EDGE 540

2.3m

All Composite Aerobatic Model

Instruction Manual

www.carf-models.com

DRAFT (Dec. 2012)

Accessories

This list will help you chose the main additional items needed to finish your Composite ARF Extra 330SC 2.3m
Some of the recommendations are strongly recommended and some easily chosen by you. The items we list here are highly recommended by C-ARF, and have been tested on various prototype aircraft used during the development of this aeroplane.

1. Servos (minimum 6 high quality servos) All the main control surfaces require a minimum 15kg digital servo such as the JR 8511/8711 metal geared servos. The prototype models used JR 8711 or MT80 Brushless 25kg servos. CARF would recommend servos over 20kg torque on the main controls.
2. Heavy duty servo metal servo arms are recommended, most servo manufacturers either offer arms like the JR items shown, or there are several after-market items available including the SWB items.
3. A receiver power supply system like the excellent Powerbox units is recommended, using two separate batteries through separate regulators. A 50-60cc model like this requires a regulator capacity above 10A.
4. Powerunit. The Edge 540 was primarily designed around the Desert Aircraft DA 60 petrol engine. The motor dome design is based on the DA-60 backplate and the four fixing points are factory fitted with T nuts. The motor dome will still allow various other engines to be installed with minor modifications to the mounting plate, but we strongly recommend the DA 60 for reliability and power. A mini pipe #910080 TD75 Canister set and full pipe option #910090 RE2 Tuned Pipe set have been designed around the DA 60 Extra 330/Edge 540 2.3 making installation straight forward. There is limited space under the wing tube, so any system chosen All items are available from CARF. An in cowl Pitts style muffler would be another option, if available for your chosen engine.
5. The Edge 540 cowling fixings have been factory completed, with captive nuts installed in the motor dome and holes drilled in the cowling halves, all reduce assembly time. The motor box design will allow various muffler options to be installed. We recommend our MTW muffler sets. Space under the wing spar tube is restricted, so if you go your own route check for clearance first.
6. A purpose produced composite, aluminium backed spinner is available from CARF-models.com part No 811100 is white, 811101 is Red, 811102 is Yellow, 811103 is Silver.
7. Fuel Tank. You will require a fuel tank suitable for petrol, we use a Dubro tank between 750 and 950cc (24-32oz). Use Tygon yellow tubing for all fuel connections.
8. A radio system with a minimum of 6 channels is needed, but C-ARF recommend using a quality radio system with mixing options allowing the

very best to be gained from your Extra 300SC. (talk to your C-ARF rep for advice on a suitable system)

9. High quality extension leads are required, if soldering wires individually is not an option for you.
10. Quality 102-104mm wheels are required, we recommend Dubro or Sullivan Skylite.
11. Light weight Tail Wheel assembly, like 801000 available from CARF-Models is required.

Supplementary Safety Notes

Pre-flight checking:
Before every session check that all the model's working systems function correctly, and be sure to carry out a range check.

The first time you fly any new model aircraft we strongly recommend that you enlist the help of an experienced modeller to help you check the model and offer advice while you are flying. He should be capable of detecting potential weak points and errors.

Be certain to keep to the recommended CG position and control surface travels. If adjustments are required, carry them out before operating the model.

Be aware of any instructions and warnings of other manufacturers, whose product(s) you use to fly this particular aircraft, especially engines and radio equipment.

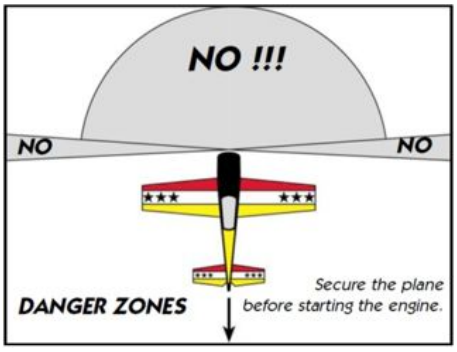
Please don't ignore our warnings, or those provided by other manufacturers. They refer to things and processes which, if ignored, could result in permanent damage or fatal injury.

Attention !

This IMAC-Aircraft is a high-end product and can create an enormous risk for both pilot and spectators, if not handled with care, and used according to the instructions. Make sure that you operate your Extra according to the AMA rules, or those laws and regulations governing the model flying in the country of use.

The engine, servos and control surfaces have to be attached properly. Please use only the recommended engines, servos, propellers, and accessories supplied in the kit.

Make sure that the 'Centre of Gravity' is located in the recommended place. Use the nose heavy end of the CG range for your first flights, before you start moving the CG back to a more critical position for 3D-maneouvers. If you find that you need to relocate your batteries or even add weight in



the aircraft to move the CG to the recommended position, please do so and don't try to save weight or hassle. A tail heavy plane, in a first flight, can be an enormous danger for you and all spectators. Fix any weights, and heavy items like batteries, very securely to the plane.

Make sure that the plane is secured properly when you start the engine. Have at least 2 helpers hold your plane from the tail end, or from behind the wing tips, before you start the engine. Make sure that all spectators are behind, or far in front, of the aircraft when running up the engine.

Make sure that you range check your R/C system thoroughly before the first flight. It is absolutely necessary to range check your complete R/C installation first WITHOUT the engine running. Leave the transmitter antenna retracted, and check the distance you can walk before 'fail-safe' occurs.

Then start up the engine, run it at about half throttle and repeat this range check with the engine running. Make sure that there is no range reduction before 'fail-safe' occurs. Only then make the 1st flight. If you feel that the range with engine running is less then with the engine off, please contact the radio supplier and the engine manufacturer and DON'T FLY at that time.

Check for vibrations through the whole throttle range. The engine should run smoothly with no unusual vibration. If you think that there are any excessive vibrations at any engine rpm's, DON'T FLY at this time and check your engine, spinner and propeller for proper balancing. The lightweight sandwich composite parts don't like too much vibration and they can suffer damage. The low mass of all the parts results in a low physical inertia, so that any excess vibrations can affect the servos and linkages.

Make sure that your main and stab tubes are not damaged. Check that the front and rear antirotation pins for the wings and horizontal stabiliser are located correctly in their holes, and are not loose. Check that the 4 plastic wing retaining nuts are tight, that the M3 bolts retaining the horizontal stablisers on to the aluminium tube are installed and tight, and that the hinge wires for the rudder and elevators cannot come out.

If you carefully checked all the points above and followed our advice exactly, you will have a safe and successful first flight - and many hours of pleasure with your CARF-Models Extra 330SC.

General informations

Our tried and tested, painted in the mould, composite vacuum-bagged sandwich construction method has set the standards for many years now. The process has been mastered by our workers to give the most consistent models, that fly straight and stay straight. The strength is guaranteed and aerodynamics checked. The process of painted in the mould does leave a few down sides, the seams are visible and with negative painting, perfect edges sometimes do not happen. For a 100% perfect finish, painting outside the mould, with filled seams and thicker paint is the only option, with the down side of increased weight and more labour cost, even stepped edges.

The full beauty of each paint job cannot be experienced until the model receives its first coats of wax polish. This removes mould release residual marks, it also protects the model from construction gluing accidents. Great care in handling the model is required as the skin can be marked by tools and hard objects. We supply wing and tail bags as standard to protect the finish during transport.

Our latest series of 2.3m aerobatic models are the most prefabricated kits we have ever produced. Most of the time consuming jobs are now factory completed, like canopy frame fitting, undercarriage fixings, cowl and motor dome fixings. These added to the now standard control horn and pre hinged surfaces make for a speedy assembly with the minimum of specialist tools.

A good quality epoxy adhesive will be required for the few bonding jobs left. Hysol or ZAP epoxy glues are recommended. Some CA glues are a useful addition too, particularly for tacking parts in place. A selection of drills, Allen keys, large Phillips Screwdriver and spanners will be required.

Before starting any construction work, it is good practice to assemble the model to check the basic fit of all parts. It is also worth noting that to achieve the recommended balance point, everything should be kept forward in the model, mount batteries around the motor dome area and keep anything fitted at the rear as light as possible.

For any composite drilling, cutting or filing we recommend you wear a suitable face mask and eye protection. Handling epoxy adhesives requires care and you should follow the manufacturer recommendations with any chemical products handled.

You have acquired a kit, which can be assembled into a fully working R/C model, when fitted out with suitable accessories as described in the instruction manual. However, as manufacturers, we are unable to influence the way you build and operate your model and we have no control over the methods you use to install, operate and maintain the radio control system components used. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect application and operation of our products. Unless otherwise prescribed by law, the obligation of the CARF models to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages. In all circumstances our total liability is limited to the amount which you actually paid for this model.

BY OPERATING THIS MODEL YOU ASSUME FULL RESPONSIBILITY FOR YOUR ACTIONS.

It is important to understand that CARF-Models.com is unable to monitor whether you follow the instructions contained in this instruction manual regarding the construction, operation and maintenance of the aircraft, nor whether you install and use the chosen radio control system correctly. For this reason CARF-Models are unable to guarantee to any individual or company that the model you have made will function correctly and safely.

You, as the operator must ensure safe operation, though checks before every flight.

This manual will guide you in detail how to get from the stage of the first photo below to the stage of the second. This process, however, should not take you much more than 25-30 hours of enjoyable modeling time. A small, clean workshop with mostly standard tools is going to be sufficient, if you have access to a Dremel and a small soldering iron.

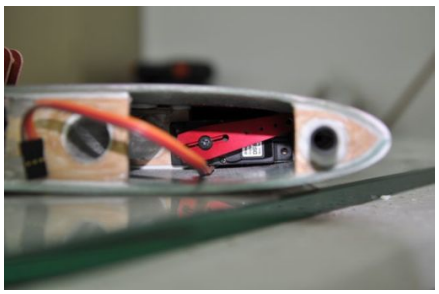
Note: Again, before you start, cover tables with bubble wrap, styrofoam or a soft cloth to prevent dents in the surface of your precious parts.

1) Stab/Elevator

To warm up, we recommend to start the build of your CARF-Models Edge 540 with the stab/elevator halves. The final result is what you see below. It will not take you more than 30 minutes per side to get there.

We use Graupner/JR servos, which come with a nicely milled aluminum servo arm. This is what a quality servo should! Not the inferior white plastic arms most manufacturer still include irresponsibly.

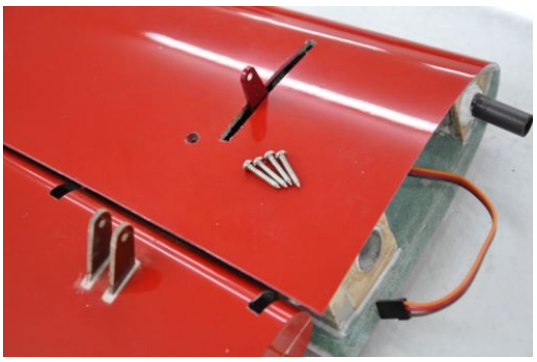
Cut one side of the arm with a dremel or a saw blade, drill the outer hole with 3 mm diameter and mount this arm properly on the centered servo. Use a drop of Loctite! Fix the servo cable with a piece of tape to the side of the case, which will make it easier to keep it at the right place when inserting the servo into the stab.



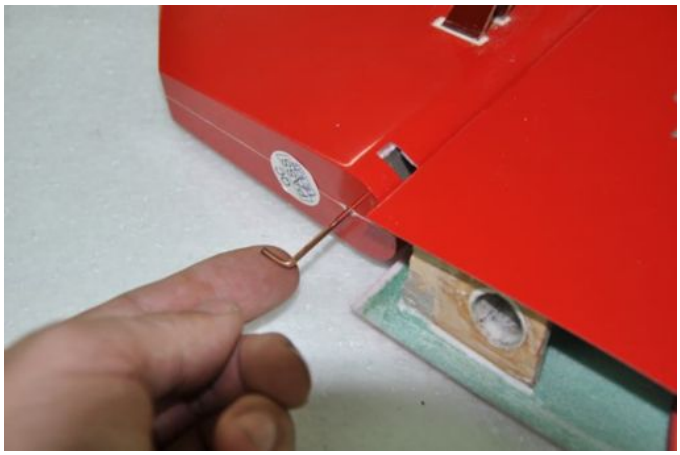
It is a very tight space in the stab. Standard size servos like JR 8911 or 8711 do fit! But definitely a little patience and some careful sanding might be needed, to remove excessive glue or wood burr. Slide the servo in and prepare yourself to cut the slot for the servo arm into the bottom skin.

If you turn the servo arm against the inside of the skin, you will see the position where to cut from the outside. Use a steel ruler and a balsa cutter (Xacto knife)

and cut a slot, not too wide and not too long. Work the servo arm through the slot and then determine how long and wide the slot ultimately needs to be for free servo movement. Widen and clean up the slot with a needle file. Finally use the 4 supplied 2.9 x 15 mm sheet metal screws and screw the servo in place.



Note:
DO NOT USE the screws supplied with the servos. Only use the screws supplied with the kit because CARF's production process requires a minimum of 2mm diameter screw holes. The original servo screws will NOT work and fall out during the first flight, probably causing a fatal crash.



Cut the 2mm steel hinge pin to the correct length, bend one end 6mm (1/4") 90 degree, **grind/sand the other end pointed** and insert the pin **from the root**. This will secure the pin in place so that it can't slide out unintendedly.

Assemble the supplied elevator linkage with the all thread, one M3 ball link and one M3 aluminum clevis with counter nut. Install the ball link between the dual horns with the M3 x 16mm Allen bolt and the stop nut, then adjust the final length with the aluminum clevis, counter with the M3 counter nut (a drop of Loctite is still recommended) and slide the 3mm aluminum pin through the clevis. Secure the pin with the provided e-clip. Use a drop of silicone oil on aluminum pin to successfully and permanently eliminate wear.

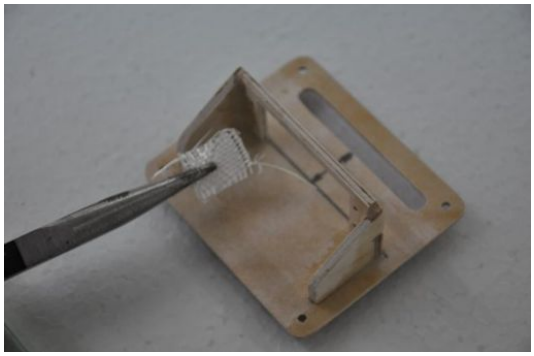
Once you are satisfied with the first half of your stab, repeat all work steps with the second half. Finally trial fit the two stabs to the fuselage and confirm fit and function. Check that the stab tube securing bolts can be inserted and tightened properly. For easy assembly on the field you should always leave the carbon tube fixed in our stab half.

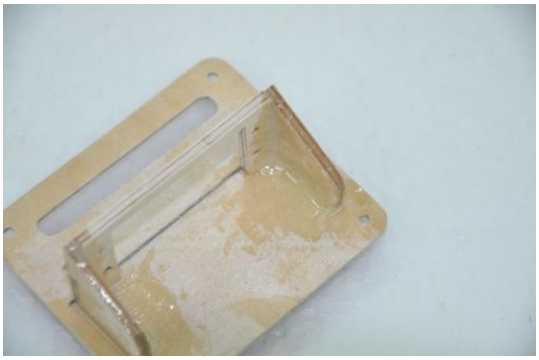
Note:
The elevator throws might be slightly restricted by the foam spars inside the elevators. The production process does not allow the hinge slots to be milled full width, because then the spar would fall apart before installed inside the elevator during the mold joining process. Therefore, these slots are short enough to keep the spar in one piece. Now, after the elevator is permanently attached to the stab, please take elevator and stab in your open hands and push them towards the maximum deflection. You will feel that the foam spars will give way quickly and easily and the phenolic hinge posts punch the slots as wide as necessary for maximum deflection.

2) Wings

The only work left on the wings is the installation of the aileron servos. This, too, should not take more than 2x 1 hour of your time. First, lets get started with the same procedure as for the elevator servos. Cut one side of the aluminum horn, mount and secure it on the spline and keep the servo ready to trial fit into the tray/hatch assembly you're going to build next.

Clean up the milled plywood parts and check the fit. Sand edges and most importantly, the back side of the servo hatch well. Clean the sanded hatch from dust with Acetone or lighter fluid. Check with the servo you're going to use the distance of the servo frame to the slot. With Graupner/JR servos this is usually 20 mm to the center line of the arm, which means, 17mm between the frame and the close edge of the slot.



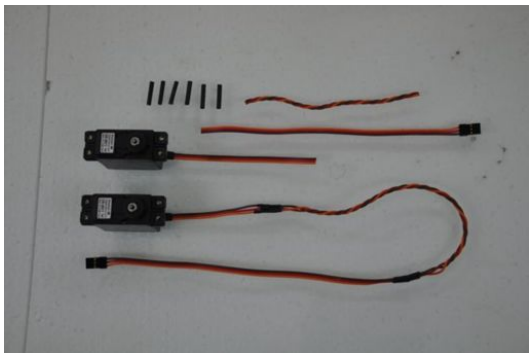


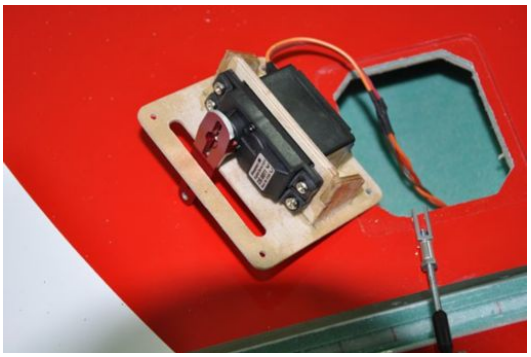
Glue the parts with thick CA first and once fit and function is checked, fill all joints with 30 minute epoxy. Fill the 30 min epoxy with some milled glass fibre or cotton flock. On the inside of the side supports you MUST use a patch of fiberglass cloth (included in the latest kits) to increase the gluing surface. You are going to install VERY powerful servos here and you risk them breaking lose from the hatch if you do not use the fiberglass patch to reinforce the joint!

Note: On some of our milling files and with basically good intentions, the side frame supports had been slightly enlarged, not taking into account that the rear edges would interfere with the mounting holes and frame support inside the wing. If necessary, please sand/cut these side supports so that they clear the mounting holes, as you can see on the photo below.

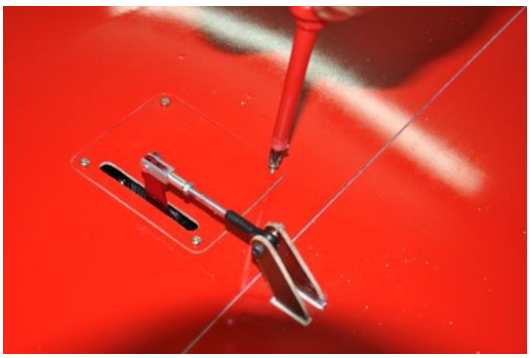
Before you screw the servos in, extend the servo wire by approx. 150 mm (6”). The safest way to do this is to solder the extension right into the wire. Use high quality solder and heat shrink tube. As an alternative you can also use readily available servo extensions, but please secure the connector, which is hidden in the wing, with tape or heat shrink, so that under no circumstances this connector can unplug during assembly, disassembly and flight.

Then use the servo screws attached with the kit (2.9 x 15mm) and do not use the original screws supplied with the servos, for the previously mentioned reason.





Assemble the supplied aileron linkage with the all thread, one M3 ball link and one M3 aluminum clevis with counter nut. Install the ball link between the dual horns with the M3 x 16mm Allen bolt and the stop nut, then adjust the final length with the aluminum clevis, counter with the M3 counter nut (a drop of Loctite is still recommended) and slide the 3mm aluminum pin through the clevis. Secure the pin with the provided e-clip. Use a drop of silicone oil on aluminum pin to successfully and permanently eliminate wear.



Finally check the movement of the aileron. With maximum servo travel you should be able to reach the max down deflection of the aileron, before it hits the spar. You do not need more up deflection than down deflection. The ailerons are VERY efficient. If necessary, enlarge the slots in the servo hatches slightly to allow maximum servo travel to each side.

Please also make sure that the bottom slot of the aileron skin-hinge is clean and not chipped in any place. If, by accident, the lip got damaged, you must repair this area with CA glue and careful sanding, before you operate the aileron servo the first time with your radio.

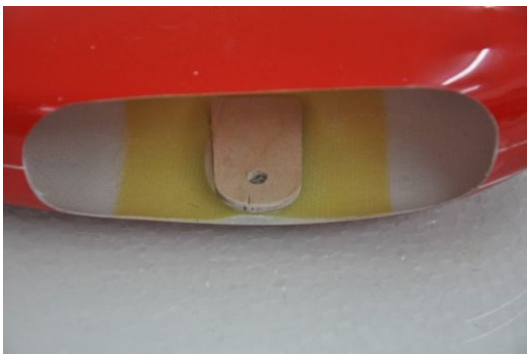
3) Landing Gear

On the fuselage it makes sense to get started with the landing gear installation. This will allow you to handle the fuselage safely, as it will always sit on the 3 wheels, not risking further dings and dangs from the work bench.

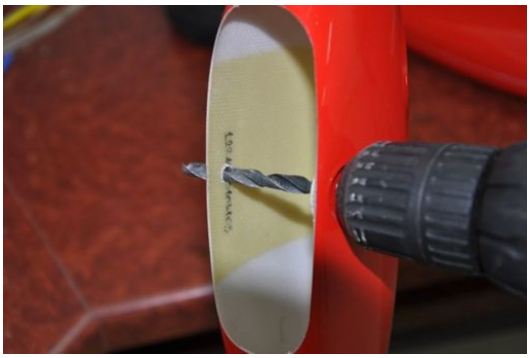
So, lets first install axles, wheels and wheel pants. The two carbon gear halves are already pre-drilled for the axle and the mounting bolts.

The suggested installation is extremely rigid, as the axle is made by a strong Allen Bolt with SHAFT, which is mounted with a T-Nut and a Safety Nut to the landing gear. The T-Nut is pre-inserted into the wheel pant and holds it securely in place as well. A pack of spacers, which could be M6 washers or even 6mm collars, depending on the withj of the wheel used, will then center the wheel in the wheel pant.

Start with drilling a 6mm hole into the wheel pant, right in the center of the radius of the molded recess. Then glue the half round plywood reinforcement from the inside in place. Sand the surface first, of course.



Once the epoxy has hardened, re-drill the hole with 7.5mm dia and at that time, also drill an access hole into the opposite side of the wheelpant. This access hole should be trimmed with a round file so that the head of the M6 axle bolt would fit through.



From the inside press the M6 T-Nut into the wood. Fill the space under the T-Nut with 30 min epoxy (thickened with microballon or milled fibre). Wait for the Epoxy to start setting, and when “rubbery” mount it to the landing gear with a short M6 bolt (the ones to be used for installing the landing gear in the fuselage). When carefully tightened, look at the wheel pant from the front view and align it nicely with the “imaginary” axle. Once the glue has completely set, take the wheel pant off again.

In this photo please look at the final result. The wheel is perfectly centered in the wheel pant and safely mounted to the landing gear. Please use packs of 6mm washers or collars, depending on which tyre you house. You might have to use collars/washers on both sides of the wheel to center it properly.

Use the final axle bolt and bolt everyting without collars/washers. Tighten the bolt's shaft against the T-Nut and determine the thickness of spacer on both sides of the wheel. Then disassemble the axle/wheel/wheel pant again. You can use CA glue to stack the required washers/collars for easier insertion while finally assembling the unit. Then slide the gear legs into the fuselage and bolt them on from the bottom side with 2 M6 x 20 bolts each.

For the tail wheel (the CARF/Grauper unit) please drill 4mm holes where the dimples are and assemble the tail wheel axle, bearing, tyre and steering arm as suggested on the tail wheel instructions.

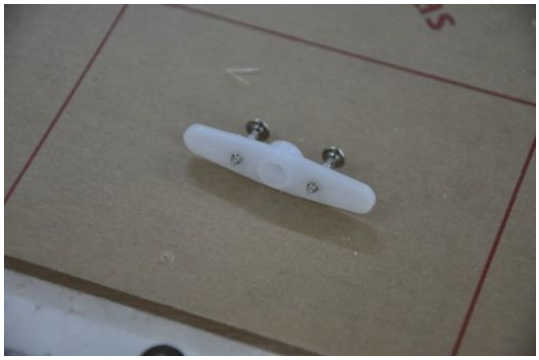
Then drill 2 4 mm holes into the bottom rear part of the fuselage. Use the tail gear as a jig. Open these holes up to 5.5mm and insert M4 T-Nuts from the inside. This might be a bit of a struggle as your arm will be barely long enough to insert the T-Nuts properly. You might have to use a balsa stick and tack glue the T-Nuts

with CA glue to the stick, helping you to get it in the right place. Then insert the bolt from the outside and pull the T-Nuts into the plywood by tightening the bolts.

Note: The further back you mount the tail wheel, the better the geometry for the linkages (springs) will work.

4) Rudder

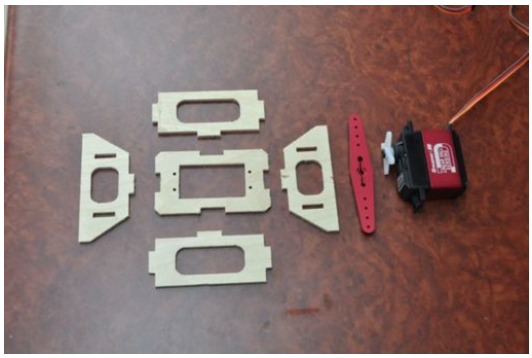
The steering of the tail wheel can be accomplished easily by using one of the improper servo arms, which come with every servo, and screwing them with 2 improper servo screws into the root of the rudder. If you use some 30 min epoxy this joint will be plenty strong.



Mount the rudder in the same style as the elevators to the stab. Cut the hinge post to the required length, bend 6mm (1/4") 90 degree, point the tip and insert from the top. Here we recommend to grind a groove into the top of the rudder so that the 90 degree bend can be counter sunk into the surface. Secure with a strong tape or a drop of 5 min epoxy.

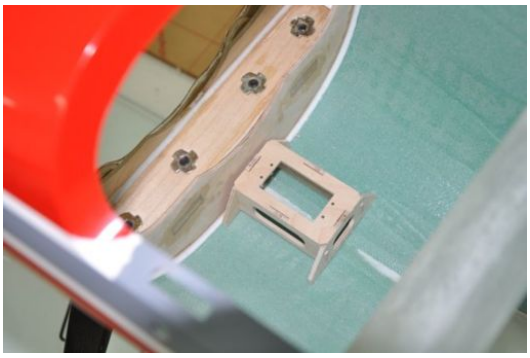
After the rudder is installed permanently, use the two springs and connect the tail wheel control arm with the servo arm you screwed to the rudder.

Then assemble the rudder servo mount from the milled plywood parts. Use thick CA to assemble the tray and fill the joints with 30 min epoxy. Prepare the servo arm for the M3 bolts to hold the ball links. Just drill 3mm holes into the outer spot, they do not have to be threaded.



Now you have to decide whether you want to use a full tuned pipe or a canister. To compensate for the weight of the long pipe, it is recommended to mount the rudder servo as far forward as possible. The best spot is right behind the gear mount.

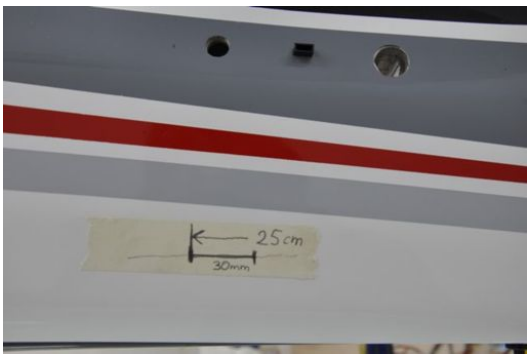
If you want to use a MTW canister, glue the rudder servo tray right behind the air exit hole in the center of the bottom fuselage. In any case, use 30 min epoxy with some milled fibre for a very strong glue joint.



For this manual, we continue with the installation of a full pipe, as this brings the engine and the plane to life as good as it ever can get. Mount the servo arm on the servo (Loctite) and the ball links to the other arm holes. Turn the threaded ends at least 6mm (1/4”) into the plastic ball link. Cut the included steel cable exactly in half.

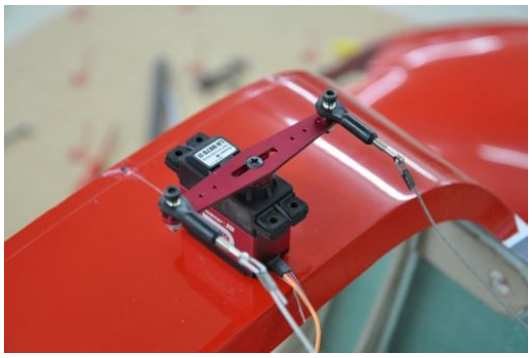
Now use them as a jig on the ouside of the fuselage to determine the position of the cable slots in the tail of the plane.

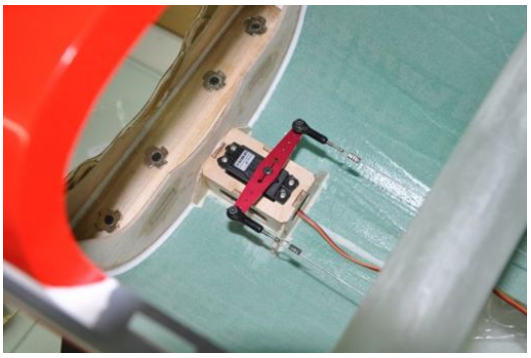
You can determine easily the position of the servo control horn in relation to the landing gear. In case of a Graupner/JR Servo this will be exactly 13mm.



In longitudinal position, the front end of the slot should be 25 cm (10”) forward of the read edge of the fuselage. Use some masking tape and a pencil to prepare the final position marking.

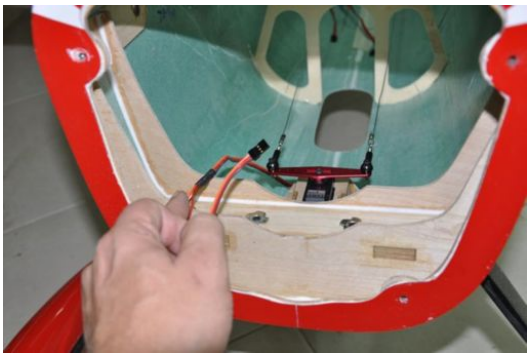
Now hold the cable to the outside of the fuselage between the front point (13mm above the landing gear) and the rear point (right the center between the two rudder control horns) under tension and mark the line at the 25 cm position. The slot should be 25-30 mm (1 – 1 ¼”) long and as narrow as possible.





Once the slot is cut, install the rudder servo permanently, crimp the two cables, without wasting any length, to the front connection, run them parallel all the way back, through the slots and then through the previously installed ball links in the dual rudder horn. Here, too, turn the threaded ends approx. 6mm (1/4") into the plastic ball links. This will allow you later to set the tension, as on both sides you will have approx. 5 mm additional thread to go.

Finally, determine the required length of the servo wire to connect to the receiver. Either solder the appropriate piece of wire into the lead or use the correct length servo extension. As a hint, we installed the receiver on the side wall of the fuselage 10 cm (4") behind the wing tube. In determining the required length please be very careful how to route the servo wire away from the hot tuned pipe. A contact between servo wire and tuned pipe in flight will ultimately cause RC failure and fatal crash.

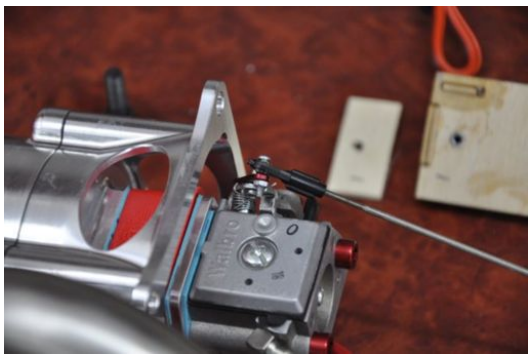


5) Engine compartment + Cowling

The well thought out engine compartment and cowl mount is the area where a lot of the building time can be saved, compared to other brand's models. CARF-Models has put a lot of prefabrication into these features. This starts with the completely finished motor dome, accepting a DA-60 engine right away and bolting to the fuselage with pre-drilled holes and pre-installed T-Nuts, and does not even end with the readily mounted two-part cowling.

It continues with the properly chosen header and exhaust recommendation and its simple mounting in the plane, as well as a matching spinner and perfectly fitting fuel tank tray.

Most work left is the installation of batteries, Powerbox or any other dual power supply solution (in our opinion mandatory for an airplane of that size), ignition unit and throttle servo.



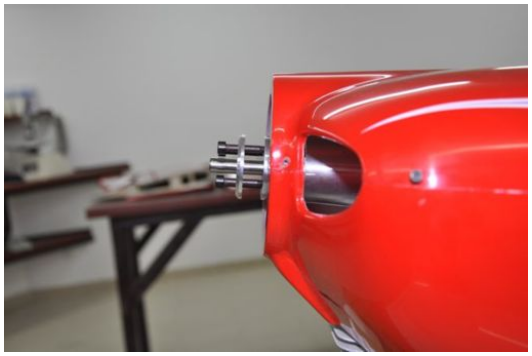
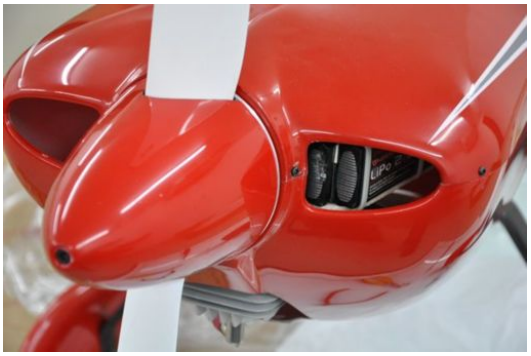
First install the throttle linkage. A DA-60 has already a throttle arm installed with a pre-drilled and tapped M2 thread. The CARF kit comes with a M2 pushrod

and ball link assembly. Using plenty of Loctite the M2 ball link should be attached to the throttle control arm and additionally secured with the M2 counter nut.

Then the Motor can be bolted to the motor dome. Therfore, please temporarily mount the motor dome with its M4 bolts as well as the cowling with M3 to the fuselage in order to pre-set the thrust line alignment.





Use 6mm washers to set the perfect distance and thrust lines. Once the spinner backplane lines up perfectly with the cowling, the thrust lines will be perfect as well.

Test fit the header at the same time. We recommend to use stainless hex head bolts, the rear of them shortened to approx. 8 mm length and/or the rear bolt hole in the header slightly enlarged.

Then take off motor dome and dowling and start the final assembly and rigging of the compartment inside the motordome.

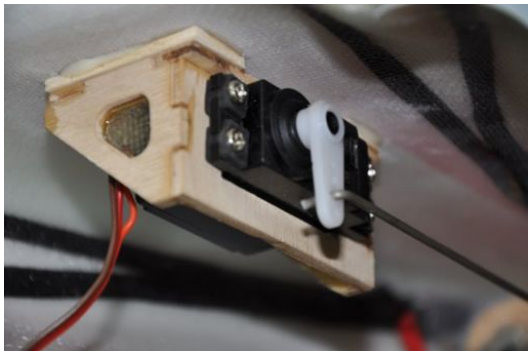
It is important to put all weight as much towards the front as possible. That means, all batteries, Powerbox, ignition, should be mounted inside and outside this motor dome.

Lets start with the throttle servo. Assemble the throttle servo mount from the CNC milled plywood parts. Don't forget, as with all other servos, to use fiberglass cloth patches to reinforce the joints. This mount is designed to be removable for better installation and handling. So it's mounted with 2 M3 bolts inside the dome. Please take the measurements from the photos below.

Drill the twpo holes into the dome, apply some glue to the two spacers and bolt the unit in its place. After the glue has set, you can remove the mount. The two plywood spacers should not remain on the inner wall. Finally install the servo with its servo arm (Z-bend of the 2mm pushrod on the servo horn side works best) and permanently bolt it in place (Loctite!).

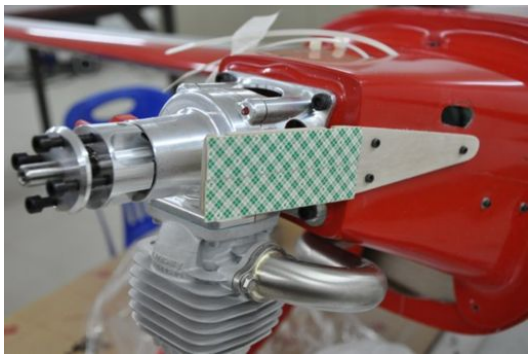
Note: Since you already know where to install the receiver later, it is now time to decide if you have to extend the throttle servo wire. If you don't want to solder,

use the appropriate length of standard servo extension. In order to remove the motor dome later, you actually should use a separate extension here!

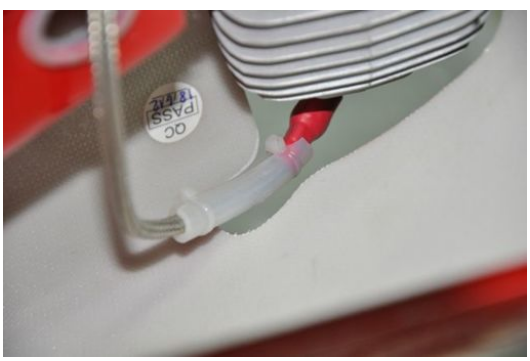


Next is the battery mount. Later kits have a readily milled part, others require the manufacturing of a simple plywood tray. The purpose of this tray is to mount the batteries as far forward as possible (even with the tuned pipe you do not need any additional weight if you follow these instructions!!!) Bolt it with 3 M3 bolts/T-Nuts to the side of the motor dome. Make sure the battery pack clears the cowling and as a thin layer of balsawood as a heat insulation from the header.

Please be assured that this system is perfectly working in our previous designs (Extra 330L), too. There are absolutely no temperature or vibration issues, which could harm the batteries. Stack the 3 batteries (approx. 2600 mAh) with double sided tape and use two cable ties to secure them to the tray.



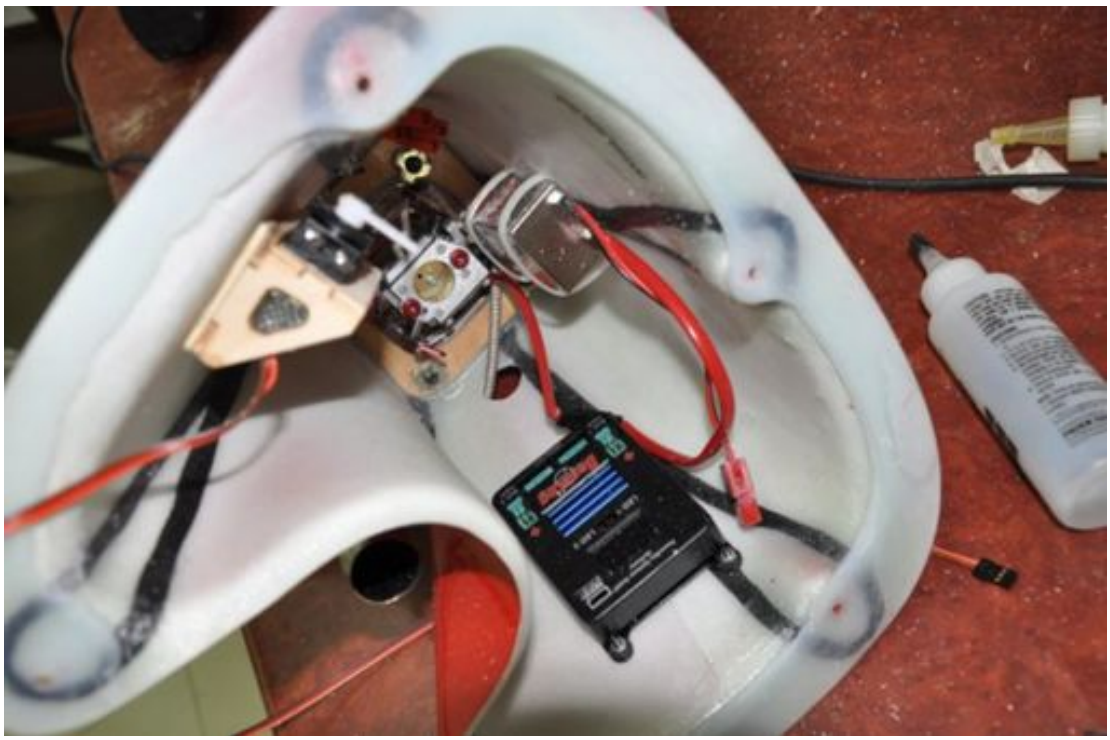
Most importantly use rubber grommets around the edges of the cable holes. You can use slotted fuel tubing and glue this around the edges. This is vitally important for the flight safety. If you do not use protection grommets the wires will be cut within a few flights, and electric failure will occure ultimately. Do the same with the ignition cable on both the motor dome and the cowling!



On both receiver batteries and the ignition battery create long enough connections. Depending on the type of battery used, you might have to extend the wires and/or solder the required connectors on.

Use cable tie sockets to hold all wires clear of any hot or sharp parts and edges. If you use the self adhesive sockets, use a drop of thick CA in the center before you attach them to the fiberglass surface!

We installed a Powerbox Base Log, which is a simple but efficient dual battery power supply. It has a sufficient power rating and is still a very light weight solution. It comes with a Sensor Switch which can be installed in the front area of the fuselage in the wing leading edge area. The Base Log should be mounted right inside the motordome as well. It is still accessible to pull the battery wires for charging, if you don't use Powerbox batteries with separate charging connectors. Take care of the vibrations by using the rubber grommets supplied with the Base Log and mount with 3-4 M3 bolts.

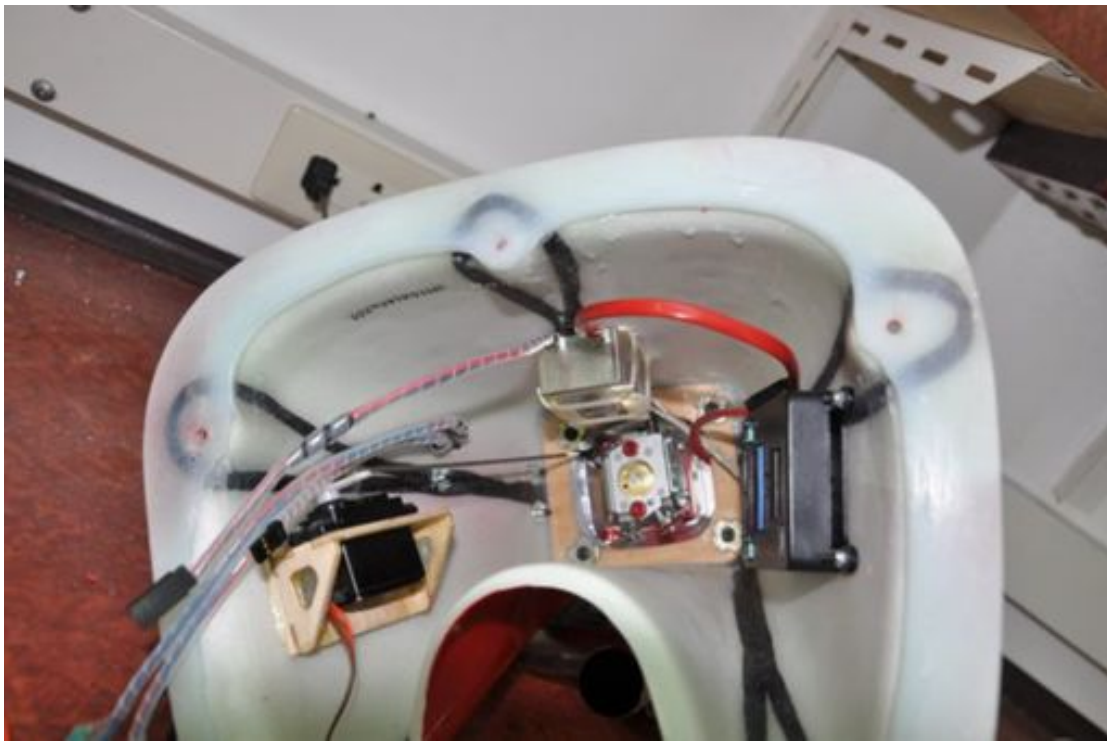


The ignition module can be mounted inside the motor dome as well. We slot the skin in 4 places and use two cable ties to fix it. For additional safety, you should

use a layer of double sided foam tape to keep vibrations away and prevent the unit from sliding out of its place.

As ignition switch either use a standard mechanical switch, a Powerbox Digi Switch or a Powerbox Spark Switch. The Spark switch is controlled by your radio system and requires a separate channel, the Digi Switch needs to be installed in the front part of the fuselage, preferably on the opposite side of the RC-switch, in the leading edge area of the wing. Please don't forget that you need to have access to the connector for charging.

Last but not least, plan all electrical connections so that you can take off and separate the motor dome unit easily and quickly from the fuselage without cutting cable ties, heat shrink or any other inconvenient measures.



Now you should finally mount the motor dome to the fuselage. Have you used Loctite for the 4x M6 engine bolts and the 5x M4 motor dome bolts? If not then it is time to **do so right now**, if you do not want to risk losing your engine in the first flight!

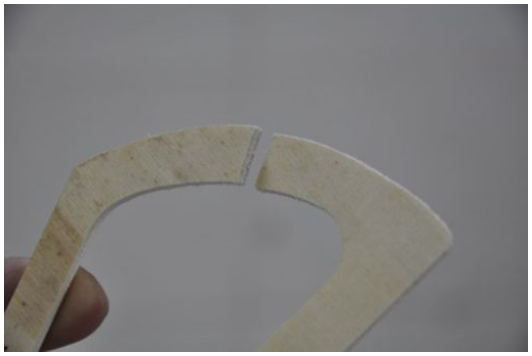
Since you'll never have the opportunity to look anymore as close as you could do right now, make sure all bolts have Loctite, all wires are fixed and secured, all plugs protected against unintended disconnecting? Once you are 100% positive that all work is done as careful and thoroughly as possible, bolt the motor dome on the fuselage and install the cowling. Here please make sure that you don't forget the two bolts right behind the spinner plate!

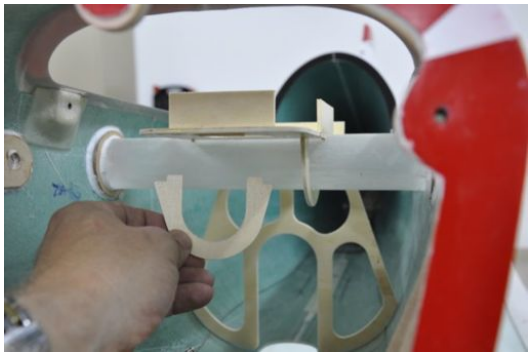
Then continue with the rest of the electrical and fuel plumbing.

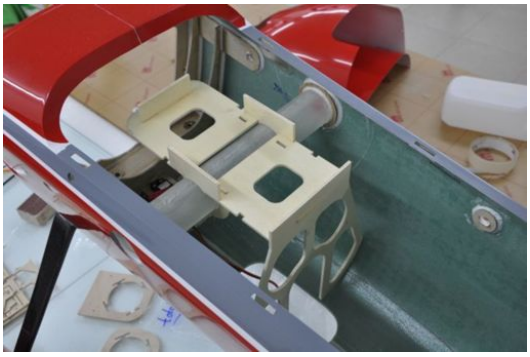
6) Fuel tank and general RC installation

On purpose we have not yet installed the fuel tank tray until now, to allow the best access inside the fuselage for the various installation processes. But now it's time to assemble the fuel tank tray and glue it on the wing tube and the fuselage floor.

If you have your rudder cables permanently installed, you can simply cut the rear vertical former to get the cable through, before you glue the unit in place.



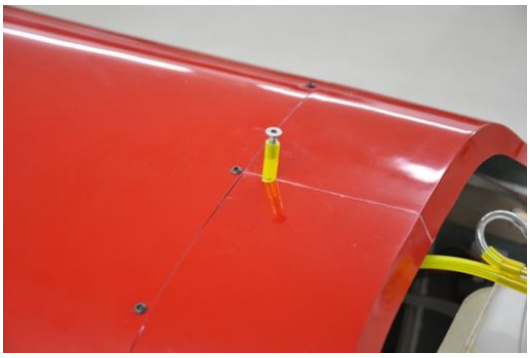




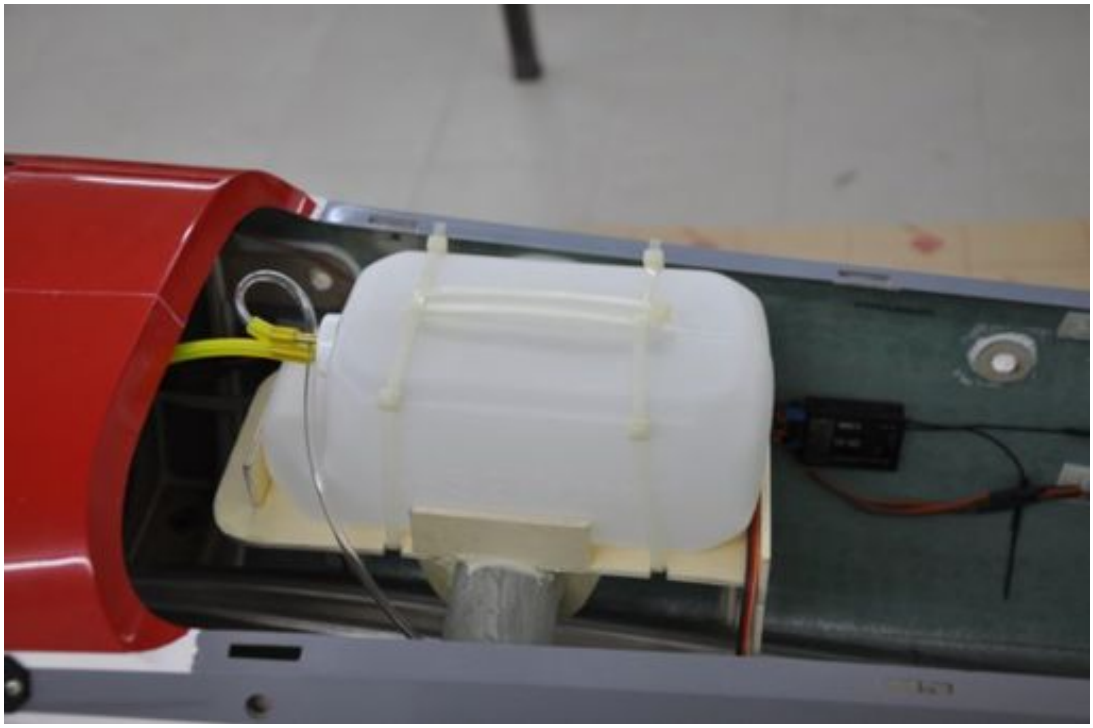
The photos shown on the previous page should give you a clear indication how everything goes together.

Assembling the fuel tank will require to follow the fuel tank manufacturers advice and instructions. Basically you have to decide if you want to go with 3 or 2 connections. If you go with 2 connections, you will need a T-fitting in the fuel line close to the fuel tank. From the T-Fitting you go either to a filler (available from many aftermarket suppliers) or drill a 6mm hole and run the fuel line tightly through. It is important that this fuel line is tightly closed and sealed, so that the engine won't draw air into the fuel system. A single air bubble can make the engine stall and quit.

A vent line can be routed to the bottom side of the fuselage. You should route it in a few loops so that in flight only little to no fuel will spill. It is also recommended to exit the vent line well behind the fuel tank, so that you can stand the plane on the spinner (for cleaning or servicing) without spilling fuel.



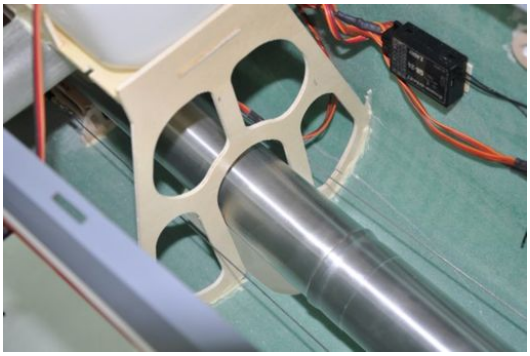
Mount the fuel tank with 2 cable ties to the tray. A third cable tie is used to keep both circular cable ties from sliding off the fuel tank to the front of the back.



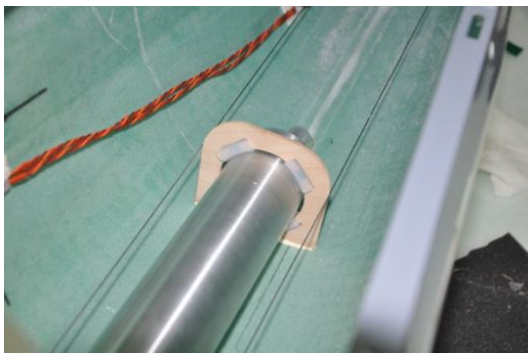
pipe mount

Now, after the fuel tank tray is finally glued in, you can permanently mount the pipe as well. Shorten the CNC milled pipe mount so that the pipe runs smoothly inside the fuselage and tack glue it in place.

Check the precise exit hole location and mill an exit hole, as tight as possible around the pipe exit. You should use a short piece of silicone or rubber tubing on the pipe exit to keep the exhaust gasses outside the fuselage. This tube must be easily removable in order to get the pipe back out of the fuselage easily. It should be rather secured to the fuselage skin than to the pipe exit tube…

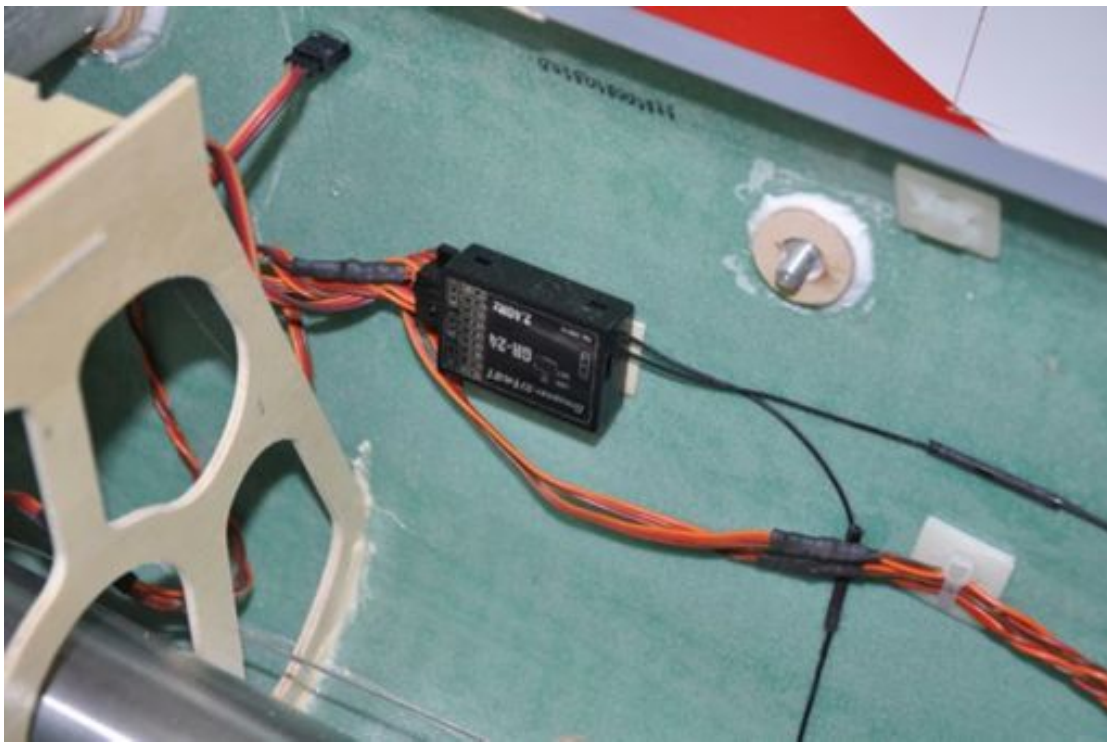


Now push the pipe on to the Teflon coupler. Don't forget to slide the two clamps over first. If you use a hot air gun to soften the Teflon coupler this is going to be very easy. Secure the joint with the two clamps. Then squeeze 4 pieces of the included silicone tubing into the T-shaped slots of the rear mount and permanently glue it with 30 min epoxy to the fuselage floor. Stiffen it with triangular scrap plywood pieces as vibration might brake it off quite easily.

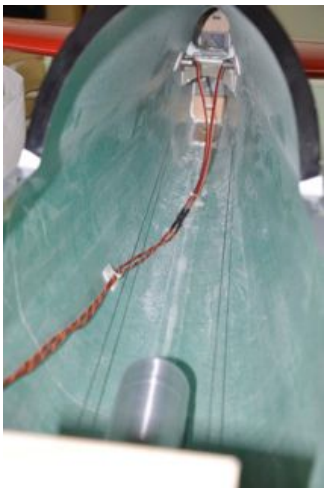


electrical plumbing

Next is the final routing of servo wires to the receiver, which you need to determine the best place for. We always recommend to keep everything simple and light, so we stick the receiver with 2 strips of double sided 3M foam tape to the fuselage wall. Once you confirmed the position, firstly route the antennas, if necessary, according to your Radio manufacturer's recommendations. If you use Satellites, install them inside the fuselage so that they are not too close to batteries or metal components.

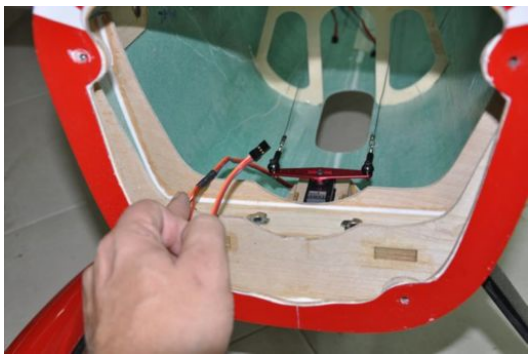


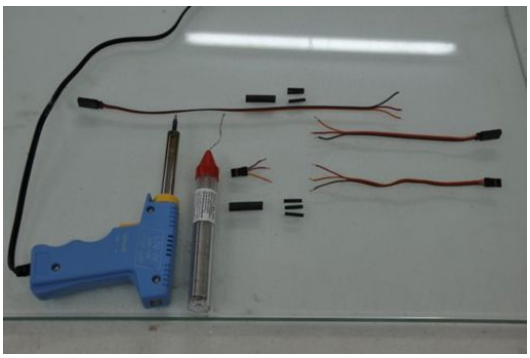
First create the elevator extensions. Determine the length and either solder them, or prepare readily confectioned lead extensions. Fix them to the fuselage wall with cable tie sockets. Don't forget to use a drop of thick CA glue to the center of the foam tape pad, otherwise they will fall off over time and might cause fatal malfunctions when the wires contact the hot tuned pipe.



Mill rectangular openings between stab tube sleeve and anti rotation pin, and then glue the socket connectors right in. Keep the holes very tight, it makes gluing the sockets much easier.

If not already done, extend the rudder servo wire so that it reaches the receiver safely. Here you have to be especially careful to route it away from the hot pipe and hold it close to the fuselage wall with cable ties and sockets.





For the ailerons, you can create extensions matching in length to the right and the left side. One is going to be very short, the other one should be routed either over the tank tray or along the bottom side of the fuselage.

For the throttle servo, it would be wise to use a readily confectioned extension, giving you a chance for easy disconnection when having to take off the motor dome.

Anyway, once all connections are installed, you should check the RC system, that all connections are done correctly and all servos are working as planned.

7) Canopy

The clear canopy of the Edge 540 is a very easy job, as it is quite short.

Start by cutting it with a pair of scissors widely, mainly across the front and the rear. Make sure the material is not cold to prevent any cracking. You should cut it in a warm room, or in a heated area, maybe in front of an electric room heater or a hot air gun.

Throw it over the canopy frame and once it sits half way accurately, draw a line with a permanent marker, approx. 5-6 mm (1/4”) outside of the canopy opening.

Then cut along the line and insert the canopy in the frame, to see how it fits. Be VERY CAREFUL for scratches along the side of the canopy, when you insert it into the frame.

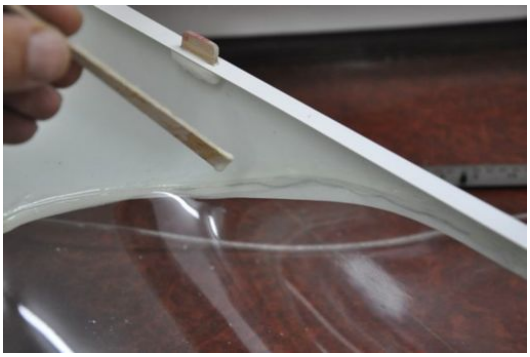
Once you determined where the cut still needs to be trimmed, mark it with a permanent pen and take the canopy out again. Adjust the cut. Then sand the inner surface of the canopy frame with course sand paper, so that glue would stick to the surface well.

Now use a drop of CA glue and tack the canopy in the front center, and in both rear bottom corners. Be very careful, you can apply CA glue to the tip of a knife and apply it very gently into the gap between canopy and frame. Very little is just enough.

Then install the canopy frame on the fuselage and make sure it is not twisted. Once this is confirmed, use one more single drop of CA and tack the top rear

center into place. Make sure you push the rear top canopy frame back towards the fuselage, so that there's no gap. Once this tack spot is done, the frame cannot twist anymore and you can take it off.

Now use 30 min epoxy and apply it from the inside along the edge of the canopy. Watch it soak in between the two surfaces. Hold the canopy frame inverted until the 30 min epoxy is cured.



Last but not least, confirm that the canopy frame fits well and tightly onto the fuselage and that the 4 bolts go in smoothly without any force.

These bolts have to be tightened and loosened very often at the flying field. It is necessary that they fit well and smoothly. Keep a few spare bolts in your field tool box in any case. You might lose them one day. The canopy frame is an integral part of the fuselage and without it securely bolted on you must not fly!

8) Flight Preparation

A matching spinner (dia. 115 mm) is available at CARF-Models. As propeller we recommend a 22x10 Biela or 23x10 Meizlik or 22x12 Meizlik. These props work well with the engine/tuned pipe combination and pipe length setup, as suggested in this manual.

Center of Gravity: 120 – 125 mm from the leading edge.

It doesn't matter where you measure the 120-125 mm, since the Edge 540 has a straight leading edge. With 3x 2,500 mAh Lipo Battery packs in the described position you will reach 125mm without any additional lead. With an un-lightened aluminum spinner and a Carbon Propeller 125 mm without any additional weight is possible as well.

Control Surface Setting

Aileron: High Rate: 60 mm up and 65 mm down is the mechanical max throw
Low Rate: 40 mm up and 44 mm down
Use appropriate Expo, 30% or more is recommended

Elevator: High Rate: mechanical maximum to both sides (make sure you have widened the hinge post slots to maximize the deflection angle (over 45 deg)
Low Rate: 20 mm both sides
Expo 25% low rate, 60% high rate recommended

Rudder: Please note: The rudder is remarkably sensitive.
High Rate: max mechanical throw
Low Rate: 40 mm both sides
Use appropriate expo, at high rate at least 50%

Prepare your transmitter for a rudder>elevator mix. The Edge will dive slightly towards the landing gear in knife edge.

Prepare your transmitter for a rudder>aileron mix. The Edge will require a little opposite aileron as it will want to slowly roll back to normal from knife edge.

The values for these mixes should be set after the first few flights. First you have to finalize your CG and your preferred control throws.

Things to check before the first flight:

Are all bolts around engine and motordome tight and secured with Loctite?

Are all servos screwed in tightly?

Are all servo horns mounted tightly and the center bolts secured with Loctite?

Are all ball links at least 6mm (1/4") on the thread?

Are all aluminum clevises secured with counter nuts? All pins secured with E-clips? A drop of oil on every aluminum pin? All linkages solid?

Are all electrical wires and fuel lines secured inside the fuselage, so that they cannot touch the canister or tuned pipe under any circumstances?

Is the cowling mounted securely, also with the two bolts right behind the spinner backplate?

Is the tuned pipe / canister secured properly so that it cannot slide back and slip out of the Teflon coupler when heating up?

Final maiden flight preparations:

First make a range check according to your radio manufacturer's guidelines.

Then fuel up and make sure there are no fuel leaks anywhere. Don't forget to plug the fuel fill line! Secure the airplane on the ground. You should never operate your Edge alone. Always make sure that a second person is available to help you. In a worst case situation, a flying buddy can be life saving.

NEVER OPERATE A MODEL AIRPLANE ALONE!!!

Choke the engine, switch on the ignition and radio, turn the prop until the engine "pops". Then release the choke and start the engine with a throttle setting of 1-2 clicks above idle. Let the engine warm up for approx. 15-20 seconds and open the throttle to full. Make sure the needle setting is correct, not too rich and not too lean. Take the throttle back and set a safe idle rpm. Move to full throttle instantly to make sure the engine wouldn't choke or stall. If the engine takes the throttle rapidly even after extended idle runs, try to stop the engine with the trim lever on your transmitter (or a kill switch, if you programmed one). Make sure you can stop the engine from your transmitter immediately and at any time.

Once all this is set, top up the fuel, restart the engine and take off to the maiden flight. Don't expect any bad surprises. The Edge is a very smooth and predictable airplane with a broad spectrum of performance.

Good Luck for the first flight! We at CARF-Models wish you a lot of fun with your new Edge 540.

Your CARF-Models Team!