



**BUILDING INSTRUCTIONS - OPERATING MANUAL**

**Whisper V. 2.0a ENG - 30/10/2003**

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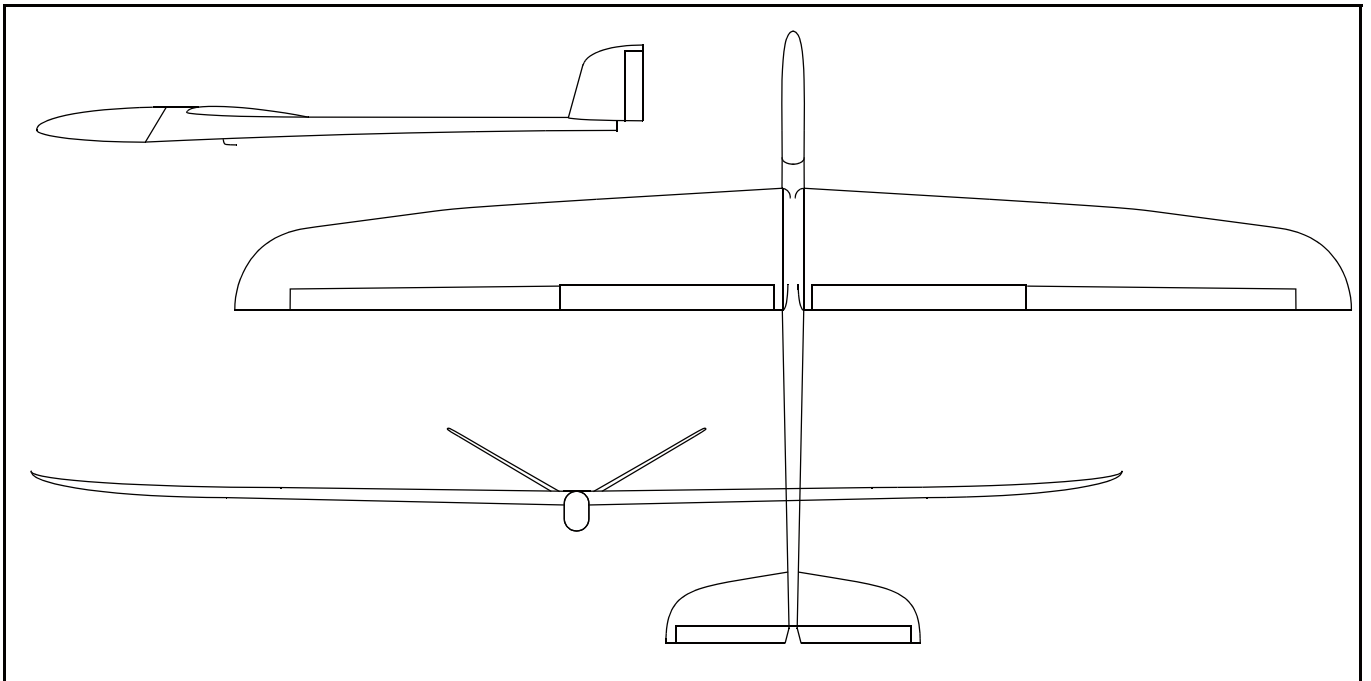
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# Whisper

## Technical data

The Whisper is a general purpose glider designed to offer the best performance in almost all flying conditions, and even if it is realized using a very high technology it will not need a “very high tech pilot” to get most out of it. All moulded fiberglass carbon reinforced wing with glass/carbon spar, SD 7037 profile to offer high performance and a very broad flying speed range; fiberglass carbon reinforced fuselage suited for slope soaring and towing and), all moulded tailplane to improve control at all flying speeds.



*Fig.1: Whisper.*

**Table 1: Technical data**

Wingspan:	2040 mm
Wing area:	about 34 dm <sup>2</sup>
Length:	1100 mm
Weight:	min. 1150 g
Profile:	SD 7037
Radio control	6 channels

Controls: ailerons, elevator, rudder, flaps (optional).

## Versions

Two version of Whisper are available:

- **ailerons only**: suited for most of flying condition and site, is lighter, easier to set up, requires only two servos in the wings;
- **ailerons and flaps**: with ailerons and flaps you may change the wing profile camber and improve the flight performances of the model and take advantage of the powerful crow brake when needed, but you will need a transmitter able to deal with 4 servos in the wings.

## CHAP. 1 PART LIST, MATERIALS AND TOOLS LIST

### 1.1 Components included in the Whisper kit

Table 2: Supplied items

COD.	QT.	Item	Remarks
FUSO	1	fuselage	fiberglass carbon reinforced
CONO	1	fuselage nose	fiberglass
BAIO	1	wing joiner	8 mm steel rod cut to size
RINV	2	control steel rod for elevators	steel with 2MA thread
MNCT	2	bushing	metal - hole 2 mm, with 2MA thread
UNIB	2	nylon uniball	with 2MA thread
GIUN	2	ball for uniball	with 2MA thread
ASCO	2	threaded rod	steel, 2MA threaded end
FORC	4	clevises	2MA thread
DADO	4	nut	2MA thread
CONF	2	female connectors	4 poles
SADX	1	right wing	balsa fiberglass sandwich with carbon spar
SASX	1	left wing	balsa fiberglass sandwich with carbon spar
PCDX	1	right elevator	balsa fiberglass sandwich with carbon spar
PCSX	1	left elevator	balsa fiberglass sandwich with carbon spar
CONM	2	male connectors	4 poles
CAVS	2	servo wire cable	triple, 35 cm long
FILO	2	servo signal wire cable	35 cm long
BOCC	2	aileron horn threaded bush	brass threaded M3
PERN	2	aileron horn screw	brass threaded M3

Table 3: Added items for flap version

COD.	QT.	Item	Remarks
BOCC	2	flap horn threaded bush	brass threaded M3
PERN	2	flap horn screw	brass threaded M3
ASCO	2	threaded rod	steel, 2MA threaded end
FORC	2	clevises	2MA thread
DADO	2	nut	2MA thread

## Decal

If you like, you may stick the decal we supply with the kit.



Fig.2: Decal "Whisper".

## 1.2 Parts needed to complete the kit but not included

These are the parts you will need to complete the model (see "List of parts you will need to complete the model") and some you may need as option.

### List of parts you will need to complete the model

To complete the model you will need the following:

**Table 4: Part needed to complete the model (NOT INCLUDED))**

COD.	QT.	Item	Remarks
SERW	2	aileron servo + servo holders	suggested: HITECH HS 85 MG or HS125MG
SERV	2	v-tail servo	suggested: HITECH HS 81 MG
RXCH	1	receiver with xtal at least 6 channels	small size receiver required max: 60x30x20 mm (but no park flyer or short range receiver, the large amount of carbon and of servo wire extension requires a very good receiver)
INTE	1	ON/OFF switch	max. dimensions: 35x25x25 mm
BATT	1	rx battery	NiCd or NiMH, 4 pcs., AA size, from 1100 to 2800 mAh
UNI2	2/4	cables with UNI connector	length: 30 cm

Note: Not included in the table are glues and small parts that should obviously be present in every modeler's house.

**Table 5: Option parts for flap version (NOT INCLUDED))**

COD.	QT.	Item	Remarks
SERW	2	flap servo + servo holders	suggested: HITECH HS 85 MG or HS125MG
UNI4	2	cables with UNI connector	length: 30 cm

## Optional parts

### Model carrying bag

it is available a special bag to safely carry your model around (see figure 3).



*Fig.3: Carrying bag.*

Completely hand made, have separate place for the wing panels, v-tails, wing rod, and fuselage.

### Towing parachute

Hand made very strong towing parachute to help in successful winch towing (see figure 4).



*Fig.4: Towing parachute.*

## 1.3 Tools and materials needed (not included) to complete the kit

### Tools

These tools may help you while assembling the kit:

- electric drill;
- cutter;
- solder;
- hair drier (at list 1000W);
- sandpaper 400 and 180 grit;
- set of files;
- usual tools like screwdrivers, pliers, etc.;
- Z-Bend pliers;
- some cleaning paper.

Note: other tools may help you too...

### Materials

To complete the model, You need the following materials:

- super-glue (CA, cyano, like Green ZAP);
- 5 minute epoxy;
- tape;
- double adhesive tape, thin;
- about 200 grams lead or more;
- some filler “micoballons”.

Note: other materials such as paints, brushes, pencils, etc. are not mentioned.

**WARNING! PAY ATTENTION TO THE SAFETY INSTRUCTIONS FOR THE USE OF ANY GLUE OR TOOLS**

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## CHAP. 2 BUILDING INSTRUCTIONS

These are our suggestion to achieve an accurate completion of our kit.

### 2.1 Preliminary operations

#### Kit components control

Have a look at the components (see “PART LIST, MATERIALS AND TOOLS LIST” at page 3) so you may easily identify these.

It is strongly suggested to trial fit all the parts “dry” before gluing the same.

### 2.2 Fuselage

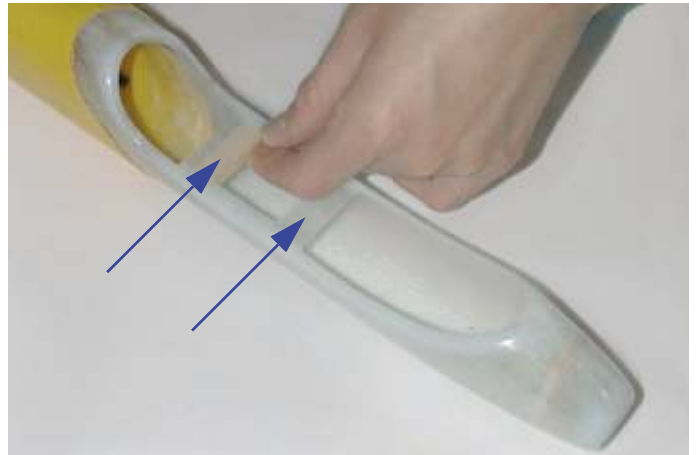
#### Internal settings

- Carve to piece of wood (see figure 5) as for drawing (see figure 72 at page 33), these will be used as a reinforcement to install the servo screws;



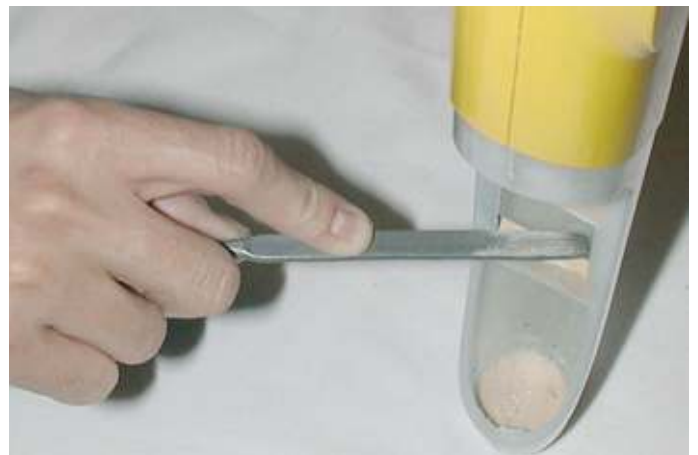
*Fig.5: Servo rails.*

- glue the two wooden rails as shown in figure 6 (under the structure);



*Fig.6: Glue the servo rails.*

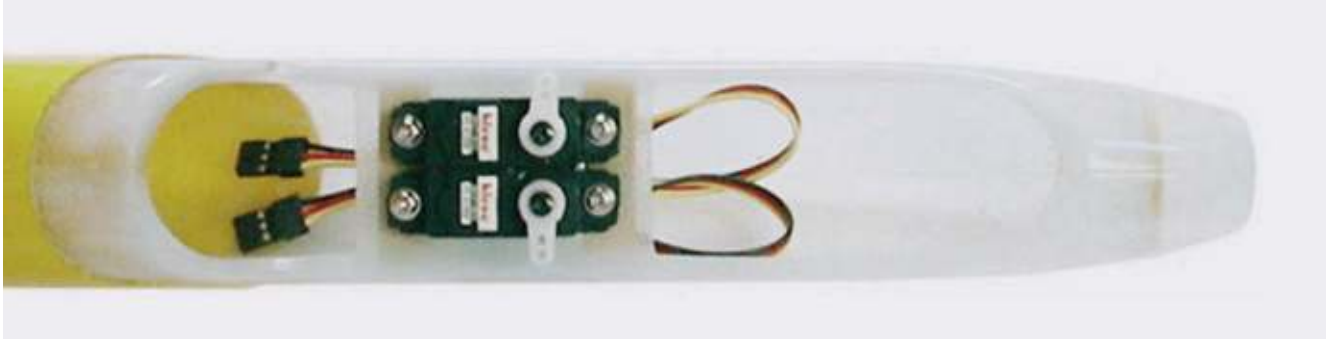
- in case you need use a file to take away some excess of blur;



*Fig.7: Take away any excess of blur.*

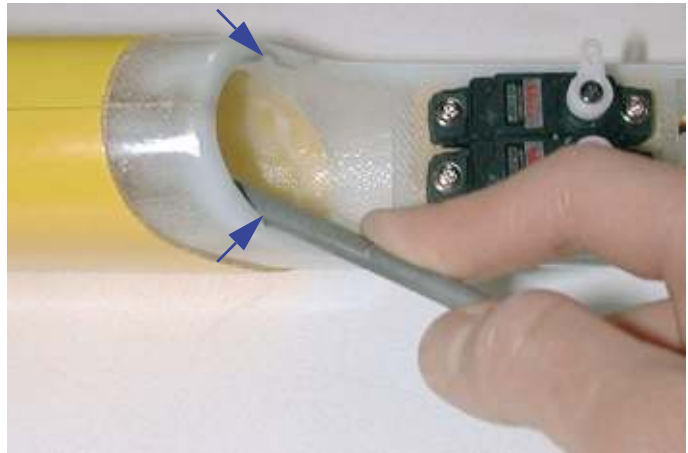
## X-MODELS - Whisper

- temporary install the servos in fuselage (see figure 8);
- using a felt pen sign the place where to make the hole for the servo screws;
- remove the servos;
- using a 2 mm drill bit make the holes for the servo screws;
- reinstall the servos and screw them in positions;



*Fig.8: How to place the servos.*

- using a round file make to round cut in the fuselage nose reinforcement, as indicated in figure 9, so that the control Bowden may move freely;



*Fig.9: Round cut for Bowden.*

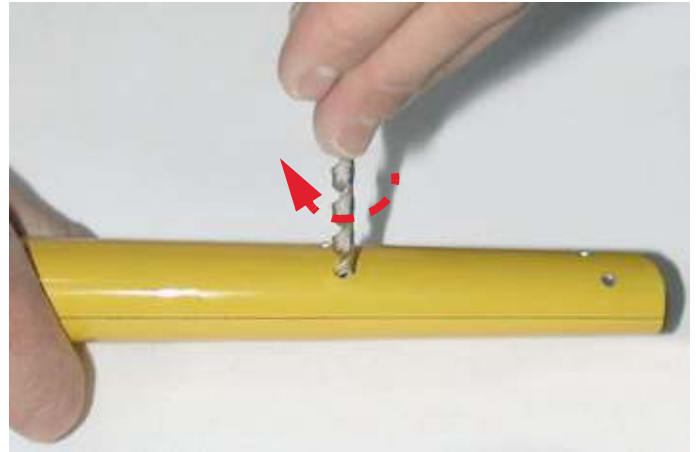
- using a 8 mm drill bit make the hole for the lead pellet (see figure 10);



*Fig.10: Where to make the hole.*

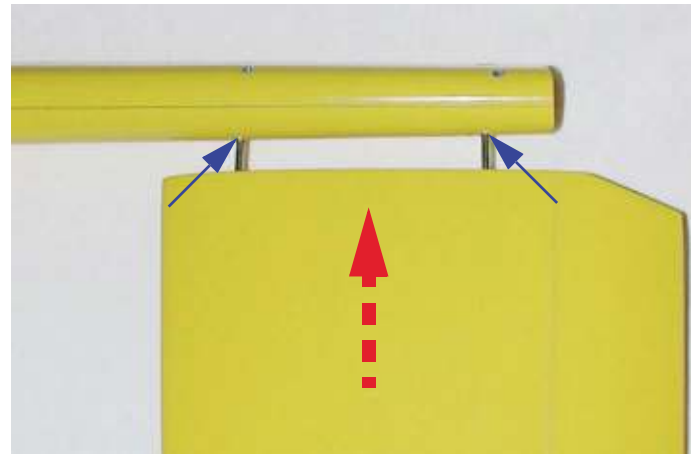
## Small works on the rear side of the fuselage

- Using a 6 mm drill bit by hand, take away any blur that may be present on the holes (see figure 11);



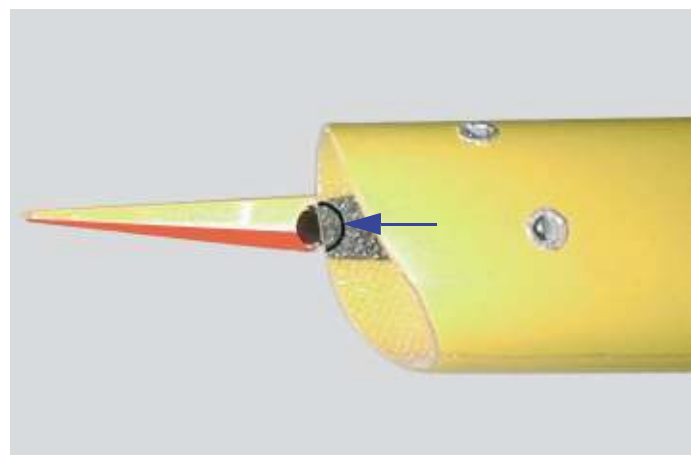
*Fig.11: Taking away the blur.*

- insert one of the v-tails in the tube installed in the fuselage (see figure 12);



*Fig.12: Installing v-tails.*

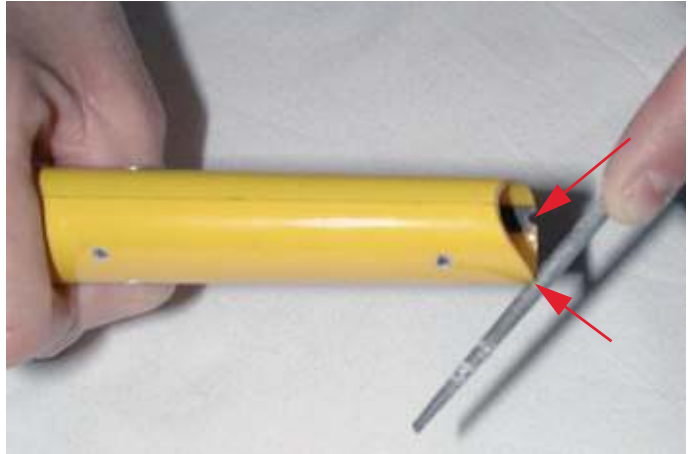
- once inserted the v-tail, make a sign on the fuselage (using a felt pen) of the place you will have to make the round cut (see figure 13) to let the v-tail control go through;
- remove the v-tail;
- repeat the operation for the other v-tail.



*Fig.13: Marking the place where to make the cut.*

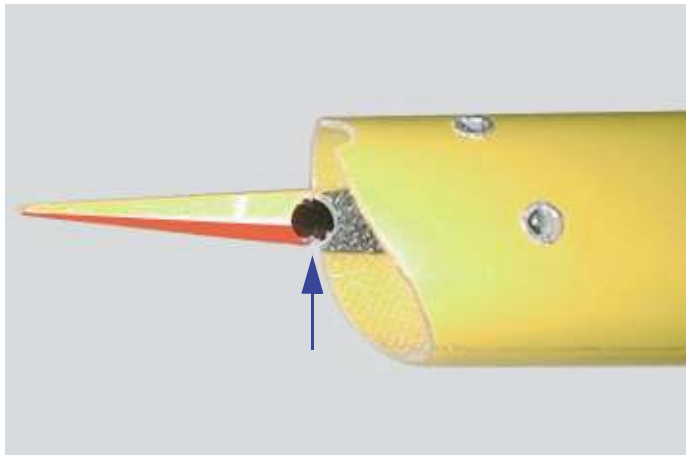
## X-MODELS - Whisper

- using a round file of about 6 mm section dig the round cut (see figure 14);



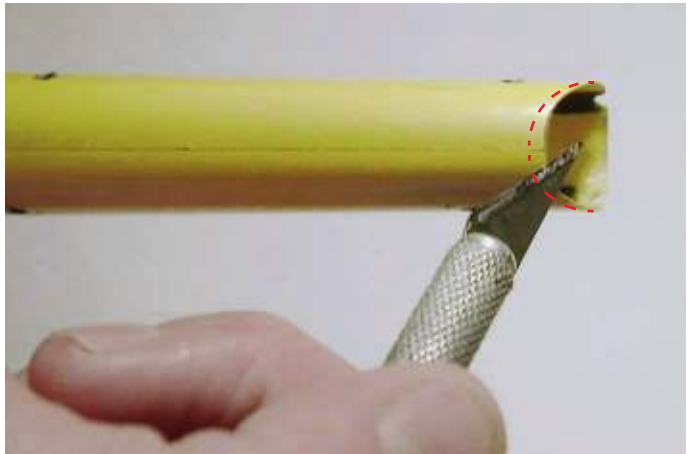
*Fig.14: Making the round cut.*

- check the correct alignment between v-tail and round cut (see figure 15);
- in case of mis-alignment, correct the round cut;
- remove the v-tail;
- repeat the procedure for the other v-tail;



*Fig.15: Checking the alignment.*

- using a sharp knife cut away a few mm (2 or 3) to leave more room for the controls (see figure 16);



*Fig.16: Cutting away some material.*

## Servo connections

There are two different connection schemes, one for the ailerons only version (see “Aileron only version”) and another for the version with ailerons and flaps(see “Flap version (optional)”).

- Remember to insert a small piece of shrinking tube, approx. 10 mm long, in each wire before soldering.

### Aileron only version

- Solder the wires of the two UNI connectors “CONF” as shown in figure 17.

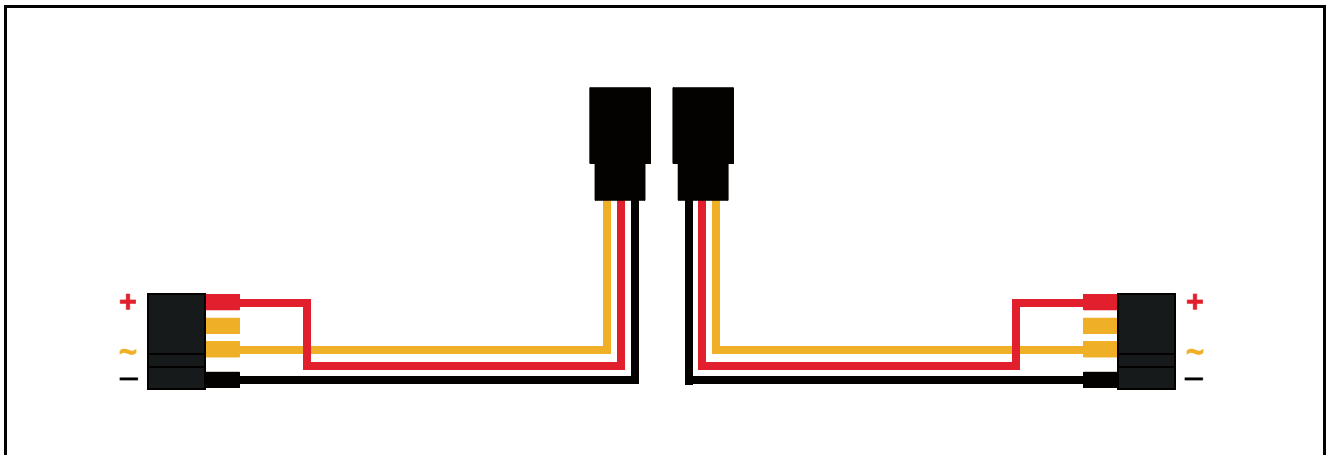


Fig.17: Aileron only servo connection scheme.

### Flap version (optional)

- Solder the wires of the four UNI connectors “CONF” as shown in figure 18.

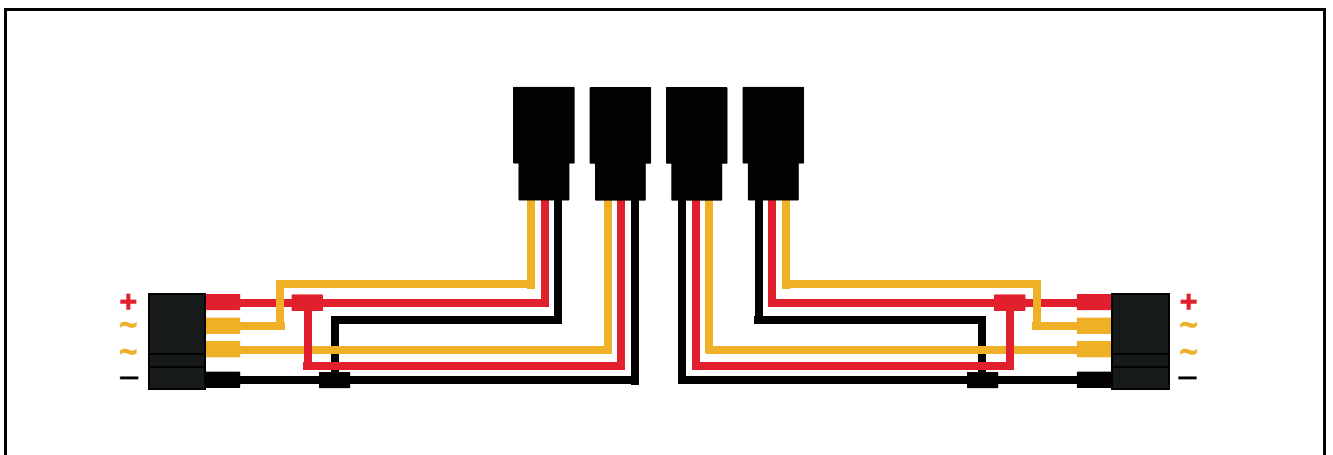
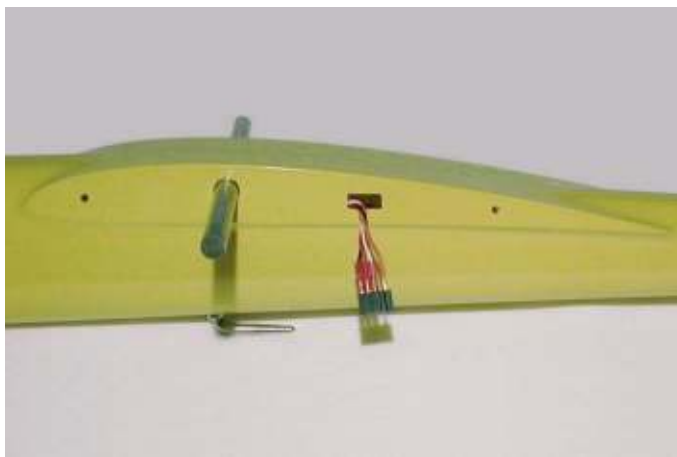


Fig.18: Flap version servo connection scheme (flap version).

## Finish the work in the fuselage

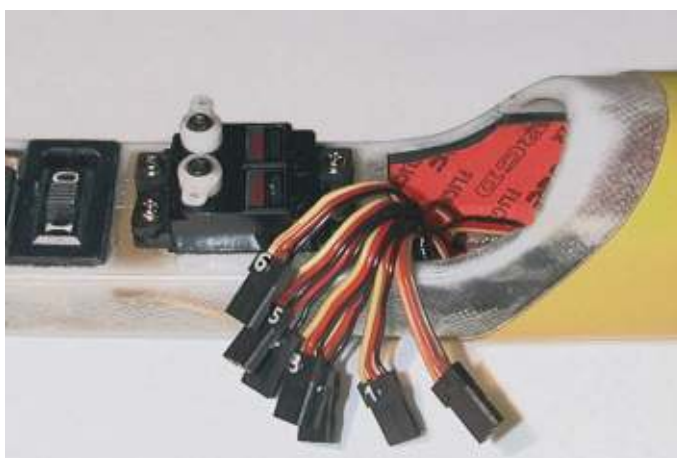
- Insert the wire assembly into the fuselage;
- extract the two connectors from the hole in the fuselage sides [figure 19](#);



*Fig.19: Connectors hanging out of the fuselage.*

- install in the fuselage the ON/OFF switch just in front of the servos, and let the switch cable go under the servo to reach the receiver; you must have five (or seven for the flap version) connectors (see [figure 20](#));

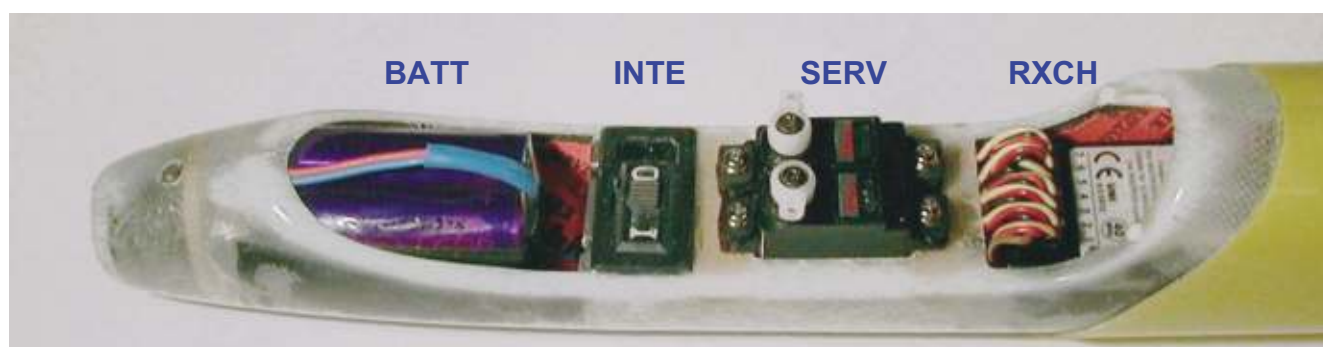
Suggestion: You may glue a thin piece of foam, 3 to 5 mm thick, on the fuselages wall and bottom in the place where the receiver will go.



*Fig.20: Connectors.*

## Components layout

- Besides the ON/OFF switch “INTE” and the two servos “SERV”, You have to put the rx battery pack “BATT” and the receiver “RXCH” (see [figure 21](#));



*Fig.21: Components layout inside the fuselage.*

- plug in the UNI connectors following the diagram shown in [figure 74](#) at [page 35](#) for the aileron only version or the diagram shown in [figure 75](#) at [page 36](#) for the flap version.

The antenna’s installation will be shown later.

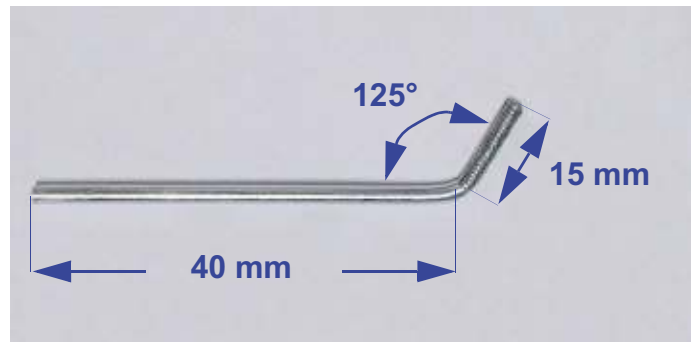
## 2.3 Tail

### V-tail control horn

You cannot use standard control horn on the surface of all moulded models like the WHISPER. The control horn for the Whisper v-tails will be made starting from two threaded rod:

- cut and bend the threaded steel rod “ASCO” as for the figure 22;

*Fig.22: How to bent drawing.*



- You may make some dint on the non threaded part to increase the adhesion of the epoxy (see figure 23);

*Fig.23: How to make dints.*



- screw the ball “GIUN” on the threaded part (see figure 24);

*Fig.24: Screw the ball on the rod.*



- using a clamp, bend 90° the not threaded side of the rod, for the extension of one centimeter (see figure 25), perpendicularly to the first bending;

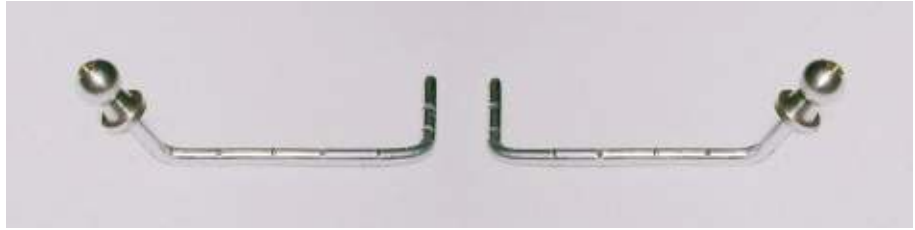
*Fig.25: Bend the not threaded side of the rod.*



## X-MODELS - Whisper

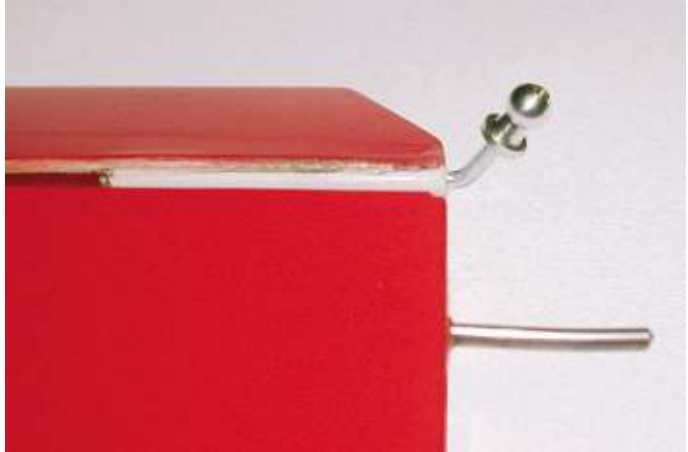
- be sure to make a “left” and a “right” side (see figure 26);

*Fig.26: Both the rods bent.*



- mix some 5 minutes epoxy and add some microballons;
- spread some epoxy on the rod;
- insert the rod in the v-tail moving part (see figure 27).

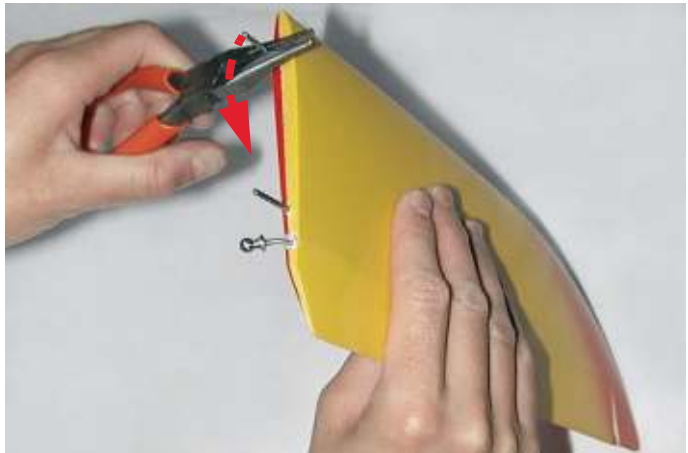
*Fig.27: Rod in position.*



### Finishing the v-tail's rods

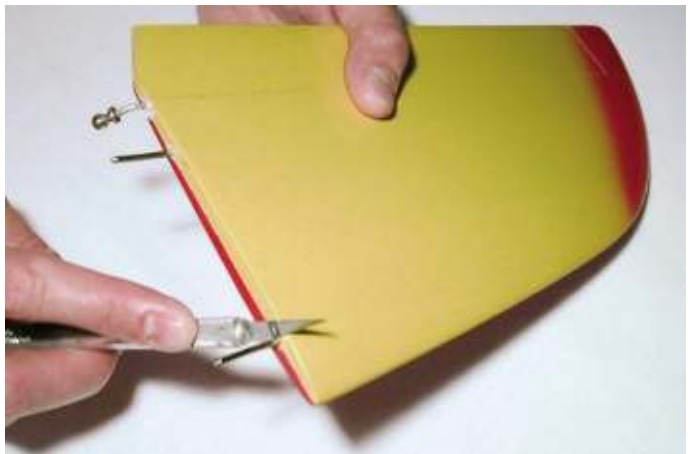
- Slightly bent the two rod protruding from the v-tail, so that they will not come out too easily (see figure 28);

*Fig.28: Bending the two rod a little.*



- using a sharp knife, cut away the blur on the root of the two rod (see figure 29);

*Fig.29: Cut away the blur.*



## V-tail linkage (rear part)

- Using a file taper a little the ending part of the plastic ball joint: “UNIB”; this will help the control smoothness;
- screw the plastic part of the ball joint “UNIB” on the two rod “RINV” (see figure 30);

*Fig.30:*Screw the joint to the rod.



- insert the rod into it's slideway (see figure 31).

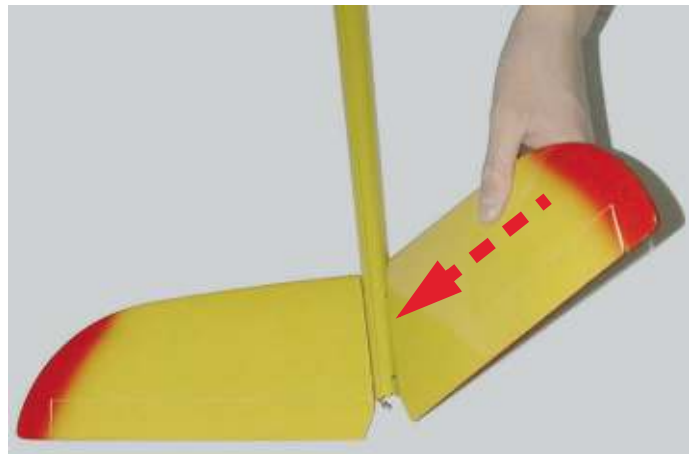
*Fig.31:*Insert the rod.



## V-tails insertion

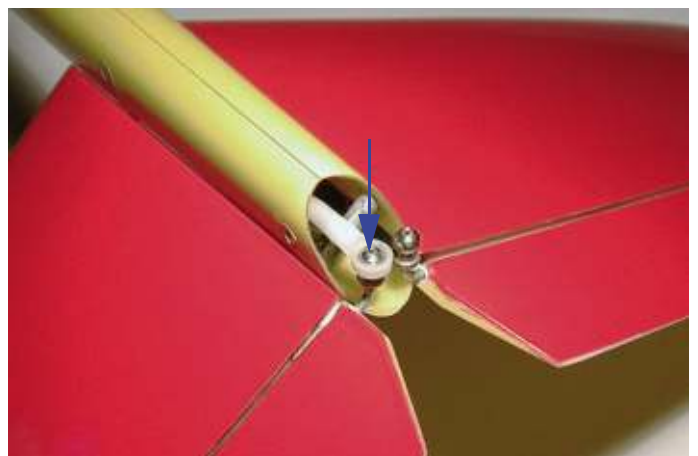
- Insert the two v-tail (see figure 32);

*Fig.32:* Insert the v-tail.



- snap on the plastic ball joint “UNIB” on the ball “GIUN” (see figure 33).

*Fig.33:* Snap on the ball joint.



## V-tail linkage (front part)

- Using a file, remove part of the clevis "FORC" up to give it the shape displayed in figure 34;

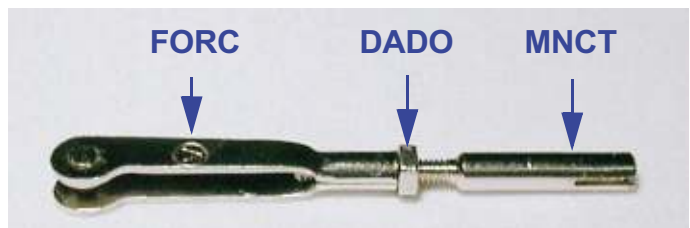
Note: file the other clevis on the opposite side.



*Fig.34: Remove part of the clevis.*

- screw the nut "DADO" then the clevis "FORC" to the bushing "MNCT" (see figure 35)

*Fig.35: Control group assembled.*



- hook the clevis to the servo's horn;
- align the group with the control rod "RINV";
- using nippers, shear the rod "RINV" more or less to the middle of the bushing position (see figure 36);
- unhook the clevis from the servo's horn;

*Fig.36: Shear the control rod.*



- snap off the plastic ball joint "UNIB" from the ball "GIUN";
- pull out the control rod from the rear part of the fuselage;
- unscrew the plastic ball joint "UNIB" from the control rod "RINV";
- insert the not threaded tip of the control rod "RINV" into the bushing "MNCT";
- using a solder, solder the bushing to the control rod (see figure 37);



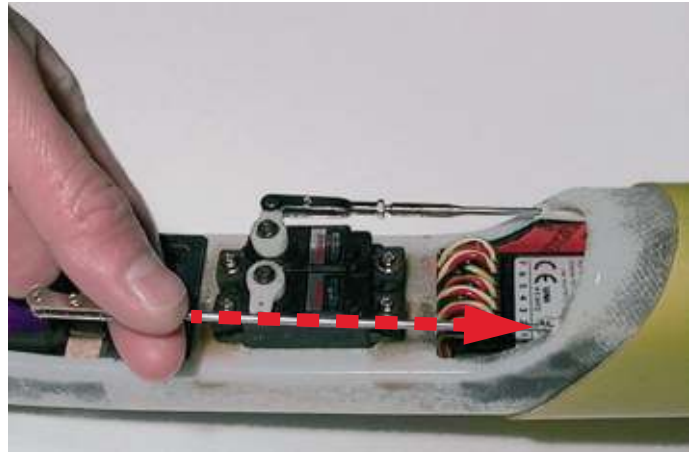
*Fig.37: Group soldered to the control rod.*

- repeat the operation for the other control rod too.

## How to insert the control rods

- Insert the rods into the fuselage's guides and connect the clevises to the servo's horns (see figure 38);

Note: the modified part of the clevis must be turned toward inside.



*Fig.38: Insert the control rods.*

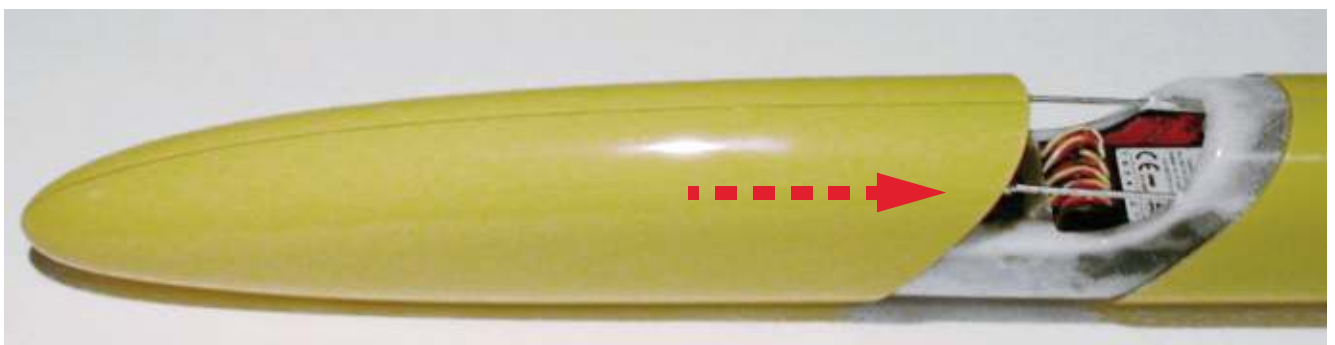
- screw the plastic part of the ball joint "UNIB" on the two rod "RINV" (see figure 39);
- snap on the plastic ball joints "UNIB" on the balls "GIUN";



*Fig.39: Screw the joints.*

## 2.4 Nose

- Install the nose "CONO" until it will fit perfectly to the fuselage (see figure 40);



*Fig.40: Install the nose.*

- check that the servo will move freely also with the nose on.

## 2.5 Wing

### Arranging the servos for the ailerons (and flaps) for rounded servo holders

It is necessary to prepare the two aileron's servos and, for the flap version, the two flap's servos too.

#### Assembling

The bag contains a couple of servo cover "ALSE" (see figure 41), purchased separately.

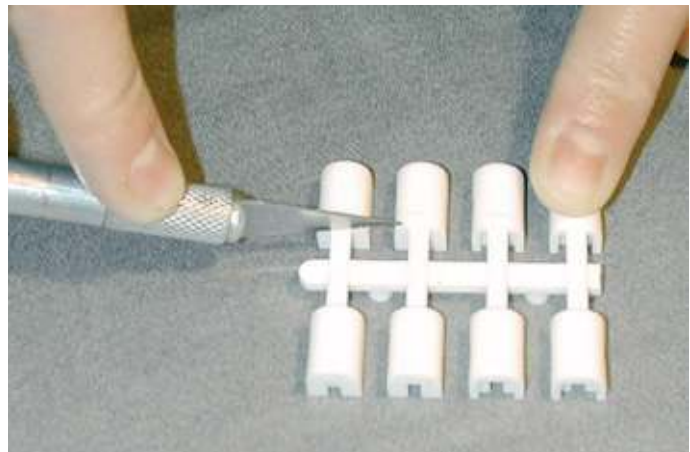
You will have to purchase one bag (ailerons only version) or two bags (version with flap) of Hitec servo holders and covers or similar;

- open the bag and pull out all the parts;



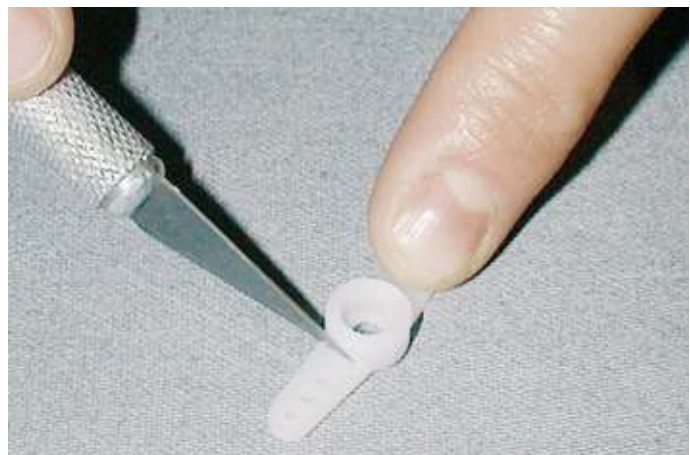
*Fig.41: Bag with two servo cover.*

- check which of the adaptor will fit your servo;
- cut with a sharp knife the desired plastic parts (see figure 42);



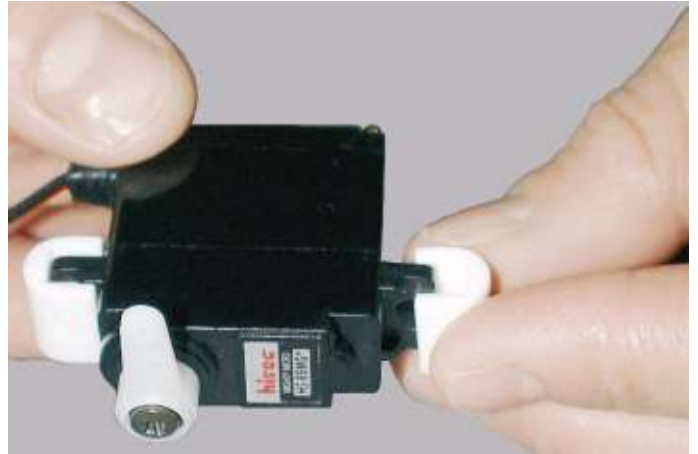
*Fig.42: Cutting the servo adapters.*

- You will need to use a servo arm with only one arm, in case your servo has two arms, just cut one of the two (see figure 43);



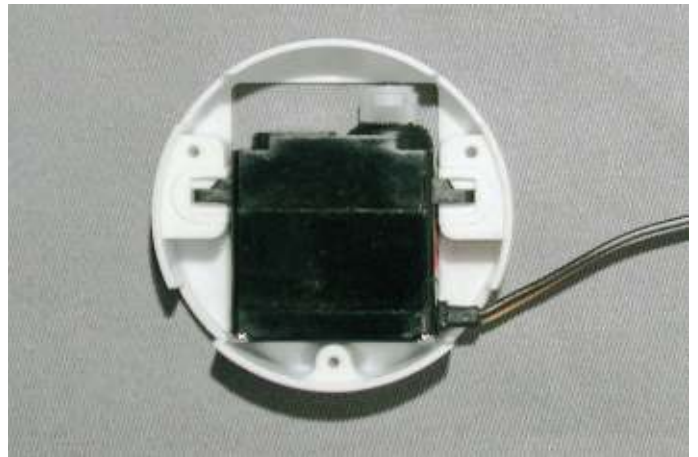
*Fig.43: Cut one of the two arms.*

- screw the servo arm and install the servo;
- install the adaptors on the wing (see figure 44);



*Fig.44: Installing the adaptors.*

- insert the servo (see figure 45).



*Fig.45: Servo installed in his holder.*

## Wing servos wiring

You will have now to glue the servo holder in their hole in the wings.

The procedure is the same for the wing halves, just mind the right and left side.

These days all servos have 3 wires (see figure 46), usually there is a black (may be brown) wire that is the negative (-), a red that is the positive (+) and a yellow (or white or orange) that is the signal (~).



*Fig.46: Signal (~), positive (+) and ground (-).*

You may choose to cut off the servo connectors and solder the servos direct to the wiring loom, alternatively you may leave the connectors and use additional extension leads with female connectors ready installed. There are advantages and disadvantages with either.

- in this case you will make the things easier, safer and lighter but you have to overcome your fear (!) of cutting the original servo wire (this cable is supplied in the model kit);
- this choice will leave the servo “as it was made” and allow for easier servo substitution and will not void servo guarantee (if needed); but you will have two more connectors (optional) in every servo line that may oxidize, is heavier and more expensive.

## Aileron only version

The aileron only wing has only one hole (see figure 47).

*Fig.47: Wing without flap.*



Servos soldered direct:

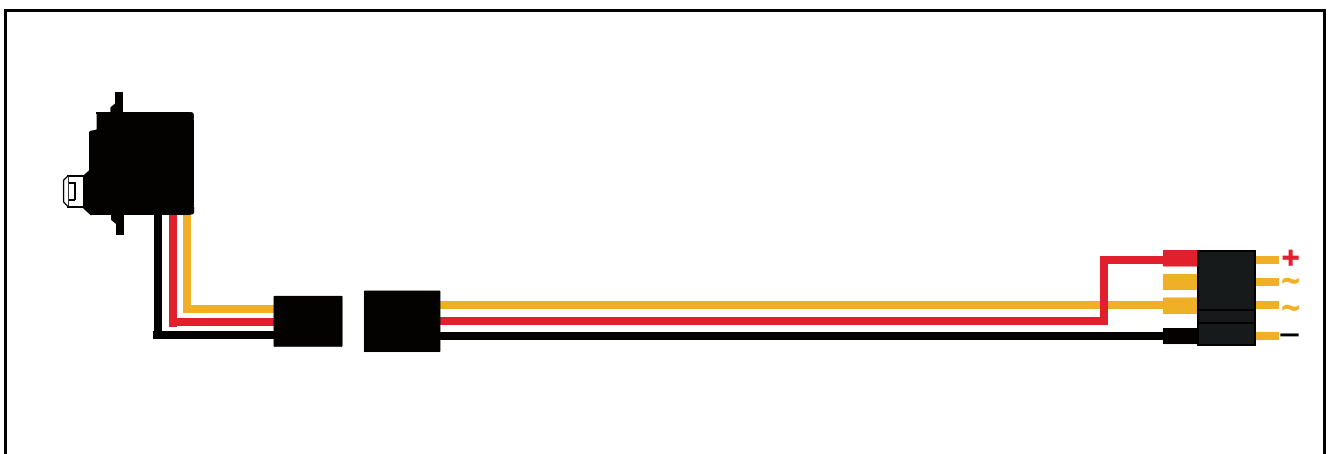
- remember to insert each wire “CAVS” in a 10 mm long piece of heat-shrink tube before soldering it;
- cut the two UN24 servo extension wires at their halve;
- solder the wires extension to the plug, not yet to the servo (see figure 48).
- cover every solder joint with the heat-shrink tube and shrink it.



*Fig.48: Servo soldered direct (aileron only version).*

Without cutting the servo lead (optional):

- solder the extension wire to the UNI plug and to the supplied connector (see figure 49).



*Fig.49: Using UNI adaptor (aileron only).*

**Flap version (optional)**

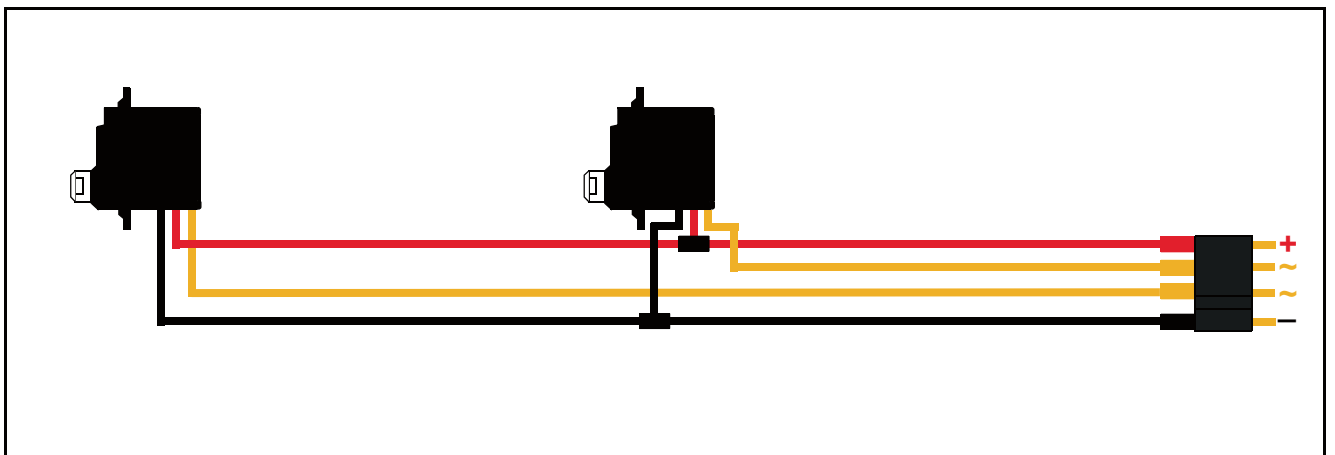
The wing has two holes for the servos (see figure 50);

*Fig.50: Wing with flap.*



Servos soldered direct:

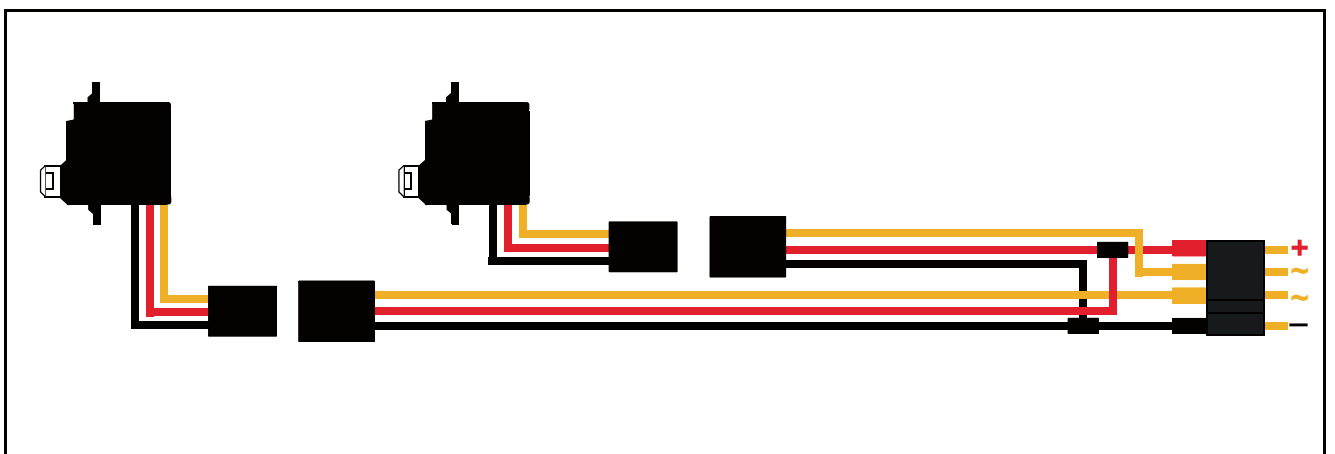
- remember to insert each wire “CAVS” and “FILO”, in a 10 mm long piece of heat-shrink tube before soldering it;
- cut all the four UN24 servo extension wires at their halve;
- solder the wires to the connector, not yet to the servo (see figure 51);
- cover every solder joint with the heat-shrink tube and shrink it.



*Fig.51: Direct servo connection (aileron and flap).*

Connection using UNI connectors (optional):

- solder the wires of the UNI wires (see figure 52).



*Fig.52: Servo connection with UNI extensions (aileron and flap).*

## Servo test

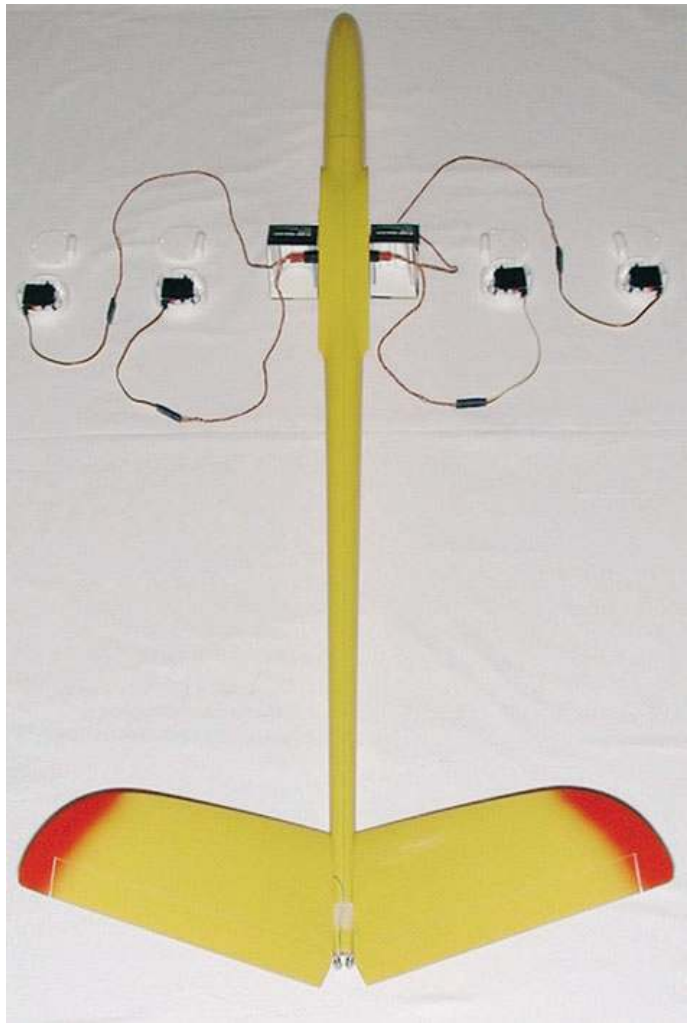
Servo test: before installing the servo holder in the wings, check that everything works correctly:

- connect all the servo to the receiver, following the schemes:
  - in [figure 74 at page 35](#) for the aileron only;
  - in [figure 75 at page 36](#) for the aileron and flap version;
- ... and following your radio system requirements.
- turn on tx and rx;
- check that all the servo are correctly connected and that all servos are moving correctly according to the stick movements;
- check for the neutral position of servo arms;

Note: try to find the correct servo arm position physically moving the servo arm on the servo, and use the electronic centering just for the minor adjustment.

- turn off receiver and transmitter.

More fine setup will have to be made after the final servo installation.



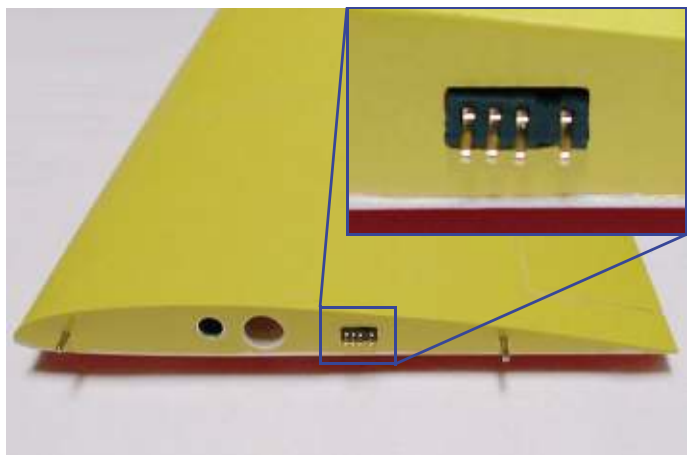
*Fig.53: Testing servo center and rotation direction.*

## Wing wires

- Insert the ready made wires through the hole in the wing root rib.

## Installing multi connector

- Glue the connector “CONM” using 5 minute epoxy in its hole (see [figure 54](#)).



*Fig.54: Connector in place.*

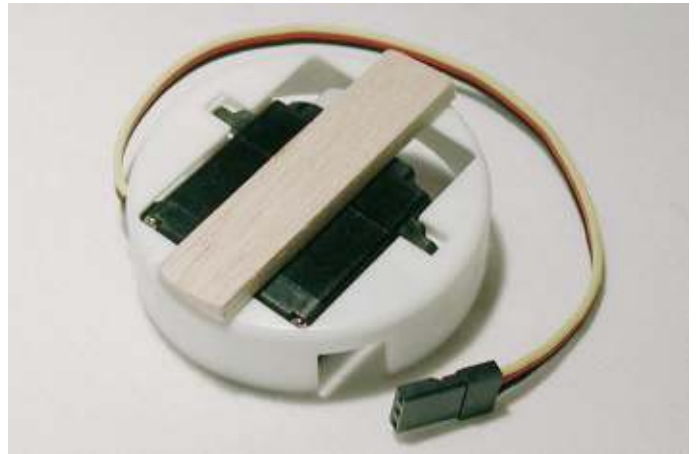
## Installing wing servos

For any servo either for ailerons than for flaps (optional):

- make the wooden adapter as for the drawing “Wing servos holder wooden adapter” a pagina 33;
- glue the adapter to the servo holder using some cyano glue (see figure 55) avoid to glue the servo;

Note: the thinnest part of the balsa piece must be facing the wing trailing edge.

*Fig.55: Gluing the wooden adapter.*



- connect the UNI connectors to the servos or solder the wires (depending on your previous choice);
- spread some 5 minute epoxy around the servo holder;
- insert the servo holder in its hole (see figure 56); the servo horn must be facing the wing trailing edge and check for the correct alignment while the 5 minutes epoxy has not yet dried.

*Fig.56: Installing servo holder.*



## Aligning servo holder

- Using a rule (see figure 57), check for the correct alignment of the servo.
- let the epoxy dry.

*Fig.57: Checking alignment.*

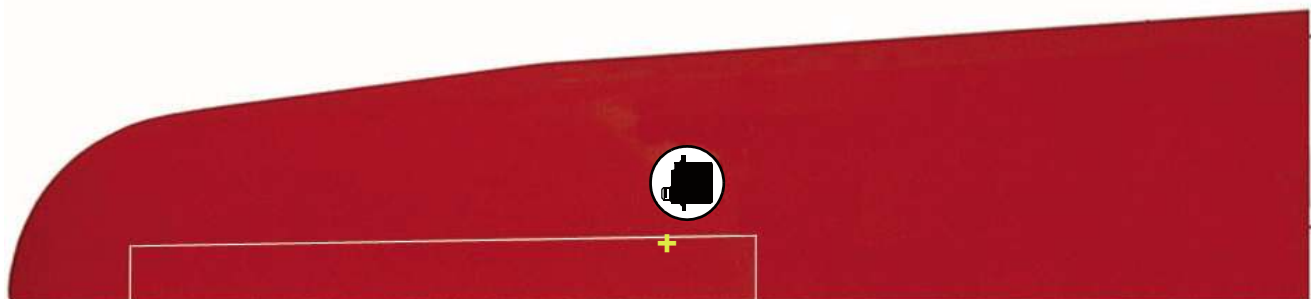


## Aileron (and optional flap) control setup

You will have to install the special made brass control horn in two pieces (“BOCC” and “PERN”). You will have to make the hole and insert the “BOCC” bush in the hole made.

Aileron only version:

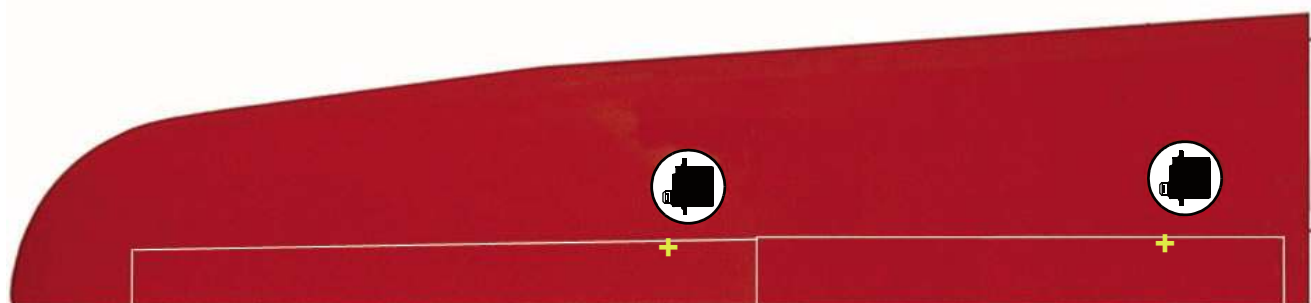
- using a 4 mm drill make the hole where indicated by the yellow cross in picture [figure 58](#).



*Fig.58: Drill a 4mm hole at min 10 mm from upper edge.*

Flap version (optional):

- using a 4 mm drill make the holes where indicated by the yellow crosses in picture [figure 59](#).

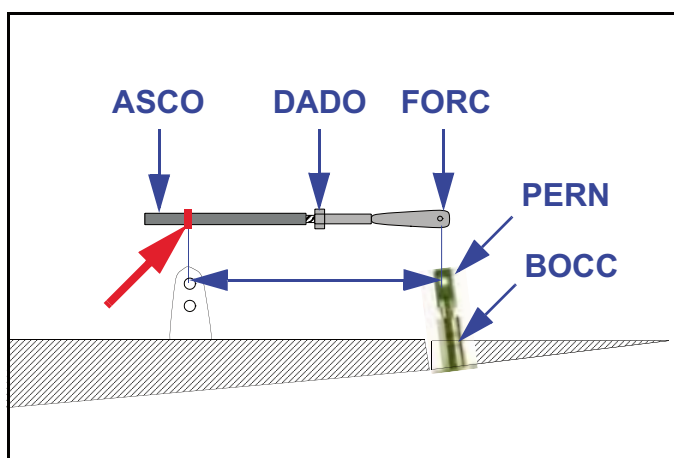


*Fig.59: Drill two 4mm holes at min. 10mm from upper edge.*

- glue the bush “BOCC” in their places using some 5 minutes epoxy.

## Making the controls

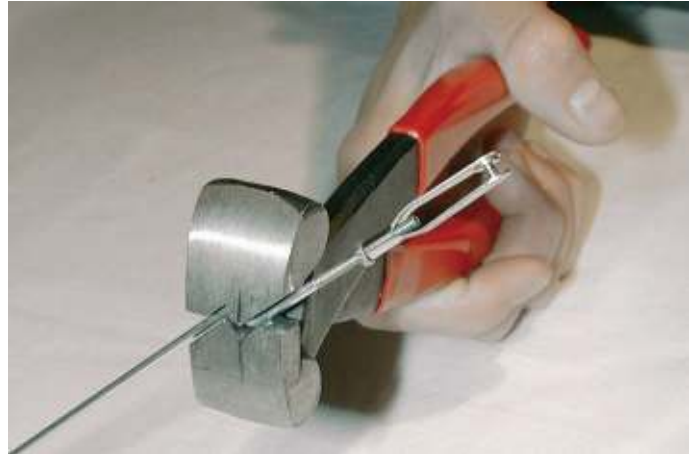
- Screw the aileron (flap) horn “PERN” into the bush “BOCC”;
- Install a nut “DADO” onto the threaded rod “ASCO”, screw the clevis “FORC” to half the length of the thread;
- mark the place where to make the “z” bend using a felt pen see (see [figure 60](#));



*Fig.60: Marking the distance on the threaded rod.*

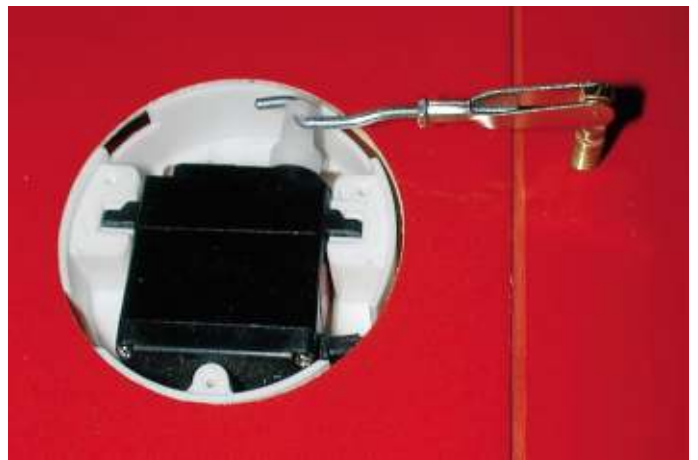
- using a pliers (or a special Z bend pliers) make the Z bend “ASCO” in the marked place (see figure 61);
- cut the rod about 5 mm after the Z bend;

*Fig.61: Making the Z bent.*



- insert the Z bent in the servo horn;, checking for the correct length (if needed move the clevis);
- insert the clevis on the aileron (flap) horn (see figure 62);

*Fig.62: Servo installed and connected.*



- install the servo cover as shown in figure 63 and screw it in place with the supplied screws.

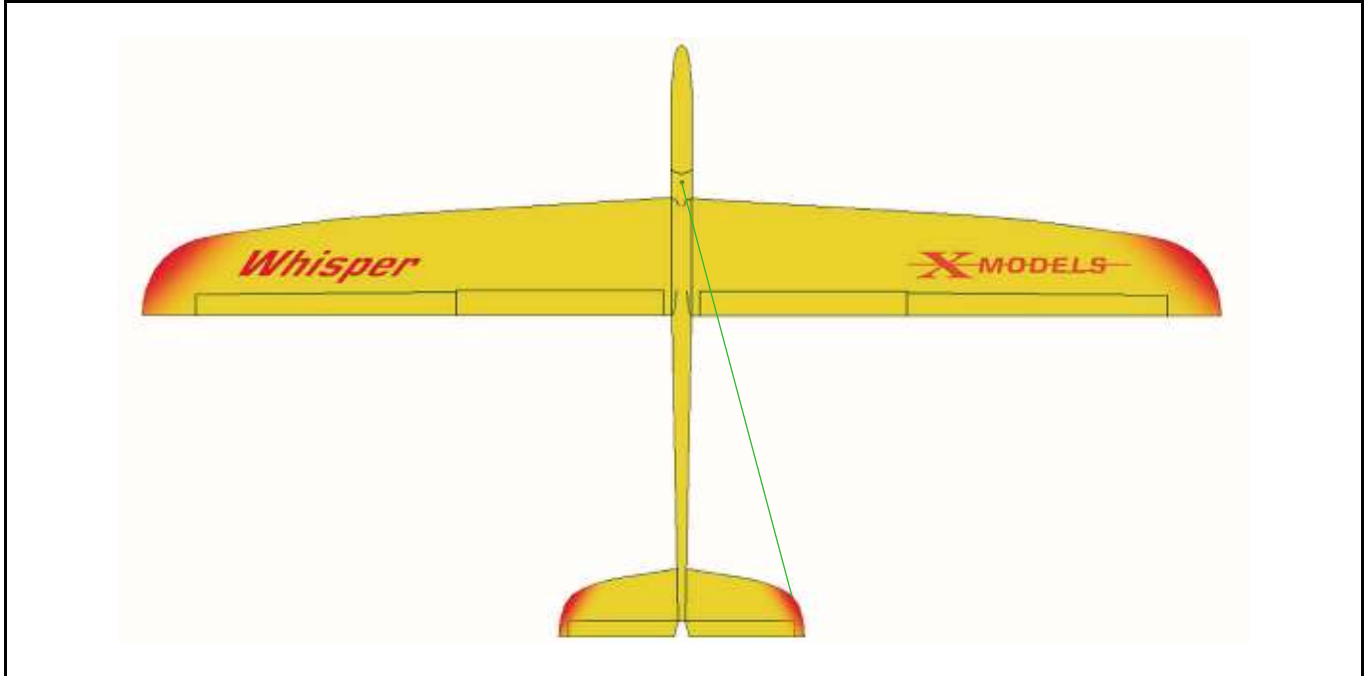
*Fig.63: Servo cover.*



## 2.6 Antenna

Because of the fuselage's reinforcements and the elevator push-rods, both in carbon fiber, we suggest to leave the antenna outside the fuselage.

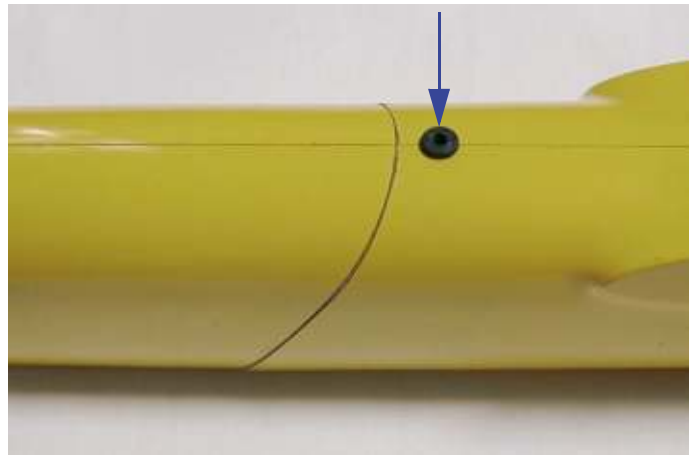
For the best reception signal, the position we recommend is the one shown in [figure 64](#).



*Fig.64: Antenna's position (recommended).*

### How to position the antenna

- Using a drill (3 mm tip), make a hole in the fuselage at, about, one centimeter from the cone edge, in the position shown in [figure 65](#);
- place a round servo grommet into the hole, in order to avoid any damage to the antenna's wire;
- let the wire pass through the hole;
- using some tape, fasten the wire to a elevator's tip (usually the right one).



*Fig.65: Antenna's hole position.*

### Other solutions

If You think that the suggested solution is aesthetically or aerodynamically no good, You can always attach the antenna's wire on the fuselage, keeping it with a piece of tesa tape placed around the fuselage, near the tail.

You may also place the antenna inside the fuselage.

In both these cases, we recommend to equip your own model with a long range high quality receiver and carefully to check the long range behavior with a field test.

## 2.7 Installing the wings

### Connecting the wire servos

It is now time for you to take the decision if you want to glue the 4 poles connectors “CONF” to the fuselage or if you want to take it “free”; every choice as its positive and negative sides, so it will be your decision.

- Insert the wing rod “BAIO” in its hole in the fuselage
- plug in the “CONF” connector coming out from the fuselage to the “CONM” connector already glued to the wing (see figure 66);

Note: check for the right polarity of the connectors.

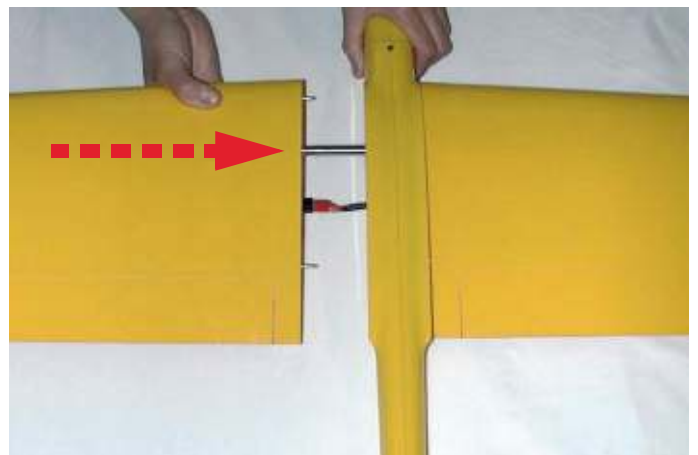


*Fig.66: Joining connectors.*

### How to put the wings together

- Hold the fuselage and insert the wing rod “BAIO” into the proper hole of the wing (see figure 67); during the operation pay attention to the cable coming out from the fuselage: it must go into the wing.

Note: the two tips on the wing root must coincide with the two holes into the fuselage wing root.



*Fig.67: Inserting the wing.*



## CHAP. 3 CONTROL TRAVEL

### 3.1 Identifying the control surfaces

Refer to [figure 68](#):

- ailerons **1** and **2** (roll);
- flap **3** and **4** (camber changing, crow brake) - optional;
- v-tails **5** and **6** (pitch - yaw).

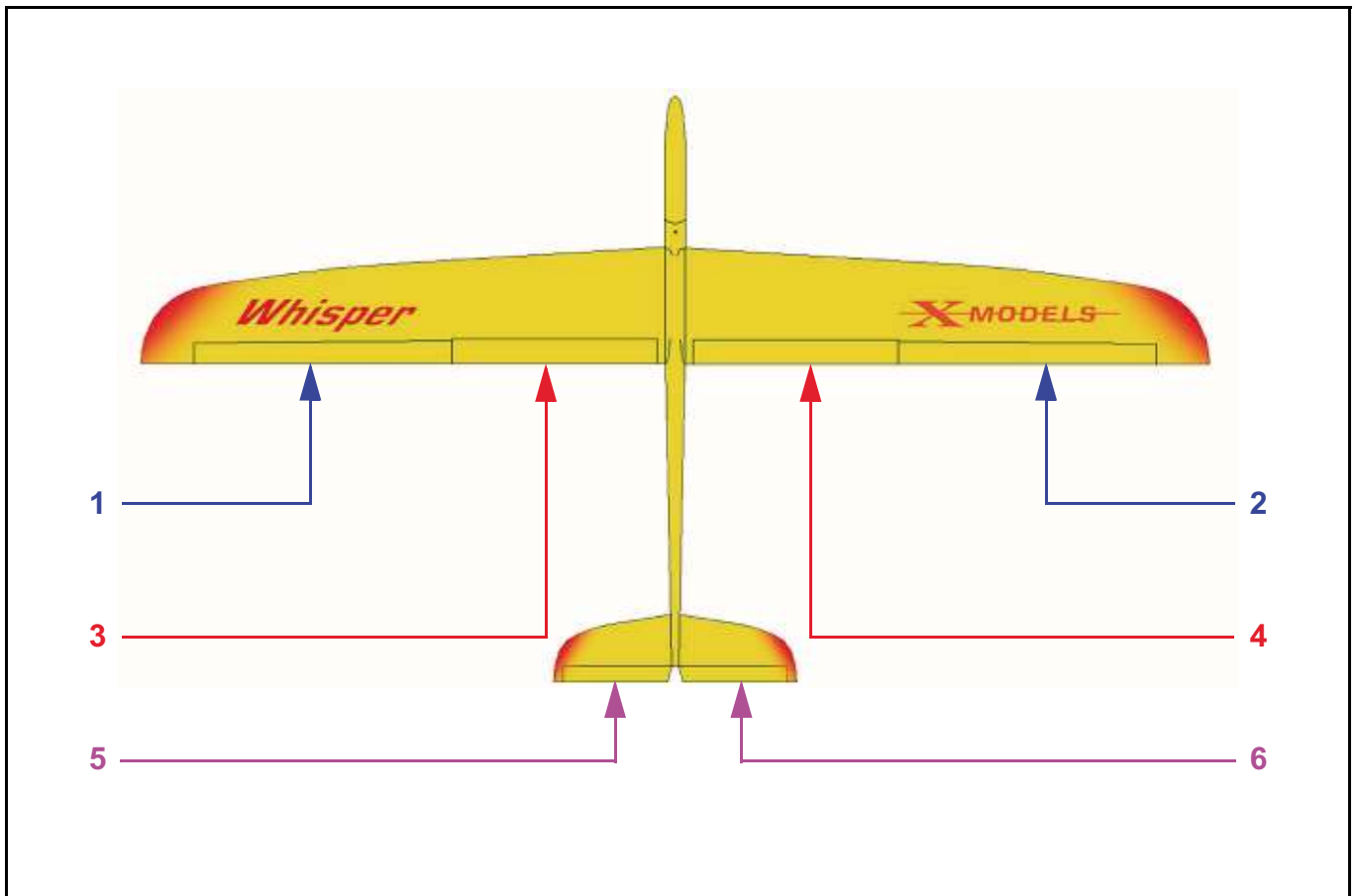


Fig.68: Control travel.

## 3.2 Travel values

These are suggested values, found during our test flights. Just consider these a starting point and feel free to modify the travel values according to your flying skill, style, flying area etc.

### Ailerons

Up ..... 14 mm;  
Down..... 10 mm.

Note: you may reduce differential for aerobatic flights

### Flap (optional)

Up ..... 4 mm;  
Down..... 4 mm.

Note: value good when the flaps are used by themselves, if used in mix with aileron to change camber, please refer to FLAP to AILERON mix set up

### V-tails

Up ..... 10 mm;  
Down..... 12 mm.

Note: measurement taken at the fuselage side.

Note: please double check that the travel of the flaps and v-tails are exactly the same as a different travel value on these surfaces may cause you trouble when flying the model.

### Special mix

If you have a computer radio you may take advantage of it and use also the following mix:

Aileron to Rudder (Combi Mix):..... 30% aileron to rudder mix will help a lot on poor lift condition.

Differential: ..... we suggested to use about 40% differential (as stated in the 14/10 travel value); nevertheless if your radio will allow, on good lift condition and to do better aerobatics maneuvers you may turn aileron differential off (14/14 mm travel)

Flap to Aileron: ..... to take advantage of changing the profile camber,  
speed: flap 2 mm up, ail 1.5 mm up  
thermal: flap 2 mm down, ail 1.5 mm down

Elevator to flap: ..... to make square figures, flap up and down 5 mm on full elevator up or down

Aileron to flap: ..... to increase roll rate (but only in good lift conditions)  
flap up 6 mm and down 4 mm

Butterfly: ..... aileron up 25 mm, flap down 30 mm, elevator down 2 mm  
(you will have to try the butterfly at a safe height the first time, to check for the right travel value)

## CHAP. 4 MODEL BALANCING

The CG of the model must be placed between 84 and 88 from the wing leading edge at the wing root (see figure 70).

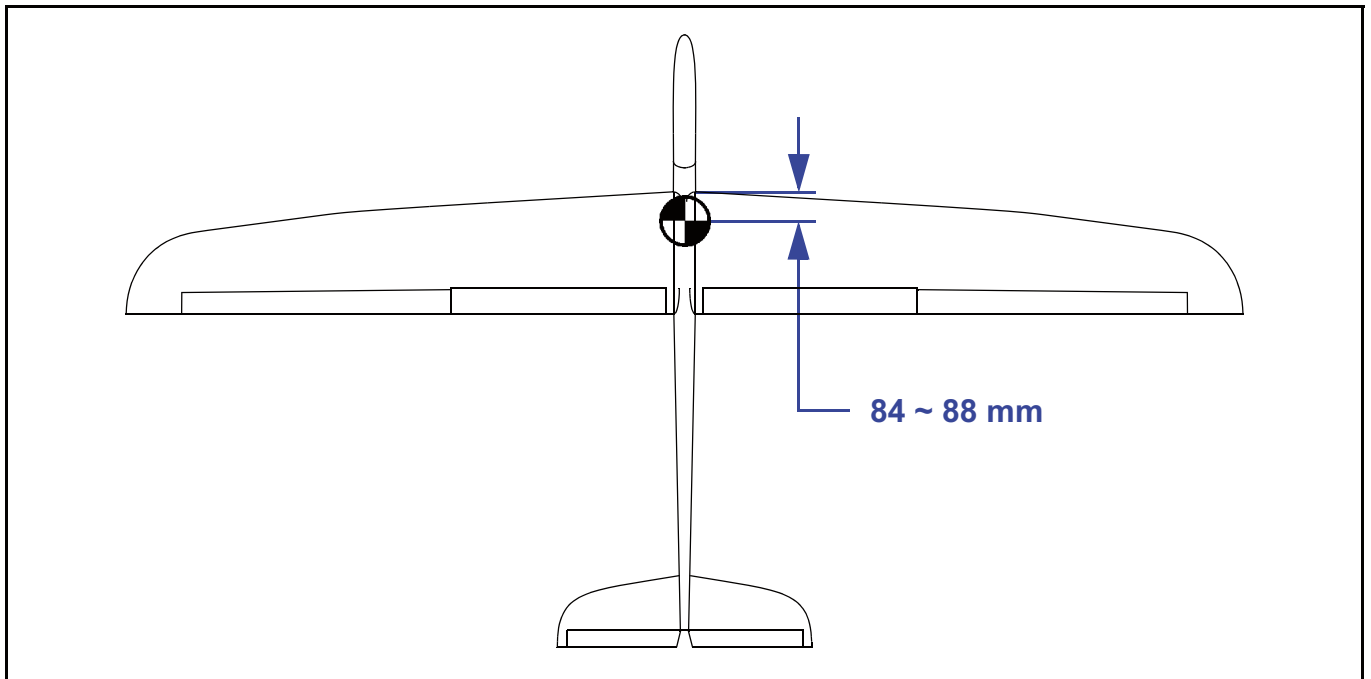


Fig.69: CG place.

Note: You may in a second time move it a little backwards if you feel (and if you are a real good pilot...)

### 4.1 Check for the CG position

- Mark with a piece of tape the CG position under the wing and hold the model with your fingers: the model must stay level;
- move or add lead to front until satisfied.

Note: the model must be complete with all his part including the nose cover during the CG check.

### 4.2 Checking for the lateral balance

- Lay the model on a flat hard surface;
- try to keep the model flat rising the wing that is in touch with the ground;
- gently leave the model alone (see figure 70);

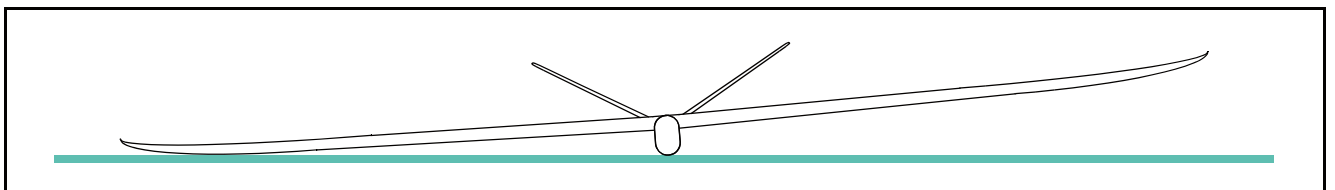


Fig.70: Checking for lateral balance.

- repeat this more times.

If the same wing half drops all the times:

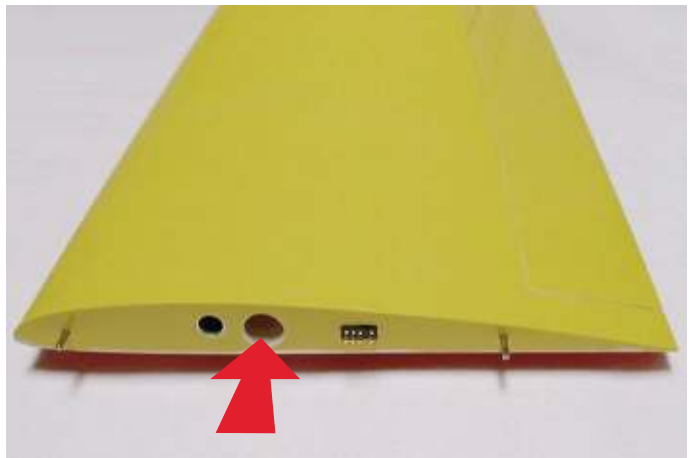
- add some lead pellet to the lighter wing (you can place the lead in the servo hole) until satisfied (usually a few grams do the job);
- repeat the test.

If the wings halves are dropping randomly, the model is ok.

### 4.3 Ballast and ballast use

Your Whisper is equipped with ballast tube, so you may add ballast in case you need to rise the model wing loading (i.e.: when you want to fly in very windy conditions); the use of ballast is really needed only in case of very windy conditions when flying mostly on dynamic conditions; the use of ballast may change the model behavior (flying speed and mostly landing speed) so be careful and pay attention when flying the model with ballast.

You may add up to 160 grams of lead in each wing ballast tube, for a total of up to 320 grams of lead (see figure 71).



*Fig.71: Ballast tube.*

## CHAP. 5 DRAWINGS 1:1 SCALE

Here you may find the drawing for the wooden part you will need to complete your model.

Note: You would have better to make a copy of this drawings so you may save the manual.

### 5.1 Fuselage servos reinforcement

Make the two wood reinforcement from two piece of hard wood 5x10x36 mm smoothing the ends (see figure 72).

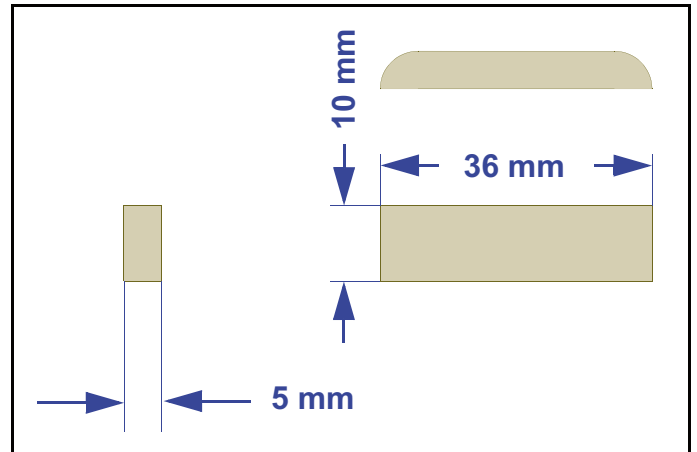


Fig.72: Hardwood servo reinforcement.

### 5.2 Wing servos holder wooden adapter

Make the wooden piece (see figure 73) out from a piece of hard balsa wood 4 mm thick and sanding it too the desired shape.

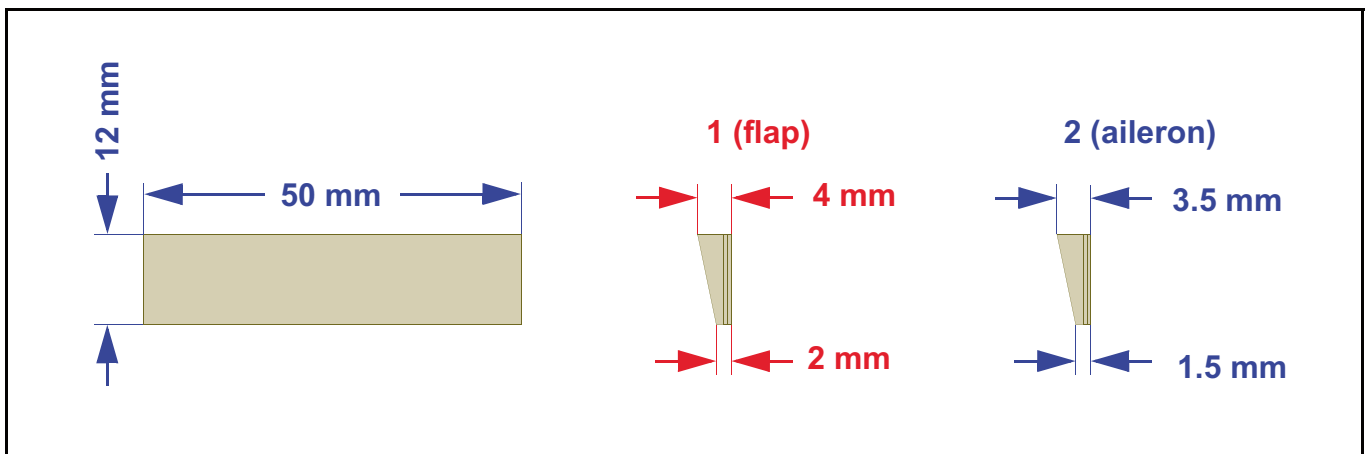


Fig.73: Flap (1) and aileron (2) wood adapter.

#### Wooden piece for flap (optional)

Taper it on one side to 2 mm as in point 1 on figure 73; two pieces required.

#### Wooden piece for aileron

Taper it on one side to 1.5 mm and on the other side to 3.5 as in point 2 on figure 73; two pieces required.





6.2 Flap version

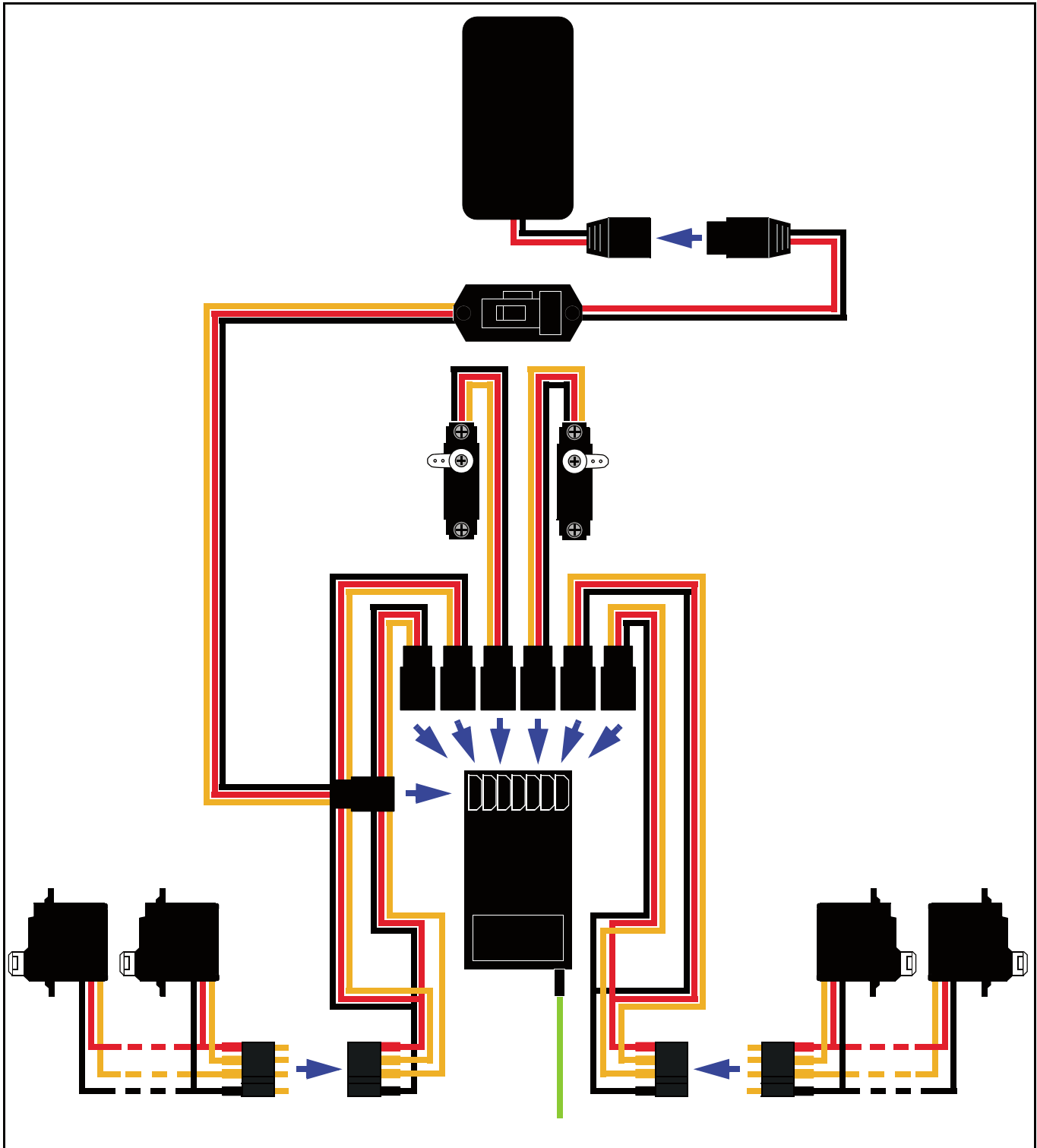


Fig.75: Aileron and flap version schematic drawing.