MXS 2.9m

Instruction Manual

Our MXS 2.9m follows the design features of our Extra 330LX. This aircraft represents a true revolution in the large-scale Aerobatic Market. Its uniqueness and distinctiveness make it a truly exceptional undertaking that was initially met with skepticism and deemed impossible by many. Yet, those naysayers were proven very wrong. The CARF-Models MXS 2.9m defies gravity and inertia, surpassing all expectations. And as a "small" 3m airframe, it's perfect for all the older 150cc engines sitting around.

CARF-MODELS

Liability Exclusions & Safety Responsibility

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 with the kit. However, as manufacturers, we at CARF-Models are not in a position 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. 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, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of the CARF-Models company 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 Ltd., 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 radio control system correctly. For this reason we at CARF-Models are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model.

Personal safety

There are a couple of things that are good to keep in mind when you are assembling your CARF-Models MXS 2.9m. Some of them are common sense, but it doesn't hurt to be reminded. While you are working with tools and sharp implements, be aware of others around you and the environment you are working in. When cutting or sanding materials, always wear a face mask to avoid inhaling particles. Keep your work environment clean and tidy at all times. A clean workshop will enhance the experience. Protect all parts from scratches and dents. Use rubber matting on your bench, and be careful of components like screws getting between the part you are working on and the bench. BE CAREFUL with the two combined ultra torque servos, open pushrods, and bell cranks - there is imminent danger to break your fingers when you switch on the RC system.

Assembly process

This manual is set to provide detailed pictures of the building steps. You may wish to change and do some things in a different order, which is fine provided you keep in mind that some things need to be done before some others. When planning out the installation of your components, always keep the centre of gravity location in mind. If you plan ahead you can avoid having to add weight to your model. It is far easier to remedy a nose heavy model than a tail heavy model. A few grams of lead at the rear is preferable to hundreds of grams in the nose! You will find that it is easiest to fit items that cannot be relocated, like aileron, elevator, rudder and throttle servos, before you do a preliminary C of G check. Receivers, ignition and batteries etc. can generally be relocated to suit your requirements.

Most of all, enjoy the process of creating your new CARF MXS 2.9m, a job well done is always satisfying!

MXS 2.9m

Category – Aerobatic Prop Planes

About

This is a quick guide to the successful installation of RC and propulsion equipment into your new MXS 2.9m. We do not have a lengthy manual to bore you with how to tighten a bolt or how to clean a surface before gluing and such. We will provide within this manual the specific details of rigging this airplane successfully for many hundreds of hours of competition flying.

The CARF-Models MXS 2.9m is a ground breaking design with a completely new approach of connecting your servos to the control surfaces of the airplane. The control surfaces are also attached to the wings/stabs in a new way for CARF-Models. If you are used to CARF-Models Aerobatic airplanes, with the skin hinged controls or the center hinged controls on the hinge posts, you will have to get accustomed with a new way of doing things. Please be open minded for the new design, and please do not alter any of the design or the hardware we provide.

All the equipment we provide is thoroughly tested in this airplane. We did so many flights with the help of nameful pilots, with very rough engines that create a lot of vibration and incredible power and various servos to make sure to recommend the best working equipment for you – and that's what we do with this manual now. PLEASE do yourself a favor and do not modify any of the design until you have a considerable amount of flights on the airplane and have a feel for WHY you might want to change this or that, if anything. Please give us the chance to show you that our research and development has been serious and successful and the sophisticated final setup we came up with works better than anything else we tried. We tried a lot!

We have seen a lot of equipment and hardware problems and failures during our testing. What you hold in your hands now is the result of all this hard work. Every detail has a reason. If it isn't exactly what you would have used, please give us the benefit of the doubt, and consider that we might have ALSO been trying to use something else instead which hasn't been working reliably or safely. We do not intend to save cost by providing a cheap solution in hardware and equipment. We are ONLY driven by our test results.

What do you need???

An expample of the basic and main accessories required...

This is a list of required products to complete your MXS 2.9m KIT. This list only is a recommendation of what to equip your airplane with. There is no reason similar products from other brands cannot be used in this plane. There are many ways and products on the market you can use with the MXS 2.9m.

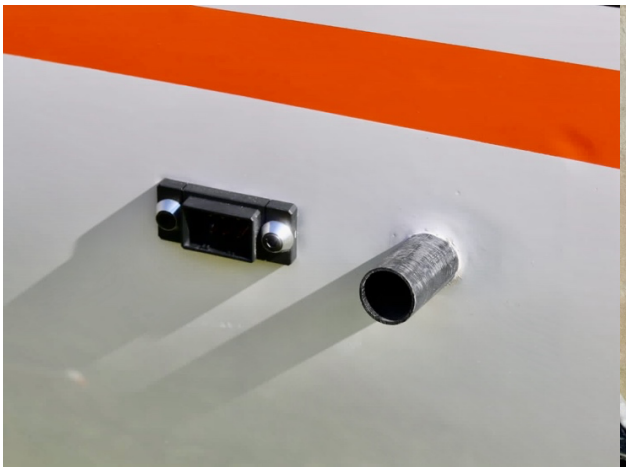
Amount	Required	Possible Accessories
1x	Engine	DA 180cc / GP 178cc / DLE 170cc
1x /4x	Engine Standoffs	1x Blazing Star DA180 / GP178 or 4x Selfmade Aluminium Standoffs
1x	Propeller	Falcon / Xoar Carbon Prop 31x12/ 31x13
1x	Spinner	CARF 5,5" Carbon Spinner
1x	Exhausts	Zimmermann Exhaust SET DA180 / GP 178 or Stock Mufflers
1x	Kill Switch	Powerbox Spark Switch RS
1x	Throttle Servo	Mac Gregor MGB 6928HV
8x	High Torque Servos	Mac Gregor MGB8555HV
8x	Double Servo Arms	CARF Double Servos Arms 25T
1x	1L Tank	Aerobatic Fuel Tank 1000cc
1x	700ml Tank	Aerobatic Smoke Tank 700cc
1x	Smoke Pump	Holy Smokes Smoke Pump / Powerbox Smoke Pump
2x	Wheels	Lightweight Foam Wheels 4,5" / Spot-On RC Fly Wheelz 4,5"
1x	Tail Gear	Tail Gear 150-170cc Size
1x	Power Supply	Jeti Central Box CB220 / Powerbox Competition SR2
2x	RX Batteries	Gens Ace Lipo 2s 2200 - 3000mAh
1x	Ignition Battery	Gens Ace Lipo 2s 1000 - 2500mAh
-	Servo Wire	Powerbox Servo Wire Maxi
-	JR Connectors	JR Connectors

Build Description

Wings

- Make sure the servos are tight on the mounting plate (16x allen bolt M3)
- Drill a hole between the servos and place a rubber grommet to put the servo wire through
- The carbon arm needs to be placed below the actual servo arm
- Connect the both servos with the linkage included in the hardware package (it's important that the two servos won't work against each other! = Servomatching)
- Use 4x allen bolt M3 with washers and stop nuts


- Get the servos on full travel to fit the servo board into the wing
- Place the finished and in the best case preprogrammed servo board in the wing using the 16x allen metal screws
- Assemble the aileron linkages with the M4 threads, 4mm carbon tubes, M4 nuts, M4 ball links and M4 aluminium clevis
- Check both linkages have the same length from the ball link hole to the aluminium clevis hole
- Install the aileron linkage with the included M3 bolt, washers, stop nuts and the pin for the aluminium clevis
- You may have to extend the linkage slot a bit in the length for more aileron deflection

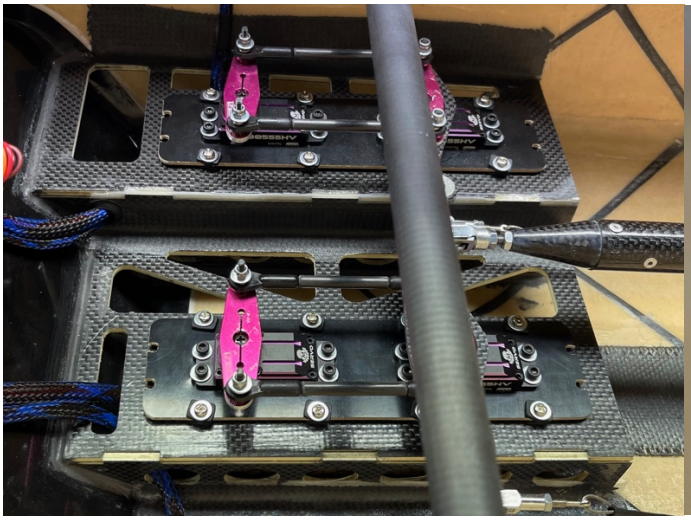


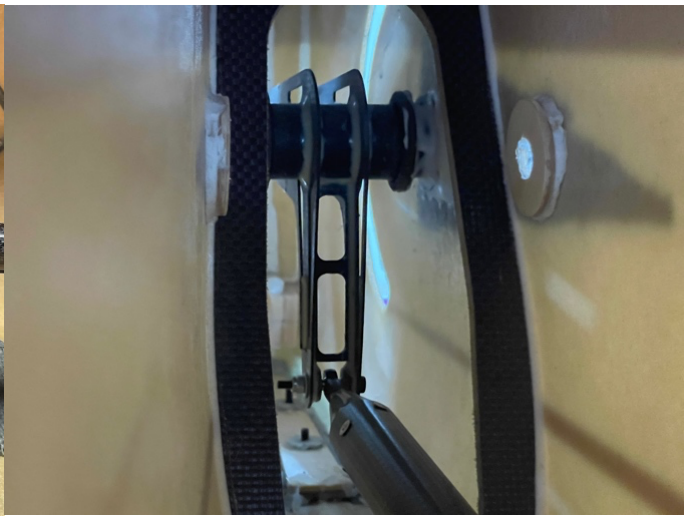

- As shown in the picture before you can use a Multiplex plug as well as other types of connectors for the wing (plugs, screws and washers not included)

Stab

The elevators are moved by a large bell crank in the tail of the airplane.

- Install and gang the two elevator servos following the guidelines given in the previous chapter for the ailerons with the included linkage hardware (it's important that the two servos won't work against each other! = Servomatching)
- Make sure the servos are tight on the mounting plate (8x allen bolt M3)
- The carbon Arm needs to be placed below the servo arm
- Connect the both servos with the linkage using 4x allen bolts M3 with washers and stop nuts



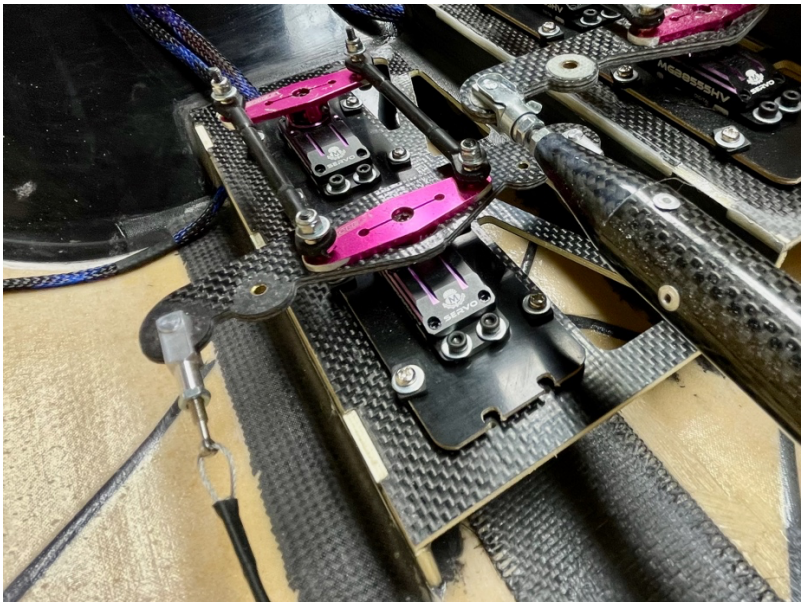


- Place the servo board with the installed and ganged servos into the wooden support beside the rudder servo
- Use the 8x allen metal srews to screw the servo board in place (yes only 8x screws, there is no need to use screws at the two left and right holes)
- Connect the steel clevis of the preinstalled elevator pushrod and move the system from end to end to make sure there is no rubbing or binding
- You may have to sand the servo arm a bit to get more elevator deflection

Rudder

Servo installation

- Install and gang the two rudder servos following the guidelines given in the previous chapter for the ailerons and elevators with the included linkage hardware (it's important that the two servos won't work against each other! = Servomatching)
- Make sure the servos are tight on the mounting plate (8x allen bolt M3)
- The carbon Arm needs to be placed below the servo arm
- Connect the both servos with the linkage using 4x allen bolts M3 with washers and stop nuts



- Place the servo board with the installed and ganged servos into the wooden support in the middle of the fuselage behind the muffler compartment
- Use the 8x allen metal srews to screw the servo board in place (yes only 8x screws, there is no need to use screws at the two left and right holes)

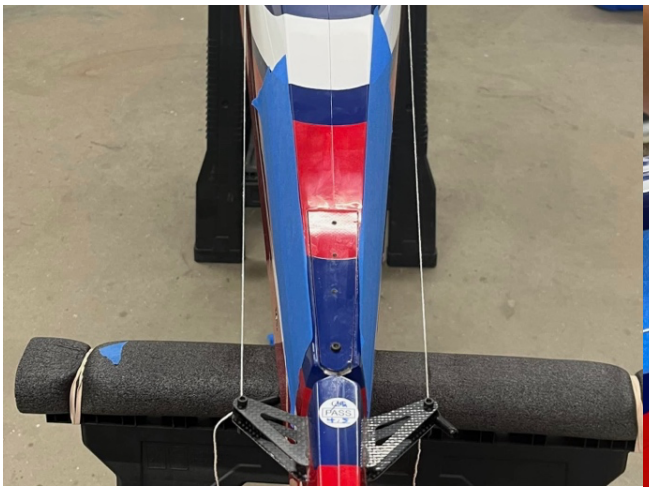
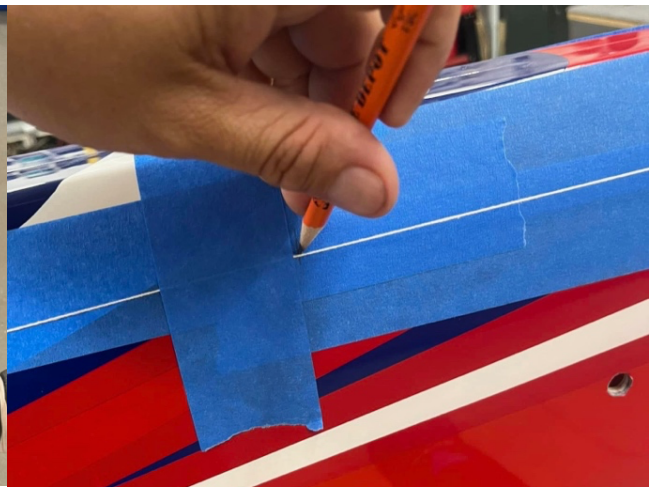
The rudder cable installation will be done in the next step...

Rudder cable installation

Even tho this pictures show the Extra330LX 2.6m, it's exactly the same procedure with this MXS 2.9m

The rudder is connected via a rather traditional pull/pull setup (no crossover of the cables).
The exit hole needs to be made by measuring and using a string to find the line.

- First you put some tape at the outside of the fuselage in the area of the rudder servo and of the possible entry in the fuselage
- Next you measure the height of the servo arm and mark the height on the tape outside the fuselage
- Now you put the M3 screw into the carbon rudder arm and fix a string around it
- Pull the string to the front and fix it at the previously marked servo arm position with tape (first picture)
- Then you need to find the spot where the string later should go through the fuselage and mark a 20 – 30mm long but thin slot at this point

- Cut or drill the marked slot carefully (third picture)
- Create the rudder cables with the two M3 ball links on rudder side first and fit them through the slot into the fuselage
- Then create the two M3 aluminum clevises ad crimp them on the servo side
- Double-loop the ends of the rudder cables in the back as well as in the front to make sure they won't slip out
- Crimp them to the correct length and allow a few mm of length adjustment with the threaded ends
- Then move the system from end to end to see that nothing is binding or rubbing


Engine, Canister, Spinner, Prop & Fuel Tank installation

Engine installation

- The firewall is all set with the perfect offset to match the cowling
- 23-25mm standoffs are needed for the engine mount
- We recommend to stand the plane up on its tail with the upper half of the cowling bolted
- Then use the motor with your standoff and the 5,5" spinner to perfectly line up the motor and drill your holes
- Before drilling bigger holes for M6 T-Nuts make sure your engine really is middle by assembling the whole cowling
- Now drill bigger holes to fit 4x T-Nuts from the back of the firewall and screw your engine with 4x M6 50mm bolts and M6 washers
- Don't forget to put a drop of Loctite on each of your engine bolts
- If you like you still can add 4x M6 washers with M6 stop nuts from the back

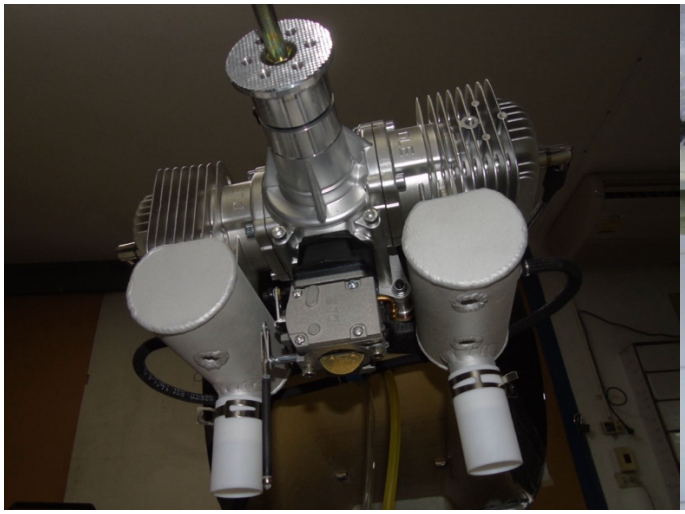
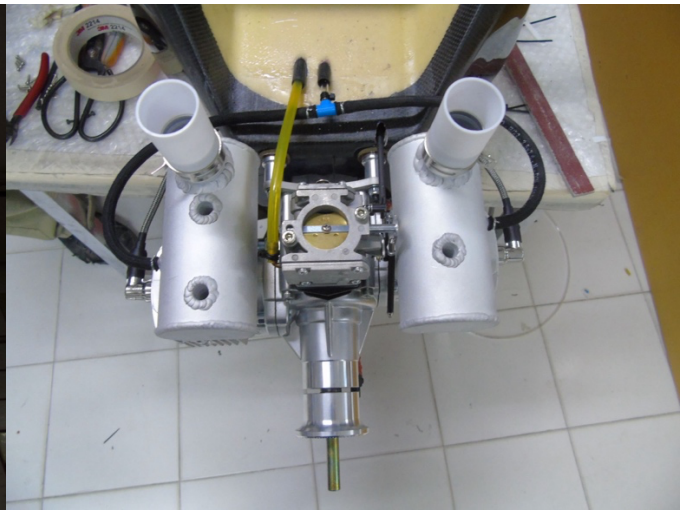
Canister installation

- The KIT has one canister mount included, which should be placed in the middle of the canisters
- Take your time to prepare and perfectly fit this mount into your MXS
- We recommend to secure your manifold/canister connection with screws between the clamps so the canisters cannot go off or turn so easiely
- The result should look pretty similar to what's shown in picture 4

⇩ Installation of the canisters mounted at the gear mount ⇩

- If you are going to use stock mufflers please just install them to your engine and cut the two holes into the lower cowling

⇩ Installation of stock mufflers ⇩

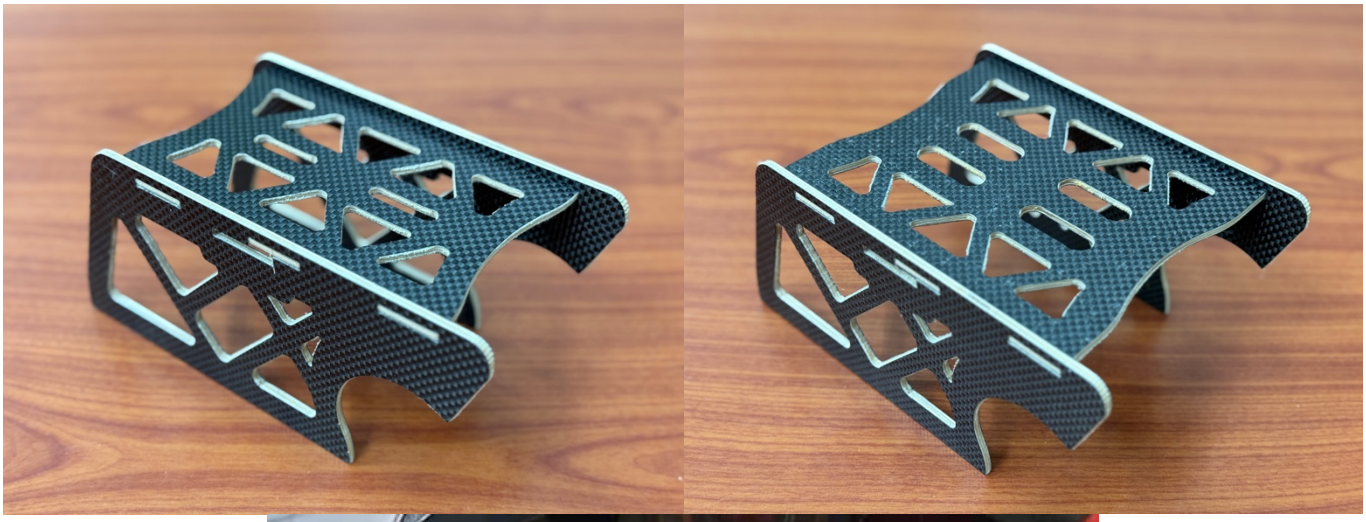
- If you want to install your ignition switch or smoke pump on the muffler compartment later you need to install some wood plates at your prefered positions from the inside of the muffler compartment

Propeller and Spinner installation

- After you have drilled the spinner backplate as well as the propeller you place them on the crankshaft pin
- You should be able to screw every single screw by hand until they are all in (if that's not possible you need to sand or extend the hole until it is)
- Thighten the propeller screws in a crossover and then thighen them clockwise
- Next you need to check if the spinner hatch fits along with your propeller and in case it doesn't extend the propeller slot all around to have a gap of approx. 3mm between the propeller and spinner hatch
- Then secure the spinner hatch with the in the spinner includud 6x flat round head screws


Fuel Tank installation

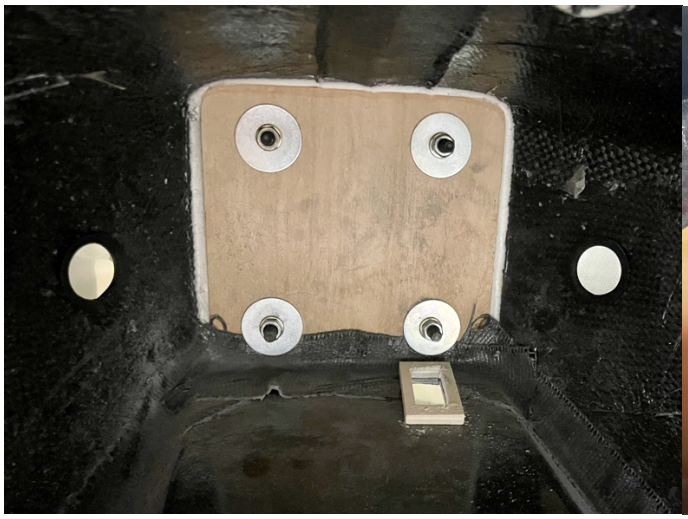
- There are two options for the fuel tank tray included in the woodparts KIT
- Option 1: Small fuel tank tray (1000ml fuel tank)
- Option 2: Wide fuel tank tray (1500m fuel tank)
- You should place the tray you need for your fuel tank in the center of the wingtube
- For both options you'll need to sand the position area and glue the tray to the wing tube as well as to the muffler compartment behind the wing tube (make sure the tray has a strong connection to the wing tube and muffler compartment)
- Before placing the fuel tank we recommend to put a 4mm brass tube in the fuel line to prevent the fuel line turning around
- To attach the fuel tank we recommend to put some welcro or double sided tape between the tank and the tray (put some welcro all around the fuel tank and tray as well)

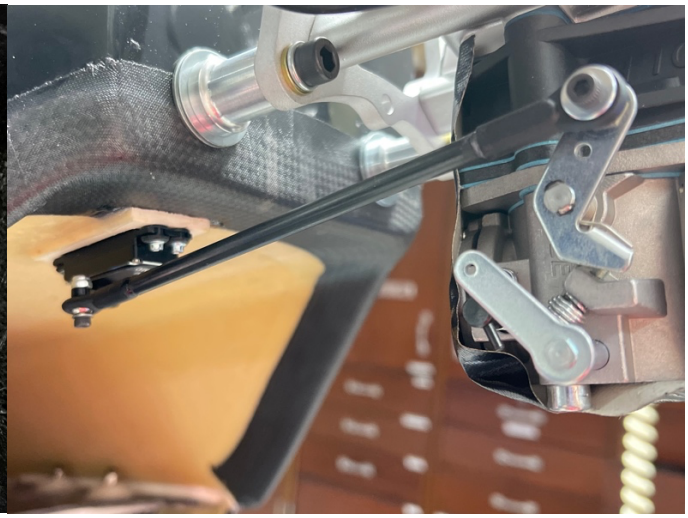


Throttle Servo, Ignition, Baffling & Air Exit

Throttle Servo installation

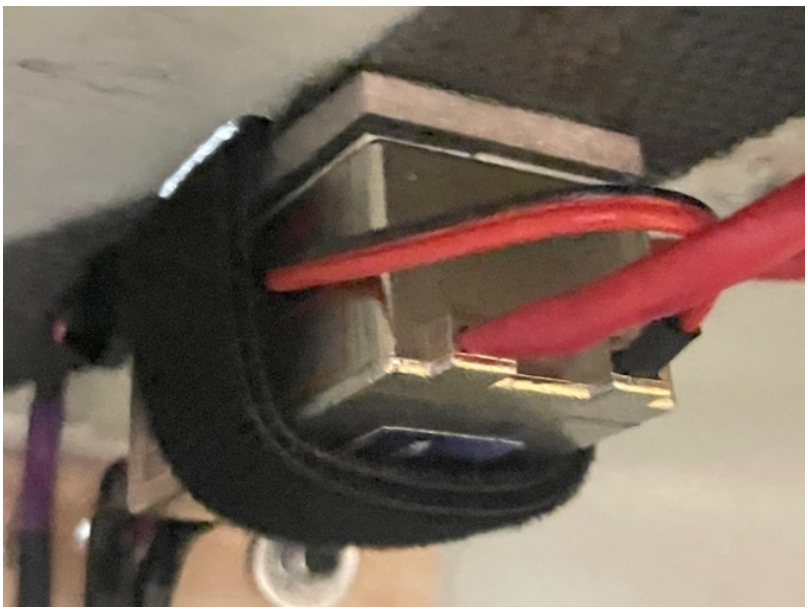
- Create a servo slow with a wood frame into the muffler compartment
- Place your throttle Servo in this servo slot and screw it with 4x Servo Screws from your Servo accessories
- Assemble the included throttle linkage (M3 thread, 2x M3 ball links, 2x M3 bolts, 2x M3 washers and 2xM3 stop nuts and if you prefer, but not included, a 3mm carbon tube)
- Use the throttle linkage to link the throttle arm with your servo arm
- We recommend to drill two holes with approx. 20 - 25mm diameter on the side of the firewall for your ignition caps





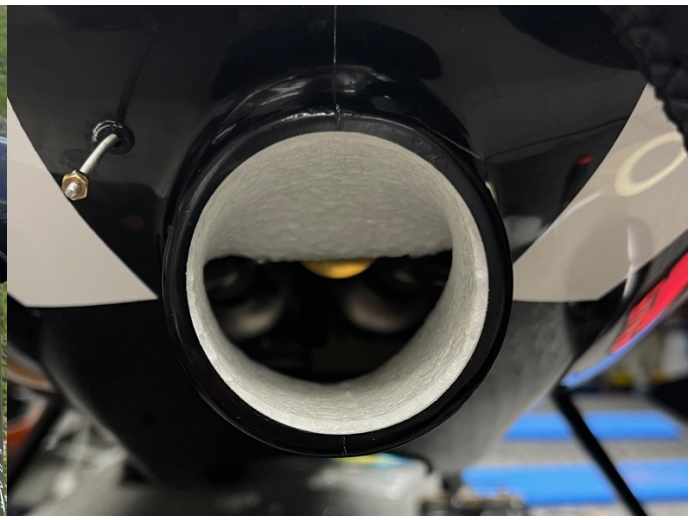
Ignition installation

- Take a small wood board more less the same size as your ignition and glue it to the top inside the fuselage front
- Drill two slots on the left and right side of your glued board for a strap of welcro
- An other option is two drill two approx. 4mm holes on each side of your glued board for two cable ties on each side
- Now you place your ignition to the installed board using double sided tape and finish the installation by put on your welcro or your cable ties
- With each of both (welcro or cable ties) you already can organize your ignition wires a little bit



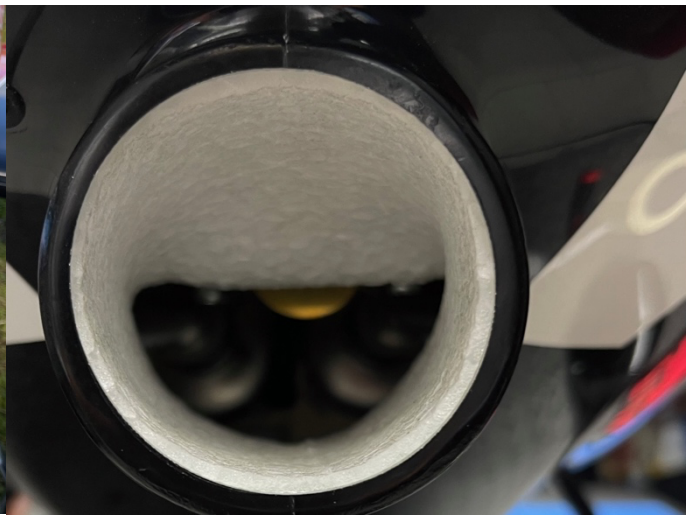
Cowling

- It's time for the cowling
- If you don't use a choke servo and you'll do it manually you need to attach a choke linkage to the your carburator and find the right spot to drill a small hole into the cowling
- Fit that choke linkage throught the hole and mount the lower cowling with the included M3 bolts first
- We recommend to use a good baffling for your engine what will be shown in the next step
- If you don't feel the need to use baffles you can mount the upper cowling with the M3 bolts at this point (otherwise you have to finish the next step before you install the upper cowling)



Baffling

- You can just use some soft styrofoam like epp to create easy bafflings which will adjust to the cylinders because of the cylinder temperature
- This is the best and easiest way to create bafflings for the cylinders and the carburator

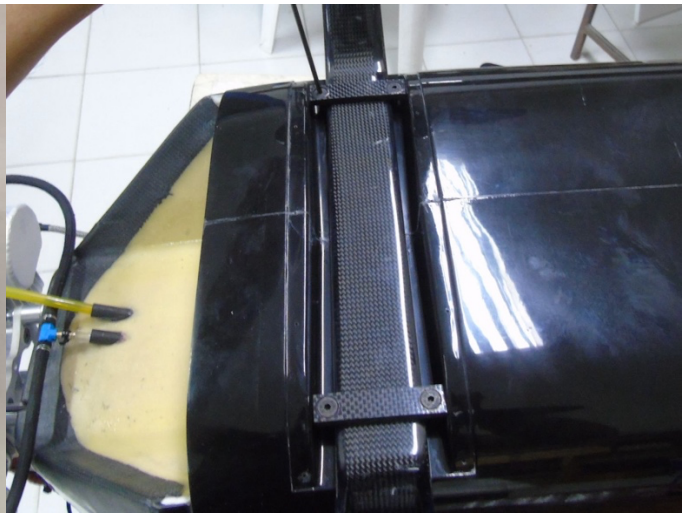
Air Exit & other things

- In case there will be a lot of heat in the muffler compartment you somehow have to open a part of the fuselage behind the landing gear mount
- We recommend to open the fuselage the same or similar way as shown in the first picture
- If you want to place something like your power supply or anything else on the muffler compartment you should add some wood or similar material in the muffler compartment to be able to thighten the screws correctly
- In case you like to mount your ignition switch or smoke pump in behind the firewall on the muffler compartment you need to place some wood parts inside the muffler compartment at the choosen positions

Landing Gear, Gear Cuffs, Wheels, Wheel Pants & Tail Wheel installation

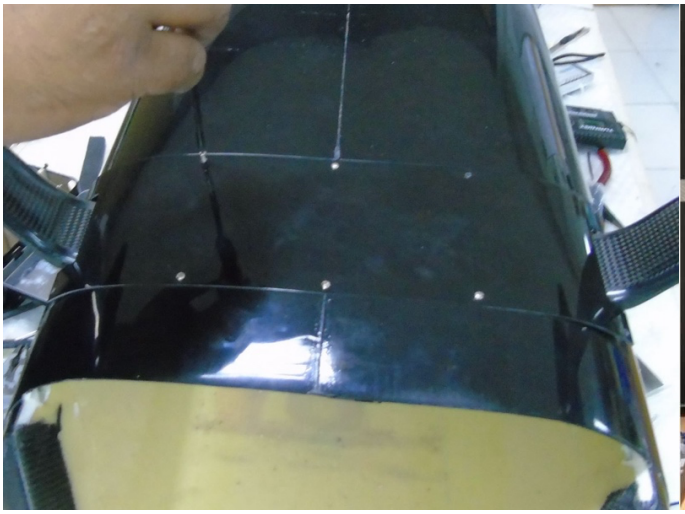
Landing Gear

- Take the included landing gear hardware to mount your landing gear to the fuselage
- Place your landing gear and middle it in the slot
- clamp it with the two carbon boards and their 4x M4 flat head bolts (a drop of loctide recommended)
- You don’t need to tighten them too much



Gear Cuffs

- Next up you put the gear cuff on (that's another way to check if your landing gear is middled)
- You can either drill 10 small holes and secure the gear cuff with 10 small screws or secure the gear cuff with clear tape (we recommend to use both, to prevent smoke oil from getting into the gear mount)
- Drill 5x holes on the front and the back of the gear cuff close to the edge
- Use 10x small sheet metal screws to screw your gear cuff to the fuselage

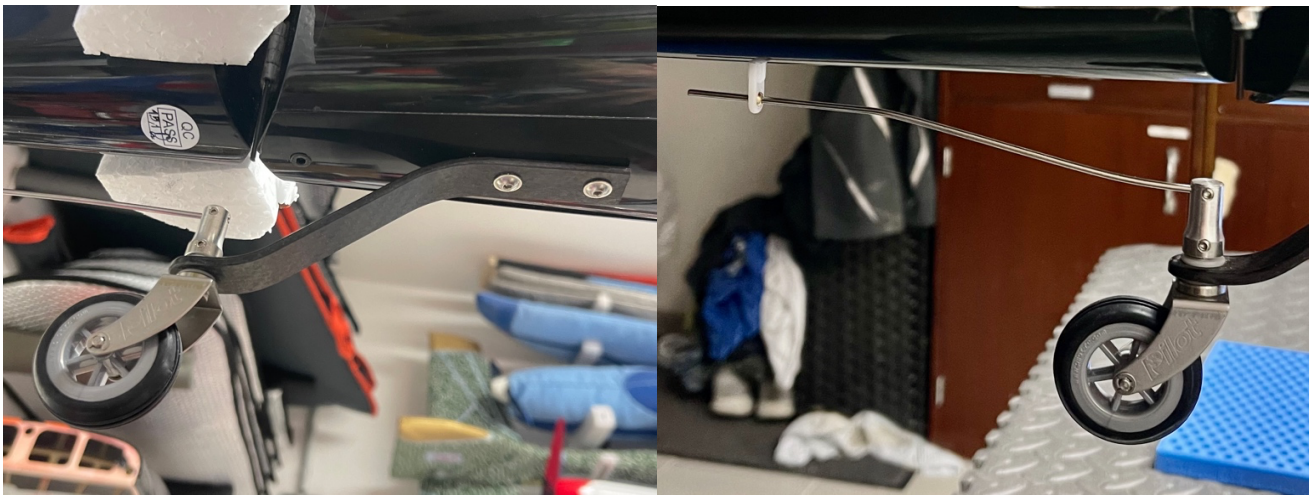



Wheels & Wheel Pants

- Mount your wheel axle to the landing gear and place your wheel on it
- Glue the included wood part into the wheel pants to later place the T-Nut to secure your wheel pant
- Install your wheel pant and secure it with a M3 bolt, a washer and a T-Nut from inside (a drop of loctide recommended)

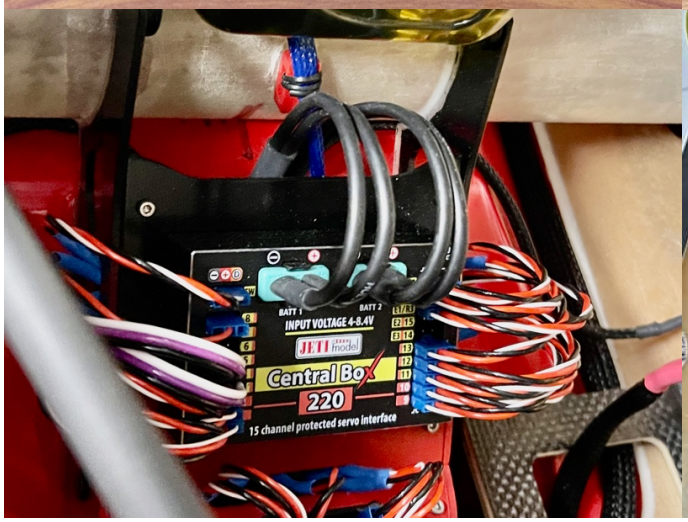

Tail Wheel

- Fix the tail wheel in position using tape and mark the spots where you need to drill two holes in your tail wheel and tail hatch
- During your tail wheel is preplaced put your rudder to full deflection and mark the maximum spot of the ball link for the steering pin (at full deflection there should still be approx. 10mm of the steel pin behind the ball link)
- Now install two M3 T-Nuts from inside the tail hatch
- Take the tail wheel off the fuselage and drill a hole in the bottom of the rudder as marked for the ball link
- Now you glue in your ball link into the rudder (use some thick epoxy or resin)
- It's absolutely enough to just glue the ball link, there is no need to put a wood block or similar on top
- Fit your steering pin into the ball link and mount your assembled tail wheel with 2x M3 bolts & M3 washers and a drop of loctide



RC Power System

- There are two options for the RC board
- Option 1: Small rc board (for central box 210/220 & similar)
- Option 2: Wide rc board (for Powerboxes & other wider power systems)
- You should install this rc board behind the wing tube onto the muffler compartment by using some thick epoxy or resin
- Mount your central box or similar power supplies on this rc board
- Please don't only use double sided tape to secure your power system (we recommend to use screws or at least welcro straps
- It's the heart of the plane and shouldn't be able to move or fall off and cause an accident
- If your system doesn't have mounts use some welcro, cable ties or design your own mount to secure it



Canopy installation

Even tho this pictures show the Extra330LX 2.6m canopy, it's exactly the same procedure with the MXS 2.9m canopy

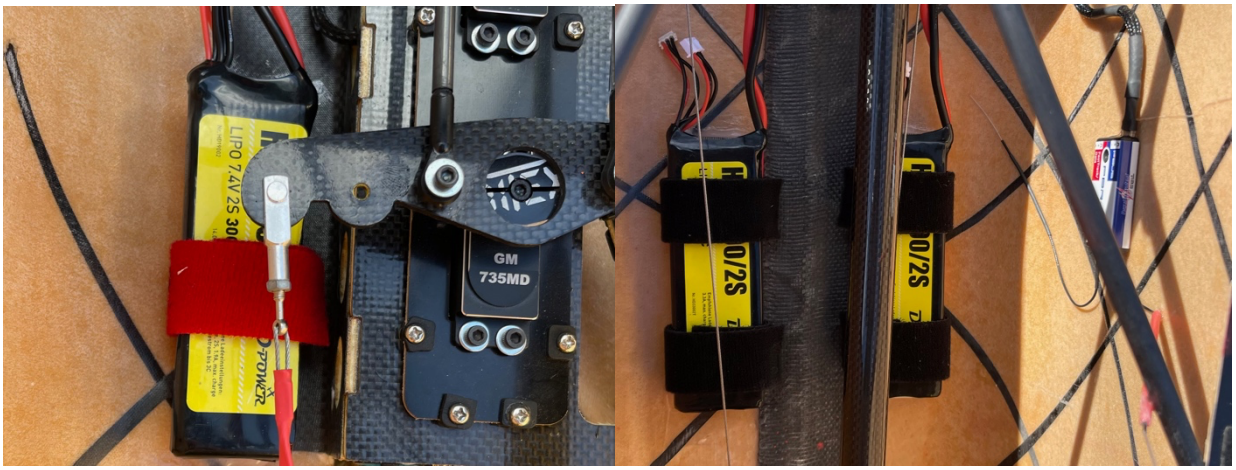
- The canopy needs to be trimmed at the cut line (we recommend trimming step by step and meanwhile see how the canopy fits)
- We recommend covering the canopy except the area which will be glued with some kind of protection (not done on the pictures…)
- As well as protecting the canopy frame with some tape
- Prepare yourself with a couple of small but strong magnets
- Fit in the canopy and glue it step by step all around with your canopy glue and put the magnets back on
- Wait until everything is dry and remove the magnets as well as the canopy and frame protection




Center of Gravity & Batteries

- **The center of gravity should be measured at the middle of the wing tube. If the plane takes the nose down the cg will be fine**

- The ignition battery can by placed on the left side of the rudder servo tray
- The two rx-batteries should be placed between the end of the canopy and the rear end of the elevator servo tray
- We recommend to mount the rx-batteries on the fuselage bottom or if you prefer they can be placed on sides left and right to have a little bit easier access



Final Settings

Control Throws:

You can set up all the control throws to the maximum possible travel. Then add between 35 – 60% Expo to the ailerons and the elevator, for the rudder 20 – 45% Expo should be enough.

For low rates you can reduce the elevator and rudder control throws by 35% and the aileron throws by 20%, but that is very much up to your personal preference.

Thank you for being a loyal customer, for choosing a fine and technologically very sophisticated aircraft over many other, maybe simpler built choices on the market. We are sure you will enjoy every minute of building and flying your Game Changer and taking the MXS 2.9m to its limits.

We hope you have enjoyed assembling your CARF-Models MXS 2.9m and you have many years of happy flying with it. If you have found yourself in difficulty and need some assistance, your sales rep is only an email away. Please contact your rep and they will endeavour to assist you, and get you back on track. Alternatively you can contact us via the emails below. We also welcome your feedback, please contact us if you would like to see something added or altered. We are always looking to improve our products and the information we supply.

www.carf-models.com

Hardware KIT Components MXS 2.9m

Part	Product	Quantity
Fuselage		
	Allen bolt M4x12mm	1
	Allen bolt M3x10mm	20
	Allen bolt M4x10mm	1
	Sheet metal screw 2.9 x 13 mm	22
	T-Nut M4	2
	Allen Bolt M4 x 12 mm	2
	Washer D4 mm	2
	T-Nut M3	3
	Allen Bolt M3 x 12	3
	Washer D3 mm	3
CNC Milled Parts		
	Carbon Servo arm for stab	1
	Carbon Servo arm for rudder	1
	Carbon Servo arm for aileron	2
	Servo mount Wing (Aileron)	2
	Servo Mount Fuselage (Elevator & Rudder)	2
	wood part set Plywood-Carbon	1
	throttle servo mount	1
Landing Gear & Wheel Pants		
	Allen bolt M6x70mm	2
	Stop nut M6	2
	Nut M6	2
	Washer M6	4
	Wheel Collar M6	4
	Sheet metal screws 2.9x13mm	18
	Counter sunk M5x40mm	4
	Carbon bracket Landing Gear	2
Wings L/R		
	All Thread M3 x 57mm	4
	Allen bolt M3x20 mm	8
	Stop nut M3	24
	Plastic ball link M3	8
	Washer M3	48
	Sheet metal screws 2.9x16mm	24
	Plastic nut M6	2
	Allen bolt M3x12mm	16
	Allen bolt M3x16mm	2
	Stop nut M3	2
	All Thread M4x130mm	2
	Nut M4	4
	Steel clevis with pin d4 / M4	2
	Plastic Ball Link M4	2
	Carbon tube outside 6mm,inside 4mmx110mm	2
Elevator		
	Allen bolt M3x12 mm	2
	All Thread M3 x 57mm	2
	Washer M3	24
	Stop nut M3	12
	Allen bolt M3x20 mm	4
	Plastic ball link M3	4
	Sheet metal screws 2.9x16 mm	12
	Allen bolt M3x12 mm	8

Rudder		
	Allen bolt M3x12 mm	8
	All Thread M3 x 57mm	2
	Plastic ball link M3	4
	Stop nut M3	12
	Washer M3	24
	Allen bolt M3x20 mm	4
	Sheet metal screws 2.9x16 mm	12
	Plastic ball link M3	2
	Steel cable 0.8 mmx1500 mm	2
	Allen bolt M3x20 mm	4
	Crimp tube 2.8	8
	Stop Nut M3	2
	Nut M3	4
	Threaded end with hole for steel cable	4
	Aluminum clevis M3 with Pin and Clip	2
Spare Item	Plastic Ball Link M3	1
	Plastic Ball Link M4	1
	Steel clevis alu with clip d4 / M4	1
	Aluminum clevis M3 with pin and clip	1