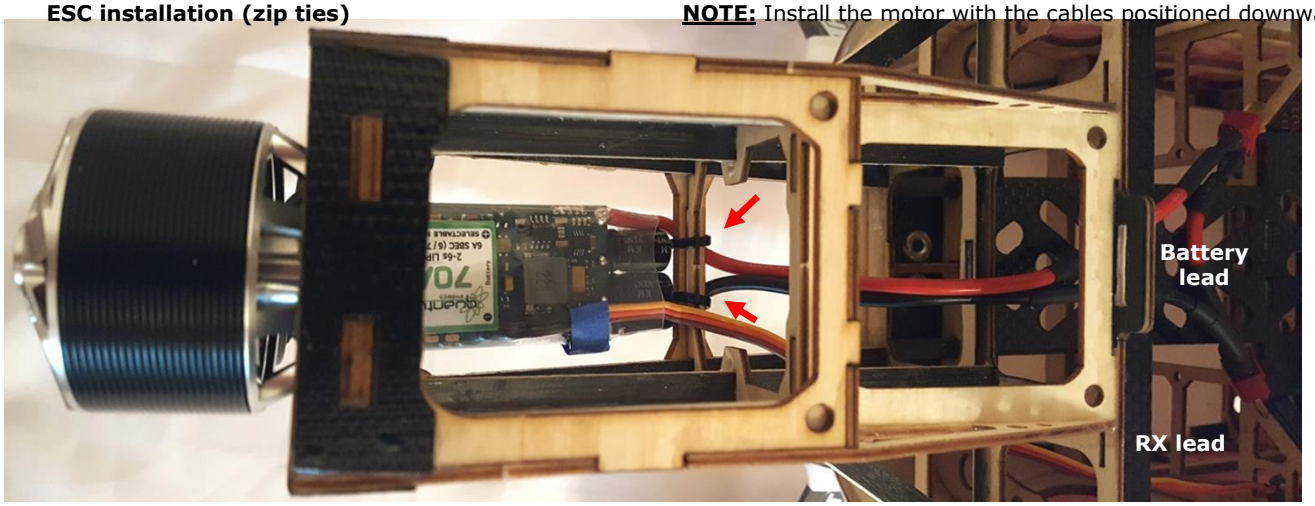

Bolts head must NOT protrude

Using CA, assemble the supplied balsa air baffles and glue them to the sides of the motor box to improve airflow to cool the motor/ESC/batteries.



ESC installation (zip ties)

NOTE: Install the motor with the cables positioned downwards

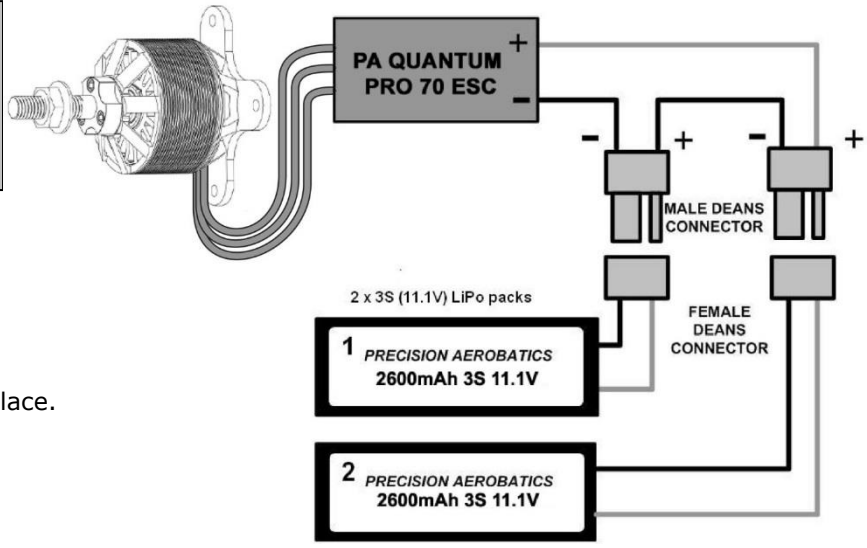


6S LiPo harness set up diagram

We strongly suggest to exclusively use US made original DEANS plugs and avoid using cheap copies/alternatives as these had proven to restrict current flow thereby degrading performance.

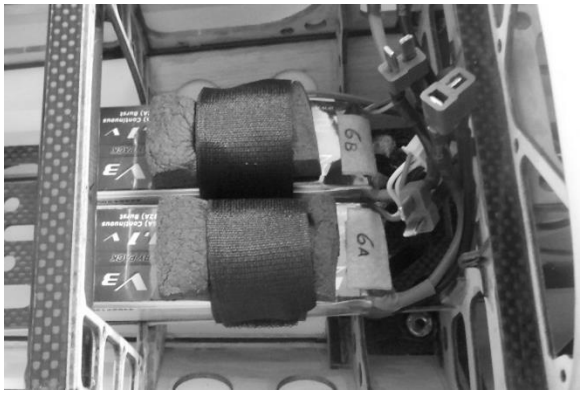
Note: Use the correct cable size for the harness. Do not use cables that are smaller in gauge to the ones installed on the ESC.

As a precaution you may place a small piece of masking tape over the BEC jumper to secure it in place.



Receiver and battery placement

It is important to properly route the RX aerial to avoid any RF noises.



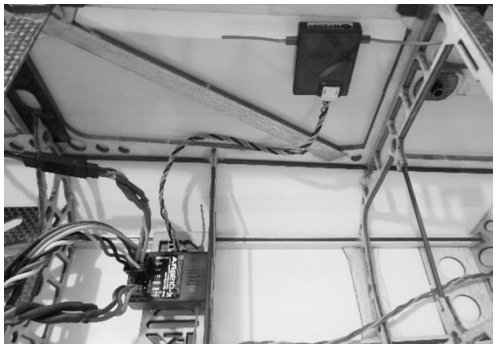
If conventional FM/PCM receiver is used, run the aerial a distance away from the servo leads and CF members along the outside bottom center of the fuselage towards the rear. Run the aerial in zigzag and not parallel to the servo leads.
Do not attempt to shorten your aerial or wind it in a coil as this reduces the effective range (Keep it fully extended). Use the installed Velcro or foamed double sided sticky tape to secure the RX on its tray. If you are using a 2.4GHz RX with twin receivers, mount the second RX away from the main RX at the inner side of the fuselage using rubberized or foam double sided sticky tape. Secure RX plugs well to avoid 2.4GHz reboots.

Note: Use only a high quality reliable receiver.

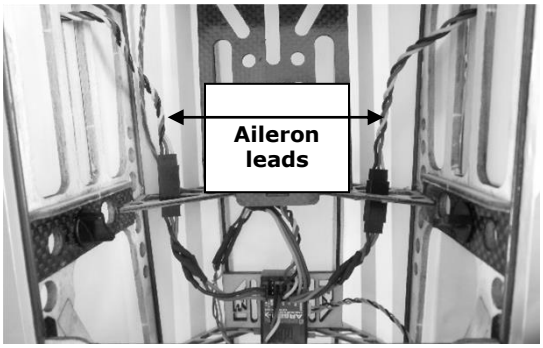
The batteries are held in place on the battery tray using the supplied Velcro straps (there are pre-cut slots in the battery tray to prevent the Velcro from sliding back and forward).To prevent the batteries from sliding on the CF tray you can stick a small piece of foamed double sided sticky tape underneath the battery and place a piece of rubber foam on the top of the battery, then wrap and fix it with the Velcro. To avoid the battery from sticking to the CF tray, "weaken" the adhesive by sticking some dust to it. If you are using a single 6s pack, you may place it on its side for easier adjustment due to its thickness/height.

Another two ways to prevent the battery from sliding would be: A. cut two pieces of Velcro (only from the rough/male type) and stick one underneath the pack and one on the tray itself. Then wrap and strap it down with the Velcro and foam as above. B. wrap a thick rubber band over your battery and continue as the above.
You may wish to trim the batteries wires to reduce weight.

Tip: Once you set up the exact CG per the manual, use a piece of sticky tape or a marker to mark the position of the batteries (rear end) as a reference point when swapping packs between flights.
Make sure the servo leads on the RX don't tangle with the Kevlar Pull-Pull wires. keep cables neat.



Spektrum 2.4GHz receiver installation

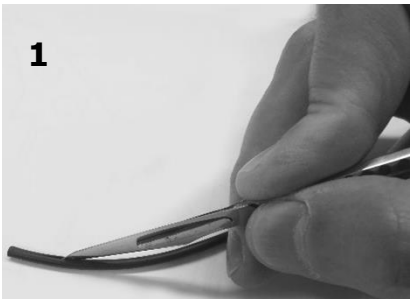


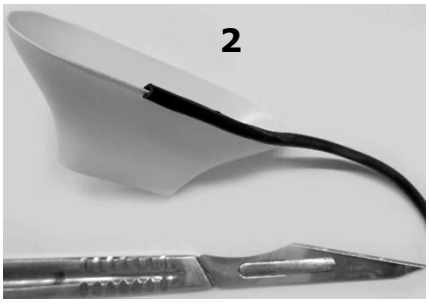
RX and ailerons' leads

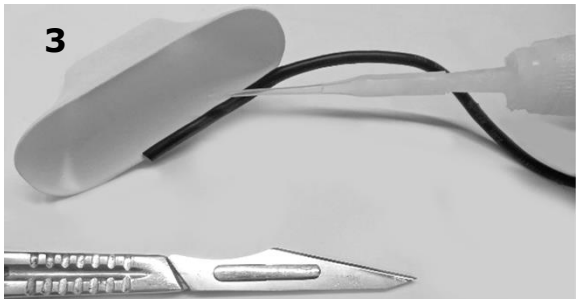
Thick double sided Sticky tape

Landing Gear (LG) cuffs

Using a sharp modeling knife on a solid surface, slit the supplied black tube to its entire length, then push it onto the top edge of the cuff all around (starting in the center of the inner side). Apply one drop of CA to secure it in and continue to tuck it in all around the lip.
Note: To prevent glue from running over the cuff, apply a drop of CA from the inside of the cuff.
Tip: before gluing the tube, test fit the LG cuff to the fuselage with the cowl on and see if it needs a bit of trimming to fit the natural shape of the fuselage and cowl leaving minimal gap.

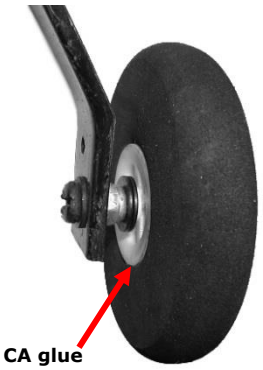






Landing Gear struts

before installing the wheels, fit the LG cuffs onto the struts and leave them loose for now (they will be installed at a later step)



Install each wheel onto the CF landing gear strut using the black M4x25mm bolt/axle in the pre-drilled hole. The order of hardware is: M4X25mm Bolt/M4 washer/CF strut /M4 lock nut /2x M4 washers /wheel/ M4 lock nut. The wheel should be captured between the washer and the lock nut tight enough to still allow free rotation of the wheel. If the nuts are too loose the wheel is likely to wobble and is more prone to damage or scuff the wheel pants. Verify that the tires are firmly glued to their rims. Apply a little bit of thin CA around the perimeter of the rims if required to keep them firmly in place. You may use some temporary Loctite on the outer nut to avoid it from fastening or loosening after time.

Wheel Pants

First, differentiate between the left and right hand side of the LG struts by placing them on the fuselage LG plate mounting holes. Position the fiberglass wheel pants over the wheel at the height you desire. If flying off grass, mount the pants higher leaving more wheel exposed and if flying on a sealed surface, the wheel pants can sit lower. Once satisfied with the position, mark the location for the self-tapping retention screw (2.3x10mm screw with soldered washer) of the wheel pant and drill, using a 1.5mm (1/16") bit. Attach the wheel pant to the landing gear strut using the self-tapping screw but DO NOT apply excessive force while doing so as this risks shearing the screw's head off. Rather "tap" the screw in gradually, if it becomes too tight remove it and enlarge the hole slightly. Take care that the wheel pants are both mounted at the same angle and height; we made a perfect recess to make it extremely easy for you. Remove the retaining screw and cut off its sharp edge so it will not hit the wheel, then apply a drop of thin CA glue into the hole to stiffen the thread. Once the glue has cured, install the wheel pants with the screws. **Note:** if the LG strut doesn't fit into the recess on the wheel pant then light filing of the strut sharp edges may needed.

Installing the Landing Gear

Install the LG onto the fuselage using M3x10mm black bolts and washers. You may apply Loctite to the bolts.
Note: if the LG struts hit the balsa on the sides of the fuselage, use a sharp modeling knife to trim the balsa keeping the gap with the LG to minimum.

Next, if desired, apply the supplied covering film to cover up the landing gear bay.
Tip: Trim the supplied covering to size with approximately 10mm overhang from the bulkhead and behind the landing gear bay. Fold the covering over the edge of the bulkhead and use the covering iron to tack it down. Gently pull the covering at the rear of the bay taut and proceed to tack it down. Once satisfied, seal the edges and carefully shrink the remaining wrinkles.

M3x10mm Mounting bolts

Mount the LG

Apply covering

Cowling Attachment

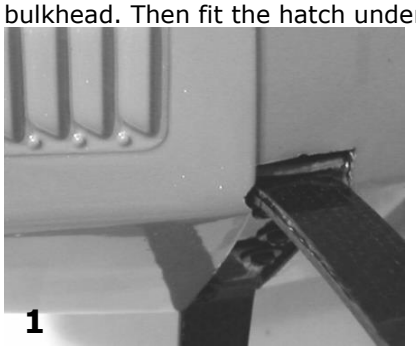
The fiberglass cowl is attached using four self-tapping screws (2.3x10mm with soldered washer) screwed into the carbon fiber mounting lugs. The cowl should fit all the way in touching the motor box mounting plate so that there is approximately 3-4mm of overlap past the fuselage front bulkhead (over the hatch). The bottom side of the cowl may require two notches to be sanded or filed in to clear the landing gear struts.

Start by temporarily fitting the cowl in and mark the locations of the landing gear struts IF they obstruct the fit. Remove the cowl and carefully file or grind the notches until the struts no longer obstruct the fitting of the cowl. Prior to fitting the cowl it is required to install the motor, prop adapter and to have the hatch fitted to the fuselage. Once cowl is fitted install the spinner backplate and align it perfectly with the cowl front ring (photo #4). This ensures that the location of the cowl could be adjusted for a precise fit.

Mark the center of the mounting tabs onto pieces of masking tape as shown in photo #2, peel the tape partially back and fit the cowl.

The cowl must be fitted so that when looking from the front, the motor shaft will protrude through the cowl exactly at the center of the opening with a slight friction free gap between the spinner backplate and the front of the cowl. Press down on the top rear section of the cowl to minimize the gap between the hatch and the cowl. Align the painted cowl with the fuselage color scheme on both sides. When you are happy with the fit, hold the cowl firmly in place using tape and lay the pieces of tape you marked previously back onto the cowl. These markings identify the location of the mounting lugs underneath the cowl, allowing you to drill, using a 1.5mm (1/16") drill bit, through the cowl and into the mounting lugs. After drilling, remove the cowl and screw the four 2.3X10mm self-tapping screws into the drilled holes in the same manner you did with the wheel pants. You may remove the screws and apply a drop of thin CA into each of the holes to set the thread. Once the CA cured reinstall the cowl.

Tip: It is easier to fit the cowl first with the hatch off as it allows you to push the upper cowl surface over the front bulkhead. Then fit the hatch under the cowl overlap, adjust and continue the procedure of final installation of the cowl.



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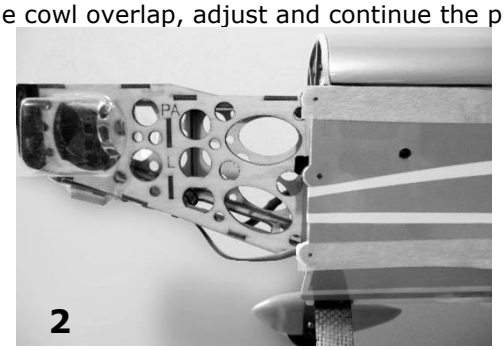

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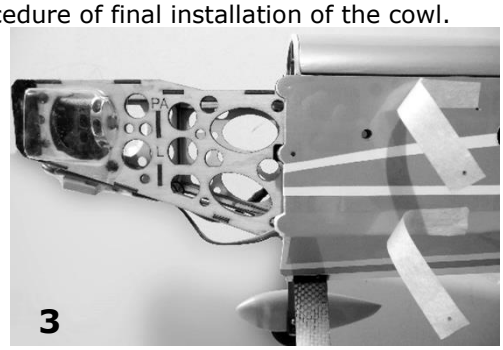

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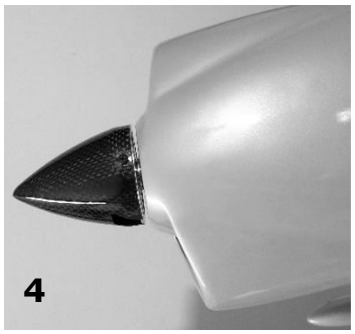
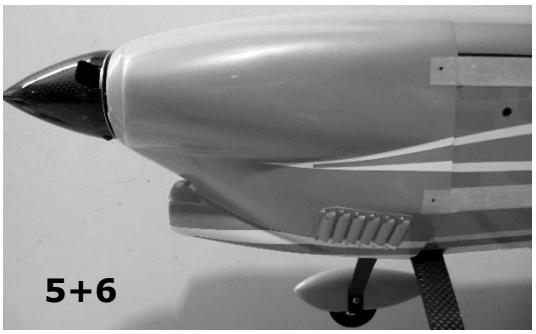
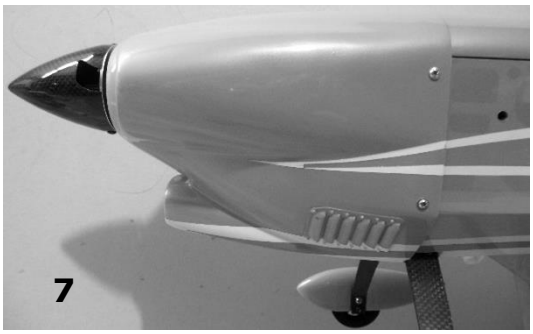
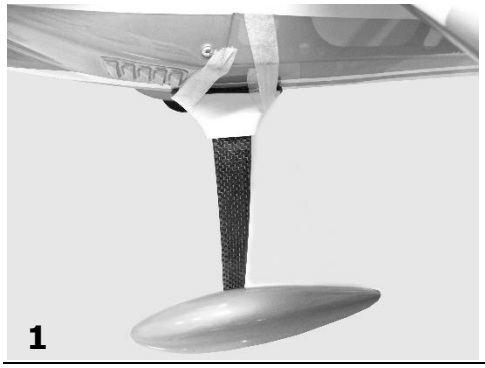
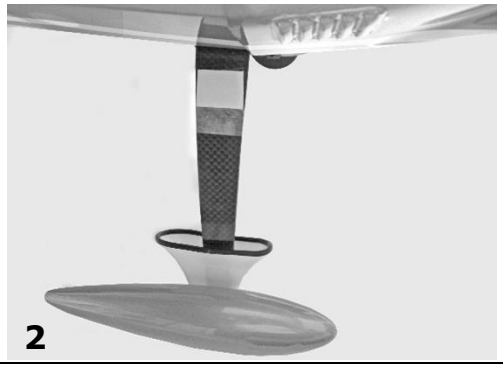


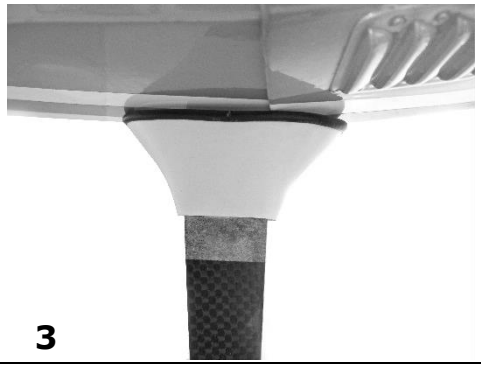




Press the cuff against the fuselage minimizing the gap and mark the lower end of the cuff on the LG strut with a small piece of sticky tape. Then stick a thick foamed double sided sticky tape from your mark up and press the cuff against it while minimizing any gap between the cuff and fuselage. Do the same with the other cuff.







Propeller, spinner and prop adapter installation

At this stage mount the propeller and if you are using a spinner, mount the cone as well. We recommend using the pre-cut 2.17" lightweight PA Carbon Fiber spinner (PA code # AC-2219) that perfectly matches the XR-61 cowl shape, to retain optimum CG and avoid carrying unnecessary weight. You can temporarily place a spacer in between the backplate and the cowl to get a minimal gap while fastening the prop adaptor.

If while fastening the prop adaptor the spinner backplate slips and you find it hard to firmly fasten it, follow this installation method: fit the spinner backplate and adjust the proper gap with the cowl front ring followed with a light fastening of the prop nut (no need to align the propeller on the backplate yet). Then remove the backplate and firmly fasten the nut on the prop. That will fix the adaptor on the motor shaft firmly. Lastly, unscrew the nut, fit the backplate, align the propeller on the backplate and then fasten the prop nut. This reduces the likelihood of a spinner flying off at full power due to loose installation.

Caution-Wood propellers require that the nut be retightened after the first few flights. Failing to do so may result in loss of propeller during flight.

Note: It is important to accurately balance your propeller prior to installation as poorly balanced propellers are inefficient and cause vibrations which are detrimental to your model and motor. Use only propellers that are adequately sized to be within the specified limits of your motor.

APC propellers are not recommended for the XR-61 due to the higher amps drawn and vibration which can lead to a motorbox failure.

If your CF spinner cone wobbles while spinning, it is more likely that the cone is not sitting flush with the backplate. There are a few potential causes for that:

1. The mounting bolts compromise the flush fit. In this case, use a fine rounded file to slightly file the holes in an oval shape towards the front of the cone. Filing towards the rear will weaken the cone.
2. The prop blades openings are undersized, therefore, hit the blades. Enlarge the openings with a file to allow an even gap around the propeller.

If the above were done and the cone still wobbles, unfasten the bolts and rotate the cone 180 degrees and fasten it. for a fine adjustment you may unfasten one bolt, counter adjust the cone and re-fasten.

Wing Attachment

Note: Due to the manufacturing tolerance of the CF wing tube and sleeves, you may experience a tight fit with difficulty sliding the wing onto the wing tube. Tight fit may create a bit of a gap between the wing root and the fuselage. In a case of a tight fit slightly sand the CF wing tube with fine sandpaper, wipe off the carbon dust using a wet paper towel and test fit again. Repeat this process until you obtain a perfect fit.
Do not attempt to force the wings onto the wing tube as this may cause damage.

The wings must initially be installed in this sequence: First insert the CF wing tube all the way into the sleeve of one wing panel until it reaches the stopper. Next fit the wing to the fuselage, taking care to align the CF anti-rotation pins when about to insert them into the fuselage. If resistance is felt, do not attempt to force the pins in. Instead, remove the wing and lightly sand the ends of the anti-rotation pins (taper them). Avoid enlarging the receptacle holes in the fuselage as loose fit may result in incorrect wing incidence.

Due to the large size of the wing roots you may need to wobble the wing panel, in order to fit the two anti rotation pins into the fuselage. if after you fit one wing panel the anti rotation pins of the other panel would not align easily, remove the wing panel and install the other wing panel first.

Prior to installing the nylon wing bolt, dip the tip of the bolt into some silicone grease to add lubrication (otherwise the bolt may have tight fit and could sheer off if excessive force is exerted). If, for any reason the bolt still feels tight to fit, do not force as there could be dirt or corrosion build up on the threads of the blind nut. Instead, remove the bolt and insert a 4.0mm metal bolt to "clear" the blind nut threads. Secure the wing in place with the nylon wing bolt but don't over tighten the bolt and take care not to cross thread the bolt.

Next install the other wing panel onto the CF wing tube. If for the reasons below (*) there is a gap between the wing and the fuselage, remove the wing and carefully sand short one end of the CF tube slightly and refit the wing. Do not attempt to force the wing onto the wing tube. Secure the wing in place with the other nylon wing bolt.
Note: If the wing panels have a tight fit over the wing tube then chances are high for a gap between the wing roots and the fuselage. If so lightly sand down the wing tube to allow an easy fit which will correct it.

(*) A few factors need to be taken into account when inspecting a gap at the wing root. Firstly, weather-related-shrinkage of the wood and the covering may cause a gap that is unavoidable. Secondly the XR-61 has a very long wing root, and as such production tolerance allows for some gap to be present.
If a gap is present simply follow the step above and sand down the wing tube to improve the fitting.

Center of Gravity (CG)

We designed the XR-61 with a very narrow CG range to attain the best flying performance. Using the iPAs® setup we have listed, you should end up with a center of gravity very close to the ideal position. Fine adjustments should be made by sliding the batteries fore or aft on the battery tray. It is **very important**, regardless of chosen setup, to check your model's center of gravity as accurately as possible as it will dramatically affect your XR-61 flight performance. Take your time to do it right.

The CG range is 126-129mm measured aft from the leading edge at the wing root. However, this plane performs at its best with a CG of 128.5mm and with the optional CF Vortex Generators installed (PA Item code # AC-2294). CG of 126mm is more for sport/IMAC flying or in windy condition.

NOTE - The XR-61 is an excellent high speed precision aerobatics and 3D performer; therefore, in order to achieve the best of both worlds we spent many hours testing the CG to find the "sweet spot" that offers a peak in overall performance. We found the **128.5mm** CG with the optional Vortex Generators installed to be the fine line which allows a good blend of both precision and 3D. With this CG the plane is neutral and axial so no KE mixing is needed. If you find the plane too neutral for you or it's a windy day, you may choose to set it at 126mm as it offers a better wind penetration in windier condition and will feel like it "flies on rails". Once you get used to the plane try the 128.5mm to get better overall performance.

Tip: Multiplex CG gauge is highly recommended to obtain an accurate set-up (PA item code# MPX693054). Make sure to use a small level gauge to level the tail while checking the CG (remove it before taking the read making sure the tail remains in the same position). Any small deviation of the CG will **greatly** affect the flight performance! Note- Plane should be placed upright with ALL the gear installed including wheel pants, hatch, prop and spinner while setting up the CG.

NOTE: EVERY new gear must be tested on the bench/ground before take off with no exceptions. Check servos and linkages for proper movement at the same time.

Transmitter Setup

As precaution, remove **all servo arms and propeller prior to initially powering up your radio system.** This prevents servos that may be initially reversed or off center to rotate beyond the control surface's deflection angles and motor to accidentally start up. Once powered up reset servos to neutral and reinstall the servo arms. Move TX sticks to verify that the control surfaces are moving in the intended directions and if not reverse rotation via the TX.

With all the channels verified, adjust the sub-trim to obtain the neutral position for all control surfaces. If you have followed the control linkage set up in the earlier sections, the sub-trims will be very minimal. Adjust the servos travel to ensure none of the servos are over traveling causing binding in the linkages.
Note that binding linkages will overload the servos which will overheat the BEC and risk a possible shutdown.

Control Setup

Using the supplied deflection gauge, we suggest setting up your control surfaces deflection in accordance with the following table. Use these as a starting point and adjust them to suit your personal flying preferences.

All the figures in this table are approximated		
Control surface	**High rates**	**Low rates**
Ailerons	Approx 45°-50° Up and Down Expo: 70%	12° Up and Down Expo: 30%
Rudder	Left and Right (maximum) Expo: 70%	25° Left and Right Expo: 35%
Elevator	approx 50°-55° Up and Down Expo: 70%	12° Up and Down Expo: 35%

Optional Spoilerons: Set 10°-12° of UP and Down ailerons deflection on a 3 position switch such as F. Mode switch. The center position of the switch is where the ailerons are neutral/0°. Upward deflection of the ailerons, in accordance to the plane's position, (i.e. Spoilerons) will allow faster descending "Elevators", spins and slower high AOA harriers. Spoilerons were great for elevators and harriers since they allowed higher propeller rpm which kept the plane more flat (during the elevator) and made high AOA harriers slower and more stable.

Initial Flight timer settings

Unlike older lithium polymer (LiPo) packs where a drop of performance is usually noticed at the last quarter of the flight warning the modeler to land, PA newer high discharge lithium polymer packs have the ability to sustain a higher and constant voltage which results in consistent performance throughout the flight until LVC (Low Voltage Cutoff) is being activated.
As such there may be instances that a modeler may accidentally prolong the landing and experience an unwanted LVC or in the long term, encounter battery damage due to over discharging, therefore, we recommend setting the flight timer as a matter of good practice. As flying style affects current consumption and flight duration may vary from one modeler to another, we suggest to initially set your flight timer at a very conservative setting. Then gradually adjust the flight duration after analyzing the battery capacity consumption over the next few consecutive flights. The mAh consumption can be observed via your fast digital charger.

If using our recommended iPAs® setup you may start by setting up your TX timer to 5:00 minutes and adjust it as explained above. Typically you can expect anywhere between 6-7minutes of flight duration.

THE Maiden flight! It is vital that you choose a proper day for the maiden flight. The combination being nervous flying a new plane along with the fact you are not familiar with the plane can lead to mishaps. Choose a good calm non-gusty day (about 0-8 knots wind). It may be early morning or late evening. It is vital to do some good bench tests (outdoor) pointing the propeller away from you or anybody around and yank the throttle from min to max power a few times. That is a harsh test that will apply a lot of loads but will verify the prop adaptor is firmly installed (otherwise it may fly off) and that the gear is working properly and propeller is balanced (no vibrations!!).

Check servos and linkages for proper movement before take off. Our test flights showed, at the higher average, current consumption of 265mAh/per minute.

Applying the Decals

As a final touch decorate your XR-61 using the supplied PA stickers. Use the following photos as a guide.

Apply the white/grey stickers on the cowl to match the fuselage trim

Apply the supplied white/grey stickers on both sides of the cowling to match the fuselage trim

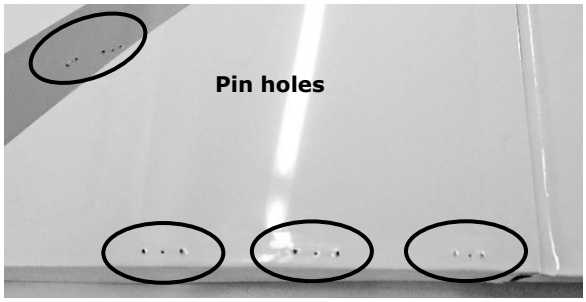
Carbon Fiber Vortex Generators installation

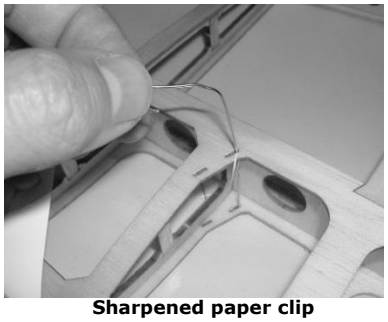
If you purchased the optional CF Vortex Generators (PA Item code # AC-2294) designed for the XR-61, now you can install them. The CNC machined CF Vortex Generators will enhance your XR-61 flight characteristics in slow high AOA flight, 3D and Knife Edge tracking and will add the funky look to your plane. We highly recommend them to complete the aerodynamic design of the XR-61 in order the get the best performance. More info about the VGs can be found on www.PrecisionAerobatics.com
The installation of the Vortex Generators (VGs) is very simple since the slots are pre cut. However, since the top side covering is solid it requires a certain technique as follows:

1- Start by placing the wing up side down (translucent covering facing up) on a flat protected surface to avoid scratches to the covering.
2- Using a heated paperclip or a sharp modelling knife reveal the pre cut slots on the bottom side of the wing (translucent covering). One VG slots falls over the white trim which will require a bit of guesstimation.
3- Use a sharp long pin or a sharpened paper clip to pierce the upper slots through the bottom side slots that you just revealed. Pierce three to four holes through the entire length of each slot. Since this is done through the translucent covering it is very easy to pierce at the correct location of the slots without causing any cosmetic damage. Flip the wing to its other side (solid covering facing up). Now looking at the pin holes you've pierced you can see the exact locations of the slots. Reveal the slots completely using a heated paperclip or a modelling knife.
4- Roughen the gluing tabs of all the VGs using a fine file or sand paper similar to what you've done previously with the control horns.
5- Perform a dry test fit of the VGs into the slots and if you find a very tight fit DO NOT force them in as you may damage the balsa sheeting. Instead, do one of the two things: 1 – you may slightly sand down the tabs to be thinner or 2- use a sharp modelling knife to slightly enlarge the slots. Do this with great care not to damage.
6- Once you are satisfied with the fit remove them and apply a layer of 30 minutes epoxy over the tabs (both sides) and inside each slot. Make sure the entire base of the VGs is covered with epoxy and once fitted in leave a bit of epoxy excess which will create a solid base and seal the gap with the wing skin. Make sure to push them all the way in so no gap is present.
7- Now verify from the front of the leading edge that each VG is perfectly perpendicular to the wing surface (90 degrees) and if not use a sticky tape (preferable paper-sticky tape) to correct the angle into a perfect 90 degrees and let it set before removing the tape.

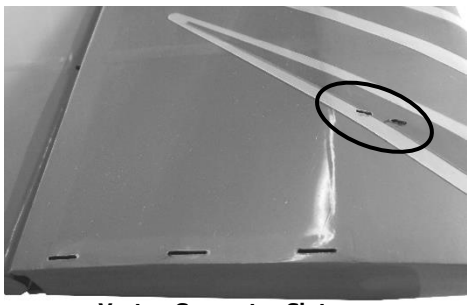
DO NOT use CA as it is not forgiving and will not allow you enough time to fit the VGs properly and verify their angle. CA may set before the VGs are fitted all the way in which means a permanent damage. It will also not seal the gap and may cause some stains in the covering surface.

Following the steps in this sequence is a guaranteed method to success!

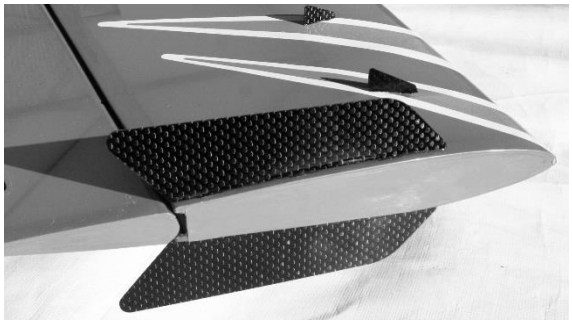


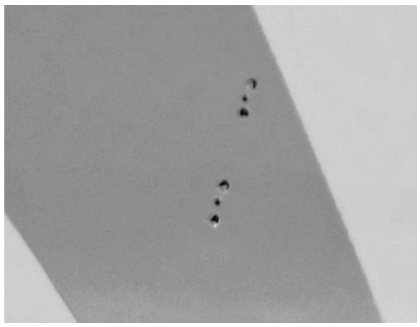


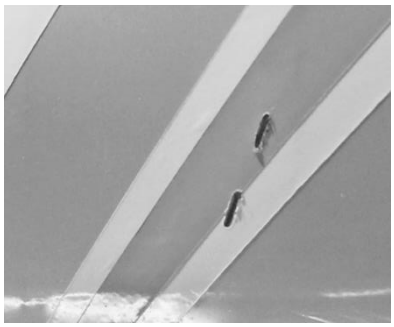
Sharpened paper clip



Vortex Generator Slots



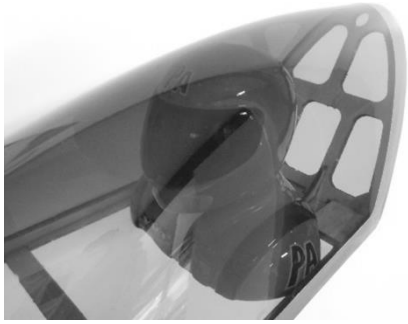


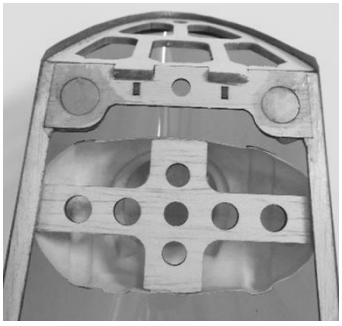


Note: Keep plane under cover and away from direct sunlight when not flown. That is to avoid the covering from fading, damage to canopy, wrinkles and warp of parts. Do not keep it in the car or garage as temperature rises affect the plane.

Optional - pilot installation

PA pilot (item # AC-2148)





To install the pilot, apply stickers if you wish to, then take the supplied balsa cross and sand its ends to a perfect fit. Apply a few drops of CA to glue it in place then test fit the pilot in the hatch. Place it over the hatch base and once satisfied with the position, apply a few drops of CA to fix it in place.
Tip: to avoid glue running over the plastic canopy, keep the hatch more upright while applying the glue and you may use medium CA instead of thin.

XR-61 Replacement parts list

We believe that you will enjoy your XR-61 for a very long time. In the event of inevitable mishaps and broken parts, all you need to do is to order replacement spare parts to restore your XR-61 and be back in the air.

AC-2224	XR-61 CF main landing gear	AC-2198	Pair of thumb wing bolts (2pc)
AC-2125	XR-61 Tail wheel assembly inc. tail wheel	AC-2199	Pack of 4 metal clevises
AC-2289	XR-61 Tinted canopy/hatch	AC-2241	Pack of 4 German made ball links
AC-2290	XR-61 Fiberglass cowl with CF reinforcement	AC-2307	XR-61 pushrods pack (CF rods only)
AC-2128	XR-61 Fiberglass wheel pants set	AC-2306	XR-61 landing gear cuffs
AC-2130	XR-61 Carbon fiber wheel pants set	AC-2308	XR-61 pull pull set with Kevlar wire
AC-2291	XR-61 Carbon fiber wing tube	AC-1915	Green translucent Covering 60cmx200cm
AC-2131	XR-61 Pair of wheels w/ wheel axles	AC-1651	Red translucent covering 60x200cm roll
AC-2292	XR-61 Motor mount with CF lockers	AC-1660	Blue translucent covering 60x200cm roll
AC-2293	XR-61 CNC machined CF control horns - set of 4pc	AC-1654	White cover 60x200cm roll
AC-2294	XR-61 vortex generators (20pc set)	AC-1657	Metallic blue covering 60x200cm roll
AC-2295	XR-61 custom made wing bags set	AC-2134	Metallic green covering 60x200cm roll
AC-2300	XR-61 Tail Feathers	AC-2024	Solid red covering 60x200cm roll
AC-2296	XR-61 right wing (pilot view)	AC-2305	XR-61 carbon fiber servo arms - set of 4pc
AC-2297	XR-61 left wing (pilot view)	AC-2219	Carbon fiber 2.17" Ultimate Style pre cut spinner
AC-2298	XR-61 wings set	AC-2303	XR-61 Bling package
AC-2299	XR-61 fuselage (canopy included)	AC-2302-M	XR-61 iPAs Power Minus airframe

Optional Extras

Carbon fiber micro long servo arms for perfect linkage geometry.
(PA Item # AC-2346)

Set of 4 Carbon Fiber servo arms specifically designed to achieve full control surface movement required for 3D flights with the correct linkage geometry to fit the XR-61. Incredibly light weight and accurately CNC machined in our facility. Snap installation - No glue required
Hardware and instruction are included.

PA Carbon Fiber 2.17" Ultimate Style CNC machined pre cut spinner
(PA Item # AC-2219)

PA 2.17" Carbon Fiber spinner is a perfect match to your XR-61. The combination of precision CNC machined Aluminum back plate and our German made precision prop adapter allows true spinning without motor's performance deterioration.

This Carbon fiber spinner is incredibly lightweight and has a beautiful shiny finish.

Note that the prop adapter is not included with the spinner. We DO NOT recommend using a poor quality prop adapter, such as those supplied with most motors available on the market. Poor machining results in un-centered spinning and excessive vibrations which will affect the motor efficiency and performance, and may in the long run cause damage to the spinner cone and wear out your motor's ball bearings.

All spinners are tested in our facility (using our German made prop adaptor) to verify they spin centered and true before shipped.

XR-61 carbon fiber wheel pants set (PA Item # AC-2130)
It is recommended to get a set of CF wheel pants as a spare set so after many happy landings you'll be able to upgrade the fiberglass wheel pants to the carbon fiber ones. the CF wheel pants are stronger and generally will last longer than the stock fiberglass pants.

XR-61 custom made wing bags set (PA Item # AC-2295)
A real must for carrying the XR-61 wings (especially when you have the vortex generators installed). Made of strong canvas and padded with thick foam to protect your wings in transport.

Take advantage on the great discount in our **Bling package** including spinner, Vortex generators (complete set), CF wheel pants and custom made wing bags at **HUGE discount**! (**PA Item # AC-2303**)

Vox Electric Prop quiver bag (PA item code AC-2160)
Vox propellers offers a high quality double padded propeller quiver bag, made of strong durable canvas on the outside and smooth fabric on the inside. The Vox quiver bag is closed from all sides so the propellers cannot slip out by mistake, yet you can easily insert and remove them, and is comfortable to carry. The bag holds 8 propellers up to 16" in length and is sold for only $14.95

Official Academy of Model Aeronautics National Model Aircraft Safety Code

1. A model aircraft shall be defined as a non-human-carrying device capable of sustained flight in the atmosphere. It shall not exceed limitations established in this code and is intended to be used exclusively for recreational or competition activity.
2. The maximum takeoff weight of a model aircraft, including fuel, is 55 pounds, except for those flown under the AMA Experimental Aircraft Rules.
3. I will abide by this Safety Code and all rules established for the flying site use. I will not willfully fly my model aircraft in a reckless and/or dangerous manner.
4. I will not fly my model aircraft in sanctioned events, air shows, or model demonstrations until it has been proven airworthy.
5. I will not fly my model aircraft higher than approximately 400 feet above ground level, when within three (3) miles of an airport without notifying the airport operator. I will yield the right-of-way and avoid flying in the proximity of full-scale aircraft, utilizing a spotter when appropriate.
6. I will not fly my model aircraft unless it is identified with my name and address, or AMA number, inside or affixed to the outside of the model aircraft. This does not apply to model aircraft flown indoors.
7. I will not operate model aircraft with metal-blade propellers or with gaseous boosts (other than air), nor will I operate model aircraft with fuels containing tetranitromethane or hydrazine.
8. I will not operate model aircraft carrying pyrotechnic devices which explode burn, or propel a projectile of any kind. Exceptions include Free Flight fuses or devices that burn producing smoke and are securely attached to the model aircraft during flight. Rocket motors up to a G-series size may be used, provided they remain firmly attached to the model aircraft during flight. Model rockets may be flown in accordance with the National Model Rocketry Safety Code; however, they may not be launched from model aircraft. Officially designated AMA Air Show Teams (AST) are authorized to use devices and practices as defined within the Air Show Advisory Committee Document.
9. I will not operate my model aircraft while under the influence of alcohol or within eight (8) hours of having consumed alcohol.
10. I will not operate my model aircraft while using any drug which could adversely affect my ability to safely control my model aircraft.
11. Children under six (6) years old are only allowed on a flightline or in a flight area as a pilot or while under flight instruction.
12. I will have completed a successful radio equipment ground-range check before the first flight of a new or repaired model aircraft.
13. I will not fly my model aircraft in the presence of spectators until I become a proficient flier, unless assisted by an experienced pilot. At all flying sites a line must be established, in front of which all flying takes place.
14. Only personnel associated with flying the model aircraft are allowed at or in front of the line. In the case of airshows demonstrations straight line must be established. An area away from the line must be maintained for spectators. Intentional flying behind the line is prohibited.
15. I will operate my model aircraft using only radio-control frequencies currently allowed by the Federal Communications Commission (FCC). Only individuals properly licensed by the FCC are authorized to operate equipment on Amateur Band frequencies.
16. I will not knowingly operate my model aircraft within three (3) miles of any preexisting flying site with out a frequency-management agreement. A frequency-management agreement may be an allocation of frequencies for each site, a day-use agreement between sites, or testing which determines that no interference exists. A frequency-management agreement may exist between two or more AMA chartered clubs, AMA clubs and individual AMA members, or individual AMA members. Frequency-management agreements, including an interference test report if the agreement indicates no interference exists, will be signed by all parties and copies provided to AMA Headquarters.
17. With the exception of events flown under official AMA rules, no powered model may be flown outdoors closer than 25 feet to any individual, except for the pilot and located at the flightline.
18. Under no circumstances may a pilot or other person touch a model aircraft in flight while it is still under power, except to divert it from striking an individual.
19. Radio-controlled night flying is limited to low-performance model aircraft (less than 100 mph). The model aircraft must be equipped with a lighting system which clearly defines the aircraft's attitude and direction at all times.
20. The operator of a radio-controlled model aircraft shall control it during the entire flight, maintaining visual contact without enhancement other than by corrective lenses that are prescribed for the pilot. No model aircraft shall be equipped with devices which allow it to be flown to a selected location which is beyond the visual range of the pilot or any device.
21. All model flying shall be conducted in a manner to avoid over flight of unprotected people. safety or lines excluding takeoff and landing, the pilot's helper(s)