RCRCM DORADO

Assembly Guide

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1. INTRODUCTION

The Dorado is a high performance composite sailplane designed for unlimited aerobatic flight across a wide speed range. The airframe is a natural progression from the highly successful Vector III, but features a completely new wing, tail-plane and fuselage design, with a revised ballast system for greater performance and energy retention.

2. KIT COMPONENTS

The following items are included in your Dorado kit:

Number	Description	Weight (gms)
2	Tailplane Panels	32 (per panel)
2	Wing Panels	530 (per panel)
1	Fuselage / Rudder / Canopy	315
1	Wing Joiner	110
4	Wing Servo Covers	NA
4	Wing Servo Trays	NA
1	Tailplane Joiner	NA
1	Tailplane Locating Pin	NA
1	Fuselage Ballast Tube	NA
1	Fuselage Servo Tray	NA
4	Aileron / Flap Pushrods	NA
3	Threaded Couplers	NA
11	M2 Clevises	NA

3. MATERIALS REQUIRED FOR COMPLETION

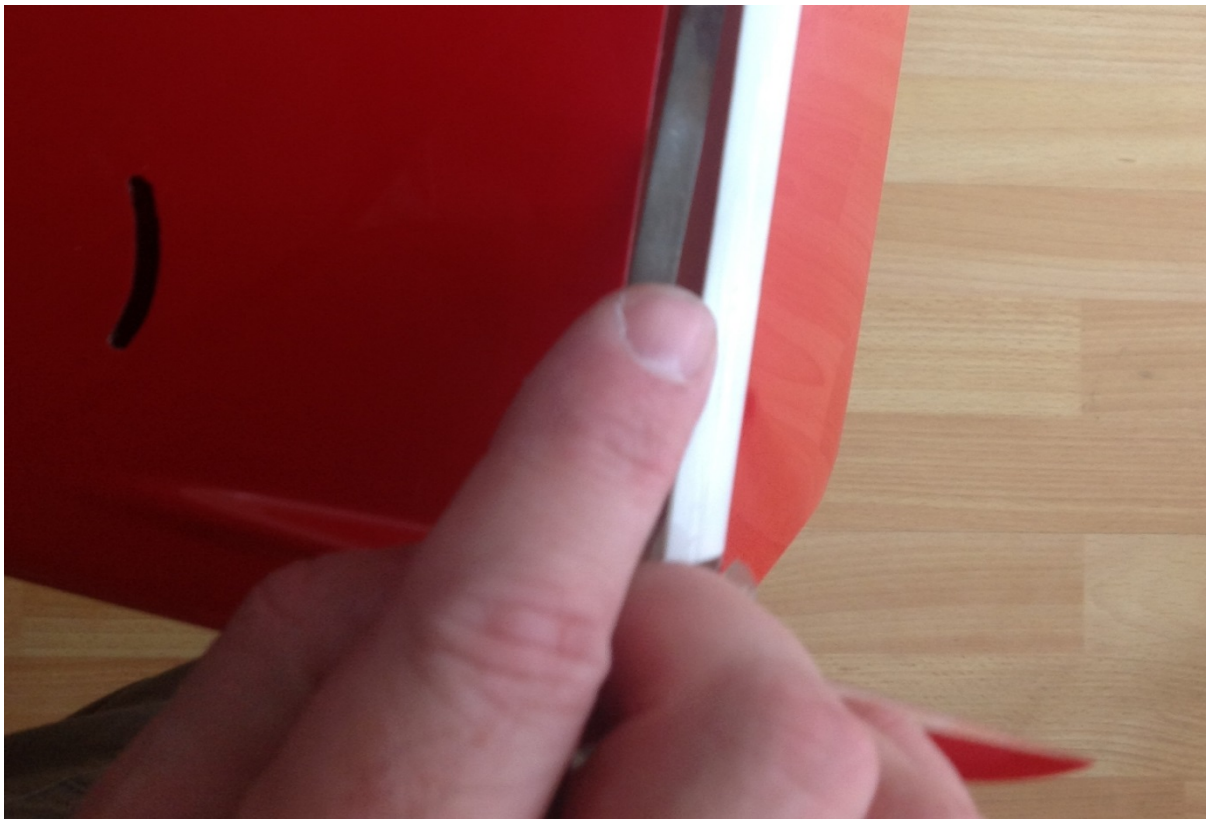
The following materials are required to complete the assembly of the Dorado.

- Soldering Iron / solder
- Servo wire
- Heat shrink tubing
- Multiplex green connectors (2x pairs)
- 4x wing servos
- 1x Elevator servo
- 1x Rudder servo
- 1x Switch
- 1x Receiver 2.4ghz
- 1 x Receiver battery (4x 1600 AF)
- Lead nose weight
- Ballast set (fuselage and wing)
- 1 x roll of Diamond Tape (or equivalent)
- Wing Bags: Optional
- UHU Plus 24 hour Araldite
- Z-Poxy 30minute
- 1 x bottle of Cyanoacrylate glue (Pink Label Zap)

4. PREPARATION

There are a number of tasks which need to be performed to ready your Dorado for assembly. To begin, please ensure that all parts connect smoothly and accurately, with minimal effort. If considerable pressure has to be applied to any component in order to rig the airframe, then work needs to be undertaken to relieve the affected part(s). Begin by checking that the wing and tailplane components slide onto their respective joiners. Use high grit (smooth) glass paper (wet) to relieve the joiners until a smooth fit is obtained. Now check that the wing torsion pins align with the fuselage holes, fore and aft of the joiner. Gently relieve with a smooth, round file until the wings connect with minimal effort. Please take care not to remove too much material. Should difficulty be experienced when connecting the tailplane through the fuselage bell-crank, it may be necessary to (horizontally) slot the pre-drilled hole for the rear tailplane locating pin.

Once the components have been adjusted for correct fitment, please check the hinges on both the wings and rudder. If the hinge is found to be tight, gently fold the surface back until the internal hinge line is exposed and run a fine file or high grit glass paper along the length of the hinge line, until a smoothly actuating control surface is achieved. Please take care when neutralising the control surface to ensure that the wiper slides back inside the trailing edge wing skin. Please note that to obtain the required 30mm rudder movement, you may need to remove a small amount of material from both the leading edge of the wiper and trailing edge skin of the fin.

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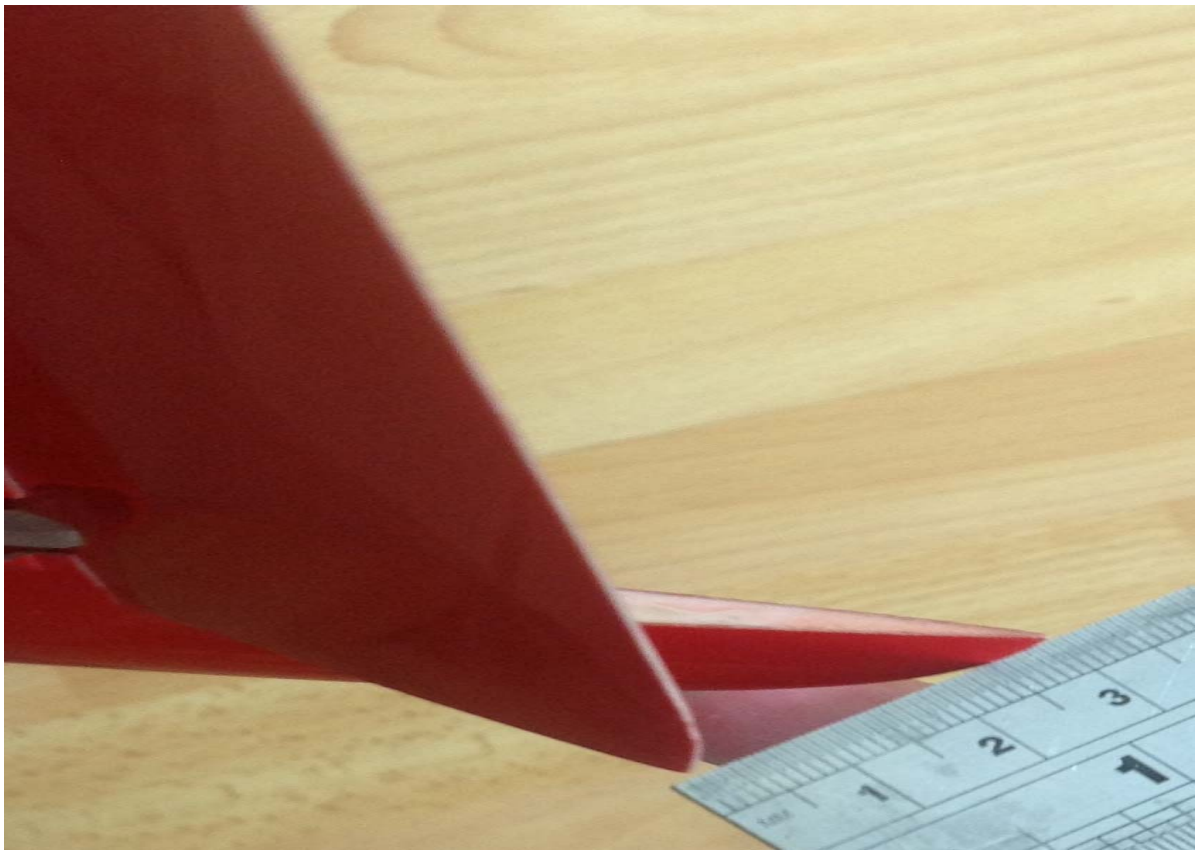
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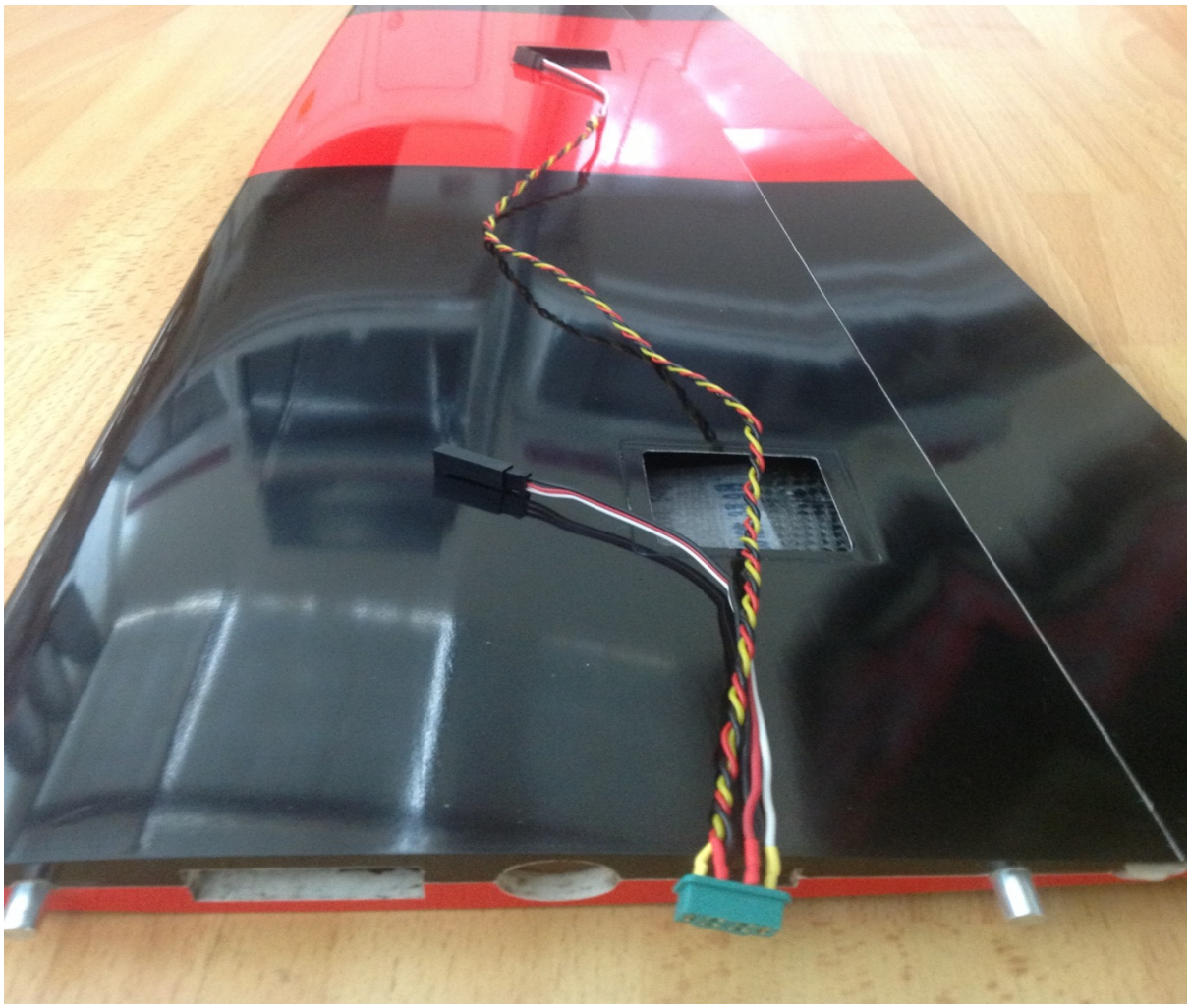
5. ASSEMBLY

5.1 Wiring Harness

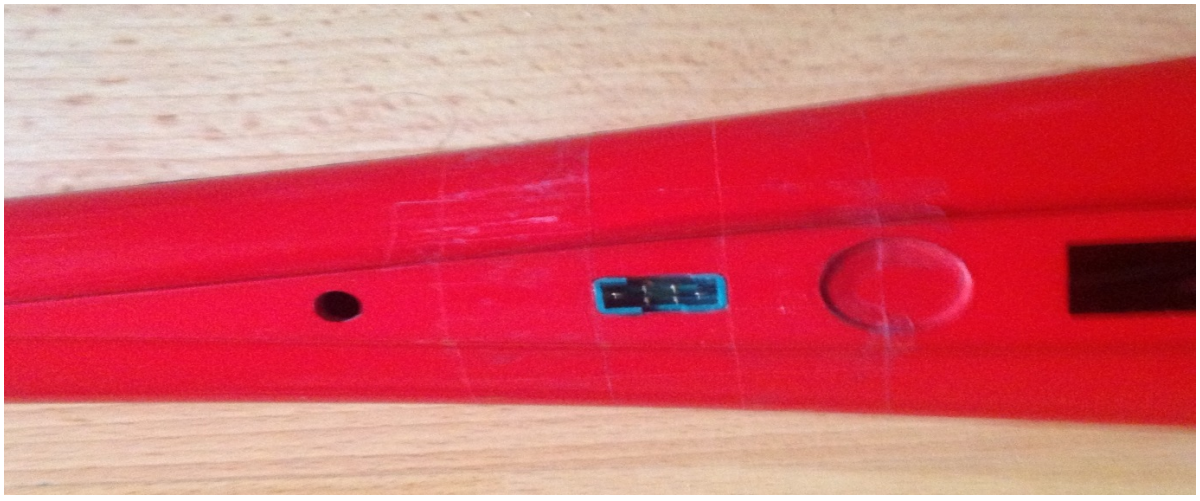
Use Multiplex 6-pin green connectors. We would suggest that you solder Futaba sockets to the wing wiring loom to enable the servos to be removed, should a gear be stripped or servo top damaged during a heavy landing. Please use a heat shrink tubing to prevent electrical shorts between the positive and negative leads. Also, ensure that the Multiplex plug is installed into the wing and corresponding Multiplex socket installed into the fuselage. In this way the wing torsion pins provide a degree of protection for the protruding plugs, especially when the wing is stood on its end for storage. Temporarily install the fuselage servo tray and establish an accurate receiver position, before cutting the fuselage wiring loom to length. The receiver should be located in front of the servos.

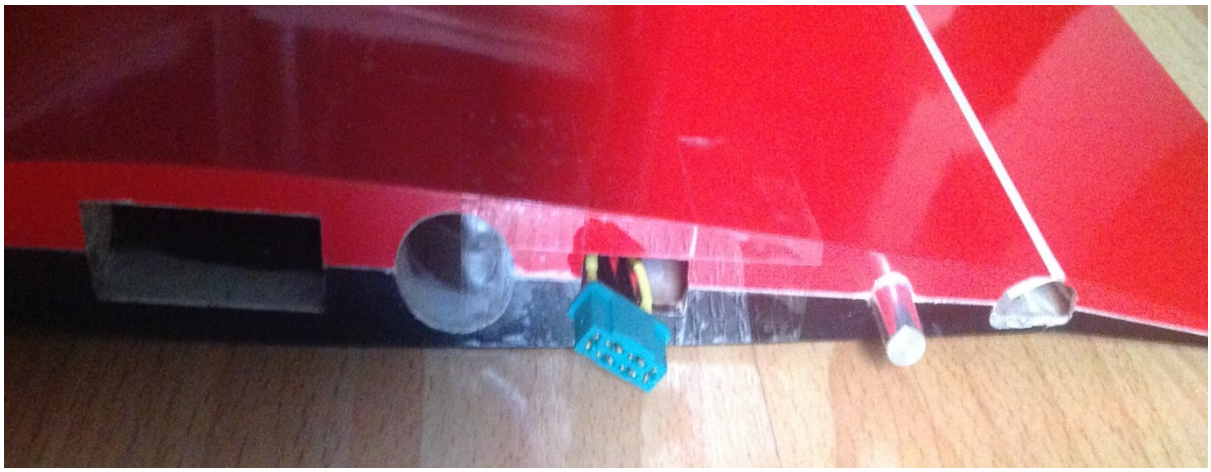


5.2 Wing / Fuselage Connectors

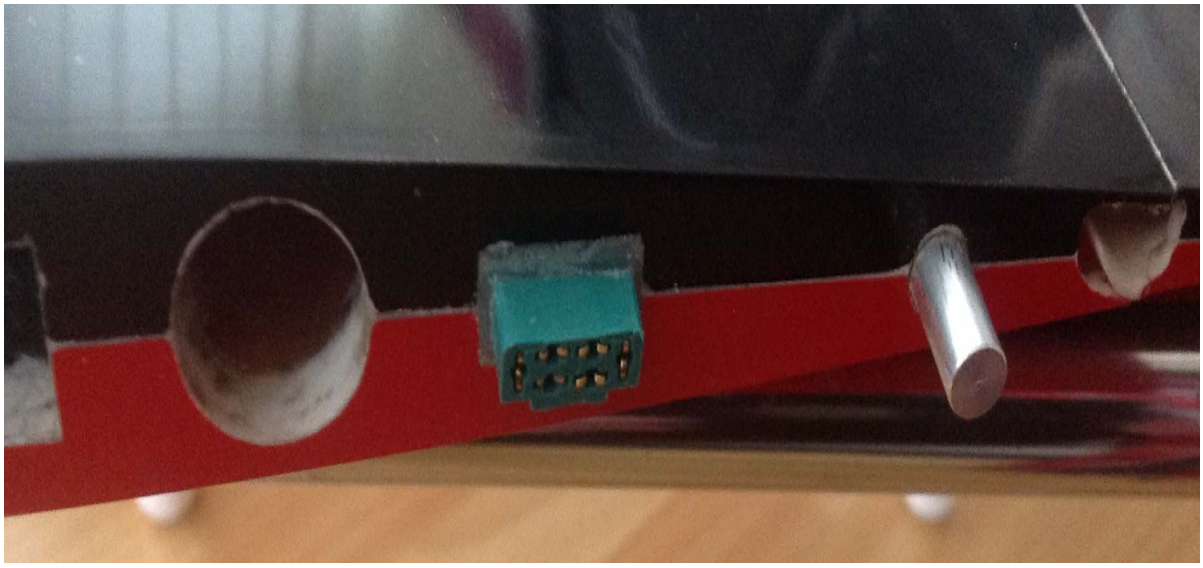
Upon completion of the wiring harness, carefully roughen the green Multiplex plugs with the tip of a scalpel and/or a needle file. Additionally (and assuming that you have chosen to install the sockets into the fuselage), gently ease the fuselage aperture until the socket fits flush to the fuselage moulding.

Now connect the plug and socket together and install the wing joiner. Align the socket so that it is parallel to the joiner, and carefully apply a few drops of cyanoacrylate glue to the edge of the socket. Once cured (which should take a matter of a few seconds), remove the plug from the socket, and repeat the process for the opposite wing. Upon completion, mix a small amount of 30 minute epoxy with micro-balloons and apply to the inside of the fuselage at the joint. Once the fuselage sockets have been secured, apply Diamond tape to the wing root and fuselage juncture to prevent excess epoxy from adhering to the components.





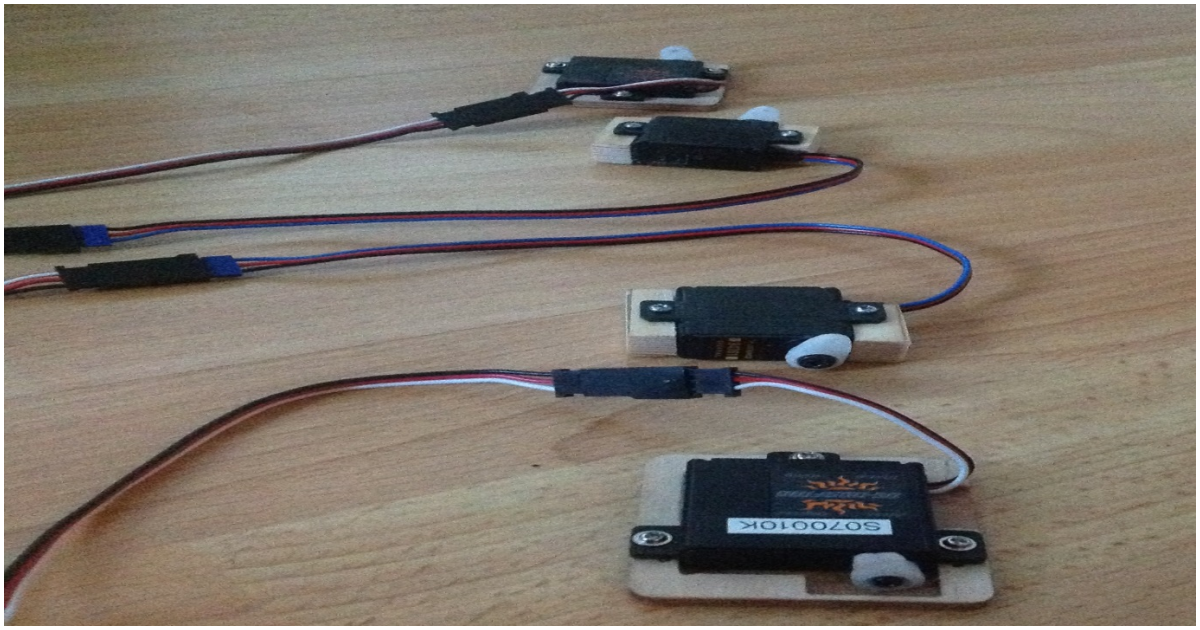
Now run the wing harness inside the wing and connect the wing plug to the fuselage socket. With the joiner installed, attempt to push the wing fully home and check for alignment. If the wing does not mate to the fuselage correctly, carefully remove the wing and open up the hole in which the plug is to be glued. Repeat this (trial and error) process until the wing fits correctly with the plug and socket connected. Upon completion, and operating on one wing at a time, mix a liberal amount of 30 minute epoxy and apply to the hole in the root rib. Now, slide the wing back onto the fuselage and carefully connect the wing plug to the fuselage socket, and push the wing fully home. Tip the fuselage, so that the wing tip is pointing upwards, allowing the epoxy to flow down to reinforce the joint. Prop the airframe in this position until the epoxy has cured, and repeat for the opposite wing. Some gentle fettling and a clean-up operation with a scalpel may be required once the wings have been disconnected from the fuselage and the diamond tap removed.



5.3 Wing Servo Installation

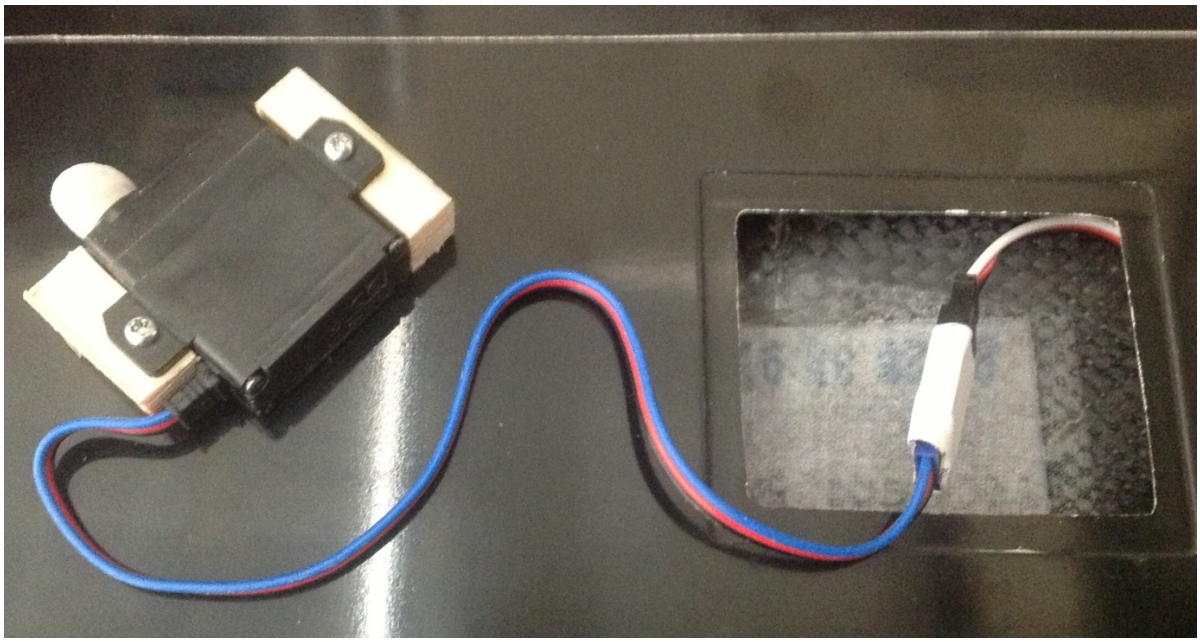
The Dorado wing offers generous thickness at the position of the main spar, but thins significantly towards the trailing edge of the wing. For this reason it is preferable (but not necessarily mandatory) to install 12mm servos for the flaps and 10mm servos for the ailerons. Begin by roughening the carbon reinforcement located within the servo wells with low grit (coarse) sand paper.

Upon completion, mount the servos on to the plywood plates provided, or your preferred choice of servo tray, and connect the servos to the receiver (you should need to connect the wings to the fuselage to achive this now!), and with the radio switched on, centralise all servos. Now, crop the servo tops for the flap and aileron to provide a single arm for operation, using the inner most hole for the clevis. To achieve a mechanical differential, rotate each servo top one-click from neutral on the servo spline. The orientation of the servos arms can be seen in the following picture:



For the flap servos, the rake of the arm should extend forwards towards the main spar, and for the ailerons,the arm should be raked back towards the trailing edge of the wing. In this way, the geometry will support a significant amount of downward flap and upward aileron.

If you have chosen to make the servos removable from the wiring harness, ensure that you tape the respective plugs / sockets before installing the servos in to the wing.



Now, neuralise the control surfaces (tape in place if required) and centrally position the servos in the wing wells to enable the required length of pushrod to be established. The measurements of 58mm (flaps) and 52mm (ailerons) should be used as a guide. Once calculated, make up the pushrods ensuring that the clevises are filed to enable rotation around the servos spline for extra movement.

With the radio switched on (and servos centralised), connect the pushrod to the control surface horn and servo top, and rehearse the process for applying epoxy to the servo mount. Once satisfied with

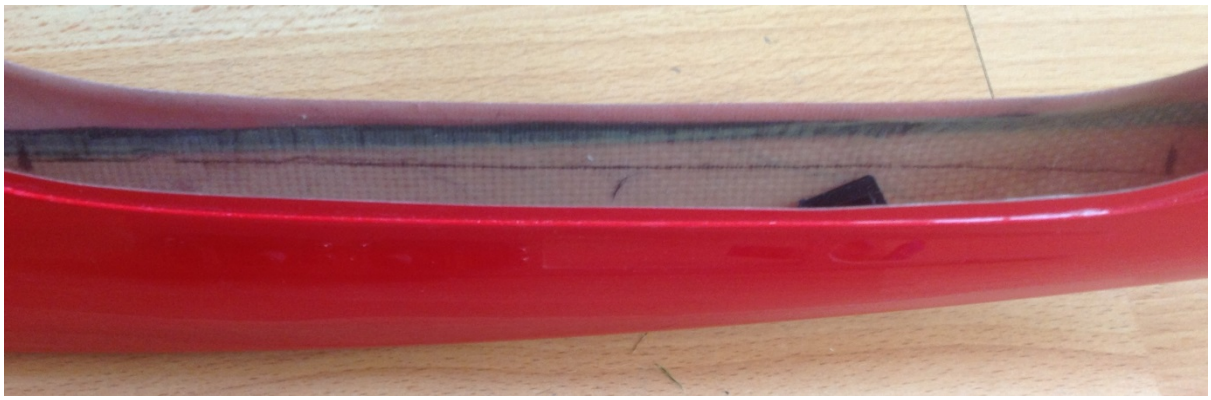
the process and anticipated outcome, apply the epoxy (preferably UHU 300 or equivalent) to the servo tray and centrally locate the servo within the servo well. Now, neutralise the control surface, and apply masking tape to the various junctures (wing tip to aileron, aileron to flap, flap to wing root) to hold in place until the epoxy cures. It is possible to apply cynoacrylate glue around the edge of the servo trays if an immediate bond is required, but it remains necessary to allow the (underpinning) long setting epoxy to cure over a period of 24 hours. Repeat this process for all four wing control surfaces. Now, sand the wing servo covers to shape and adhere to the skin using Diamond tape.

5.4 Fuselage Installation

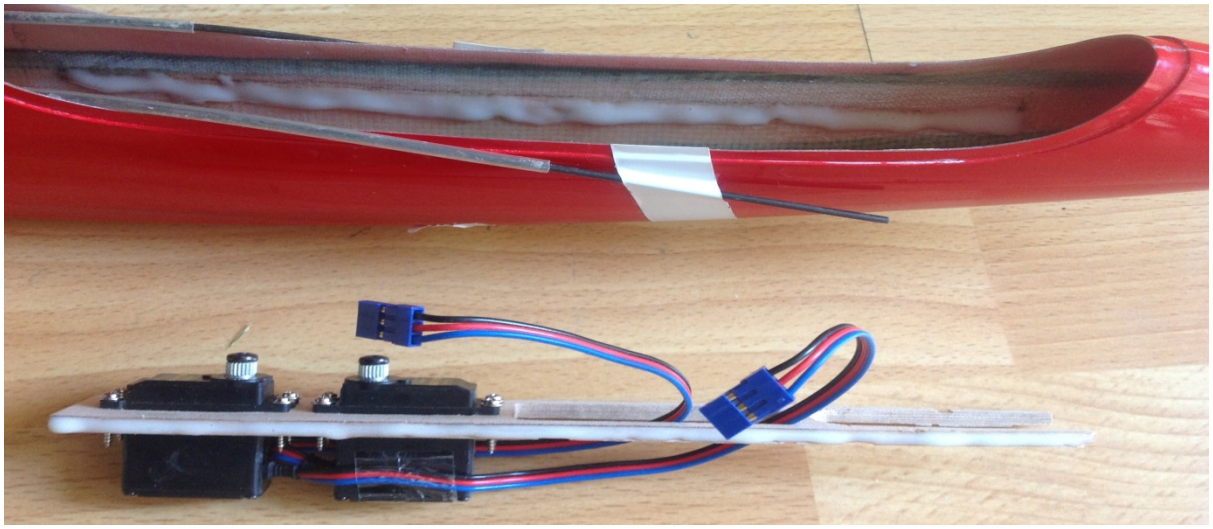
Begin by connecting the pushrod to the rudder. This is a simple job which only requires the surface of the carbon pushrod to be roughened with glass paper, and glued to the threaded coupler using 30 minute epoxy. Upon completion, screw the clevis on to the coupler and connect to the rudder horn.

Now, install your chosen servos on to the supplied plywood servo tray. The holes may need to be adjusted to accommodate the servos, receiver and battery. 12mm servos with a torque rating of 4kgs and above should be used for the elevator, and preferably the rudder. Once satisfied, drill the plywood tray and screw the servos in to their respective locations.

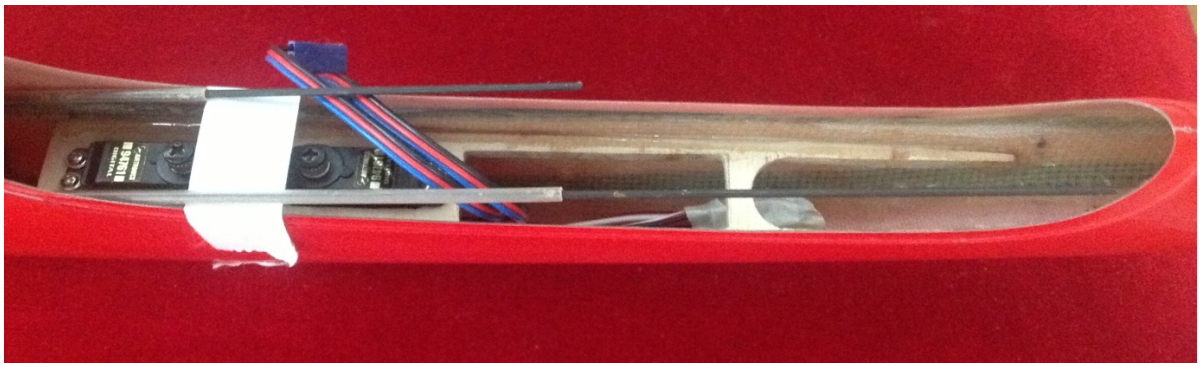
Upon completion, mark the position of the servos tray on the inner fuselage skin. Please ensure that sufficient clearance is provided to enable the wiring harness to pass under the elevator / rudder servos. The receiver battery should also be made to be removable, and sufficient space provided for the required amount of nose weight (circa 188 gms for a 98mm C of G).



Once satisfied, roughen the inside of the fuselage above and below the prescribed line and apply UHU 300 (or equivalent) to **both** the fuselage and servo tray.



Once installed, tape the pushrods to the sides of the fuselage to ensure that excess epoxy does not compromise the smooth actuation of the elevator / rudder, and leave to cure for 24 hours.



Once cured, intall the servos tops (with coupler / clevis attached), centralise the elevator and rudder servos, and cut the pushrods to the required length (a fine toothed razor saw is ideal for this operation). Upon completion, roughen the pushrod inners with high grit (smooth) glass paper and glue the couplers to the pushrods using 30 minute epoxy.

Please ensure that the pushrod outers are appropriately secure from the wing root forward. This is easily achieved by creating two plywood formers for installation in the fuselage under the wing joiner, and to the rear of the canopy aperture. Use a minimum of 1/8" plywood for this task, and adhere with UHU 300 (or equivalent). Now install the receiver, switch, battery and nose weight (188gms).

5.5 Ballast Tube Installation

The fuselage ballast tube can now be installed. The tube routes above the wing joiner and connects to the base of the fuselage boom behind the wing fairing. The front of the ballast tube is retained by a 1/8” plywood former located to the immediate rear of the canopy aperture. The former should be made by transposing the rear shape of the canopy on to the plywood sheet (i.e. drawing arount it), and drilling / filing a hole through which the ballast tube can be inlet. An off-cut of threaded rod or any spare piano wire can be used to create an ‘L’ shaped pin to secure the ballast within the tube. Please take care when drilling the ballast tube to ensure that the hole doesn’t run from centre.

Before installation, trial fit the ballast tube and front former to ensure that the wing joiner and canopy sit correctly, with the ballast tube in position. Once satisfied, apply a liberal amount of clear silicon to the rear end of the ballast tube, and route the tube down the fuselage. Now, apply the UHU 300 (or equivalent) around the edge of the plywood former, and slide over the ballast tube to the intended position within the fuselage. Apply an additional fillet of UHU 300 (or equivalent) around the front of the tube to adhere to the plywood former. Leave to cure for 24 hours.

5.6 Ballast Slugs and Spacers

The Dorado features three ballast tubes, one within each wing panelandone in the fuselage. Using a 17mm OD brass tube, ballast slugs can be made to the following specification:

Component	Number of Ballast Slugs	Ballast Slug Length (mm)	Ballast Slug Weight (gms)	Total Ballast Weight (gms)
Fuselage	3	105	215	645
Left Wing	1	155	320	320
Right Wing	1	155	320	320
			Total	**1285**

**Please note that to maintain the C of G at 98mm from the leading edge of the wing, an 18mm insert should be permanently installed at the rear of the ballast tube.

Additionally, 2 x 105mm wooden spacers (dowels) should be made to enable ballast adjustments within the fuselage. The spacers can be wrapped in a bright tape to aid visibility, should they be dropped in long grass!

6. TRIMMING AND FLYING

Wait for a day with good visibility and an 5-8 m/s wind square to the slope. Ideally, begin the flight testing without any ballast on board the airframe to test the C of G (which should be 98mm from leading edge for initial flights), control throws and landing configurations. Once confidence grows with the handling of the model, begin to add more ballast until such time that the optimum setting is found between inertia and agility. The following settings provide a safe starting point for initial flights.

Recommended Control Throws			
Control	***Direction***	***Throw (mm)***	***Comments***
Elevator	Up	10 - 12	
	Down	10 - 12	
Rudder	Left	30	
	Right	30	
Aileron	Up	20	Measured at flap / aileron juncture.
	Down	15	Reduce to 10mm for thermal mode.
Landing (Flap)	Down	38	Measured at wing root.
Landing (Aileron)	Up	10	Measured at flap / aileron juncture.
Landing (Elevator)	Down	6	
Thermal (Flap)	Down	3	Measured at wing root.
Thermal (Aileron)	Down	Align to flap	
Snap (Flap)	Down	3	Disable mix for thermal and landing modes.
Snap (Aileron)	Down	Align to flap	Disable mix for thermal and landing modes.
Snap (Flap)	Up	3	Disable mix for thermal and landing modes.
Snap (Aileron)	Up	Align to flap	Disable mix for thermal and landing modes.
Flapperon (Flap)	Up	10	Disable mix for thermal and landing modes.
	Down	7.5	Disable mix for thermal and landing modes.

WE WISH YOU MANY HAPPY FLIGHTS WITH YOUR RCRCM DORADO!!