X MODELS

BUILDING INSTRUCTIONS - OPERATING MANUAL

Nuova FULCRO Service
Via Castelleone, 9 - Costa S. Abramo - 26022 Castelverde - CR (ITALY)

Blade 1.5 V.: 3.2 ENG - 30/04/2007

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Blade 1.5

Features

The Blade 1.5 is a fun model able to offer good performances in most flight conditions, offering the possibility to reach high flying speeds and to withstand hot turns; nevertheless due to the low wing loading and the good profile it can be flown even in mild conditions. The wing is made of fiberglass with carbon spars and reinforcements and has an RG15 modified profile to offer the best performances in a wide speed range. The fuselage is made of fiberglass with carbon reinforcements suitable for slope or bungee and winch launching. All moulded V-tails are big enough to offer a positive control even at low speed and to offer a good stability.

Versions

The model is available in two main versions:

Blade 1.5 standard

Model with wing in two parts to make the transport easier, but note that the two pieces wing only has ailerons, no flaps.

Blade 1.5 DS

Model with one piece wing; this kind of wing offers the maximum stiffness in order to be able to flight with difficult meteorological conditions and suitable for high speed fly; wing equipped with ailerons and flaps.

Each version can be made in carbon fiber. The model, made of this material, offers a better torsional stiffness and an exceptional sturdiness.

Notes about this manual (IMPORTANT)

This manual covers both versions: 1.5 standard + “DS” models.

Note: all assembly instructions are for both model versions, unless stated otherwise, when separate notes, or pictures, will be given.

Blade 1.5 standard - technical data

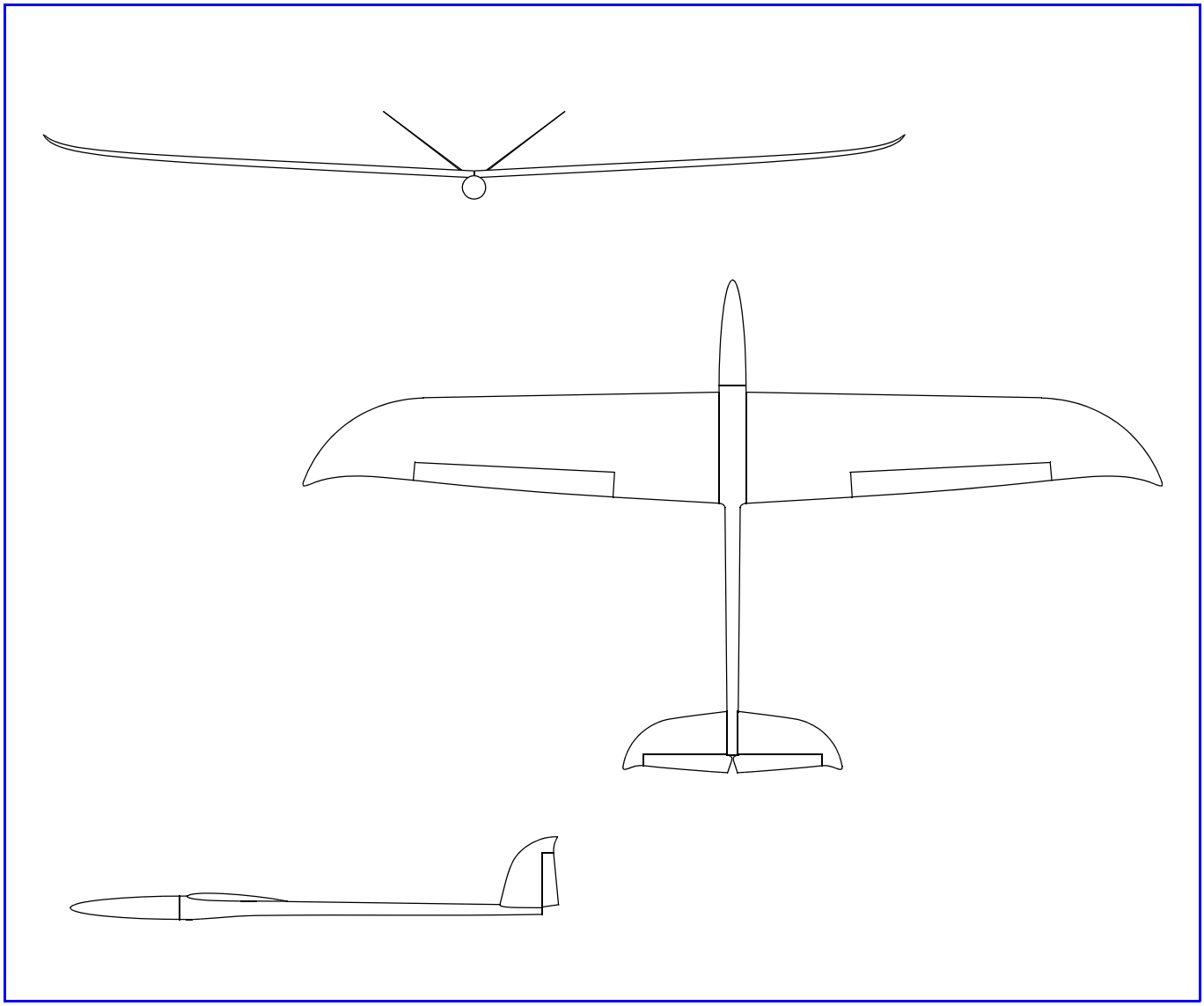

Fig.1: **Blade 1.5 standard (version with wing in two parts).**

Wingspan:	1530 mm
Length:	900 mm
Profile:	RG15 mod.
Weight (empty / in flight):	approx. 600 g / approx. 850 g
Radio control	at least 4 channels

Controls: ailerons, elevator, rudder.

Blade 1.5 DS - technical data

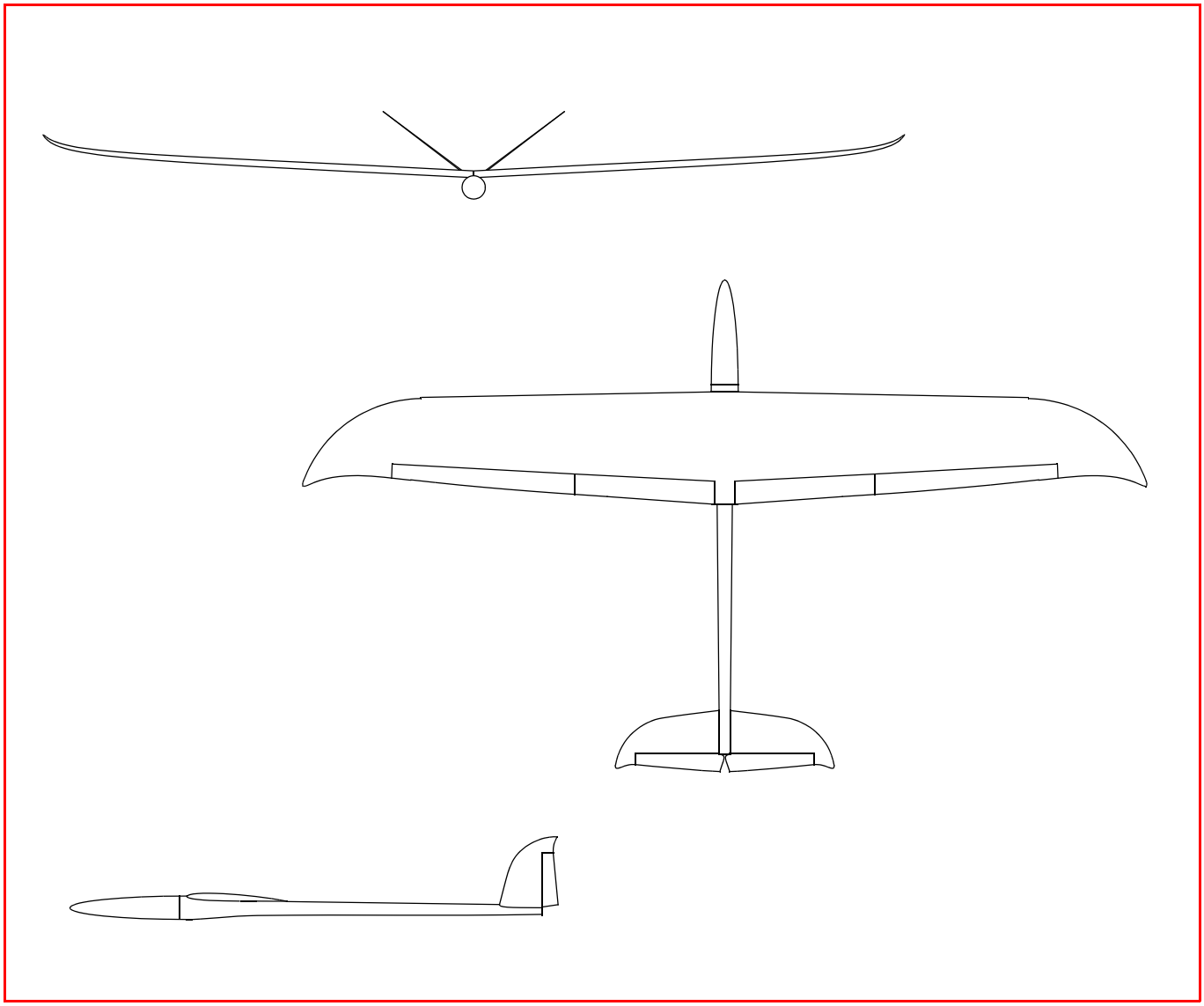

Fig.2: **Blade 1.5 DS (version with one piece wing).**

Wingspan:	1500 mm
Length:	900 mm
Profile:	RG15 mod.
Weight:	approx. 700 g / approx. 950 g
Radio control	at least 6 channels

Controls: ailerons, elevator, rudder, flaps.

CHAP. 1 PART LIST, MATERIALS AND TOOLS LIST

1.1 Warning

DO NOT EXPOSE THE MODEL TO HIGH TEMPERATURES. Exposing the model (or its parts) to high temperatures, over 50°C (example: in a car parked directly in the sun) may deform structures and make it unusable.

1.2 Components included in the kit

Common parts for both versions

COD.	QT.	Item	Remarks
CONO	1	fuselage nose	fiberglass (optional, carbon fiber)
FUSO	1	fuselage	fiberglass, carbon reinforced (optional, all carbon fiber)
COSX	1	V-tail left elevator	balsa fiberglass sandwich with carbon spar
CODX	1	V-tail right elevator	balsa fiberglass sandwich with carbon spar
ASTA	2	elevator pushrod	carbon tube - length 60 cm - diameter 4 mm - hole Ø 2 mm
RINV	6	metal pushrod	length 30 cm - one tip M2 thread
UNIB	2	Nylon uniball	M2 thread
VITE	2	screw	length 15 mm - M2 thread
GIUN	2	ball for uniball	M2 thread
FORC	4	clevis	M2 thread
DADO	4	nut	M2 thread
WHSC	1	servo hole cover	2 pair supplied to suit 4 holes
BOCC	2	horn threaded bush	brass M3 thread
PERN	2	threaded horn	brass M3 thread
SSER	2	servo mounting frame	ply-wood

Decal

If you like, you may apply the decal we supply with the kit (see figure 3).

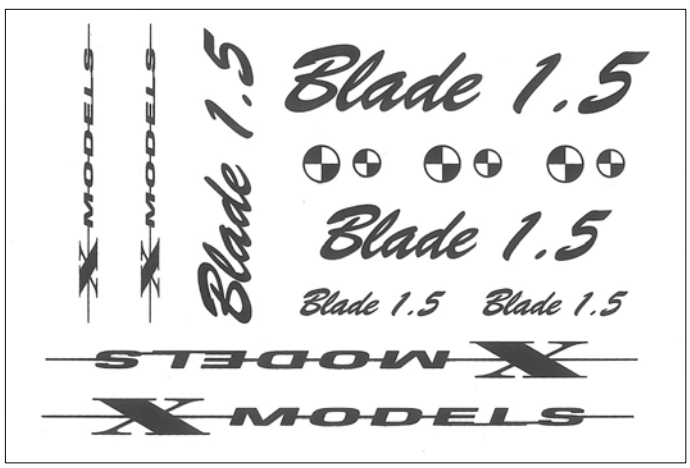

Fig.3: **Decal "Blade 1.5".**

Components to add for the Blade 1.5 standard version only

COD.	QT.	Item	Remarks
ADXL	1	right wing-panel	fiberglass, carbon reinforced (optional, all carbon fiber)
ASXL	1	left wing-panel	fiberglass, carbon reinforced (optional, all carbon fiber)
BAIO	1	wing rod	steel - length 135 mm, Ø 6 mm
MPXF	2	MPX connector female	plastic - 6 pin
MPXM	2	MPX connector male	plastic - 6 pin
CAVS	1	wing servo cable	twisted - three wires, length 1 m

Components to add for the Blade 1.5 DS version only

COD.	QT.	Item	Remarks
ALDS	1	wing	fiberglass, carbon reinforced (optional, all carbon fiber)
RINV	2	metal pushrod	length 30 cm - one tip threaded M2
FORC	2	clevis	threaded hole M2
DADO	2	nut	threaded hole M2
MPXF	1	MPX connector female	plastic - 6 pin
MPXM	1	MPX connector male	plastic - 6 pin
CAVS	1	wing servo cable	twisted - three wires, length 2 m
CARS	1	servo hole cover	2 pair supplied to suit 4 holes
BOCC	2	threaded bush	brass threaded M3
PERN	2	threaded horn	brass threaded M3
VBLA	2	wing holding screw	Nylon - length 25 mm - M4 thread

1.3 Components not included in the kit

The following lists include components, not included in the kit (purchasable separately), needed to complete the model.

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

Part not included in the kit to add for Blade 1.5 DS version only

COD.	QT.	Item	Remarks
SERF	2	flap servo	HI-TECH HS-125MG
UNIM	2	cable with a RX (UNI) plug	length: 30 cm

Parts not included in the kit, common for both versions

COD.	QT,	Item	Remarks
SERA	2	aileron servo	HI-TECH HS-125MG
SERV	2	tail servo	MULTIPLEX Tiny-S or HI-TECH HS-81
RXAP	1	receiver	MULTIPLEX PiCO 5/6 or HI-TECH Electron 6
INTE	1	ON/OFF switch	max. dimensions: 35 x 25 x 25 mm
BATT	1	battery pack	NiCd or NiMH, 4 cells, size AAA from 950 mAh
UNIM	2	cable with RX (UNI) plug	length: 30 cm

Optional parts

Wing and fuselage made of carbon fiber

On request, wing and fuselage are available completely made of carbon fiber.

Model carrying bag

To make the model transport easy and to conserve it intact this practical bag is available, made to measure either for the standard version (see figure 4) than for the DS version (see figure 5).

The bag is made of cloth, quilted and trimmed, with velcro-fastening and transport handle.

Fig.4: **Blade 1.5 standard bag.**

Fig.5: **Blade 1.5 DS bag.**

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

Tools

These tools may help you while assembling the kit:
— electric drill (and various size drill bits);
— modelling knife (or scapel);
— hair drier (at least 1000W);
— set of files;
— usual tools like screwdrivers, pliers, etc.;
— solder + soldering iron;
— Z-Bend pliers.

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 and masking tape;
— approx. 150 grams lead;
— heat shrink sleeve (diameters: 3 mm e 6 mm);
— double adhesive tape, thin.

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

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

Nuova Fulcro Service

If you should need we may supply all you need to complete your model:

Nuova Fulcro Service S.r.l.
Via Castelleone, 9 - Costa S. Abramo - 26022 Castelverde - CR (ITALY).
Tel.: 0039 0372 35138 - Fax: 0039 0372 27121
e-mail: info@fulcroservice.it
www.xmodels.it

CHAP. 2 BUILDING INSTRUCTIONS

In order to achieve a correct assembling of the model, we suggest You read the instructions carefully.

2.1 Preliminary operations

Kit components control

Have a look at the components (see “PART LIST, MATERIALS AND TOOLS LIST” at page 5) in order to easily identify them.

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

2.2 Fuselage

Into the fuselage are mounted: v-tail servos, ON/OFF switch, balancing weights, battery pack, receiver, and so on.

Preparing fuselage (both versions)

- Using a file, remove the border outlined in figure 2 for a depth of approx. 2 mm;

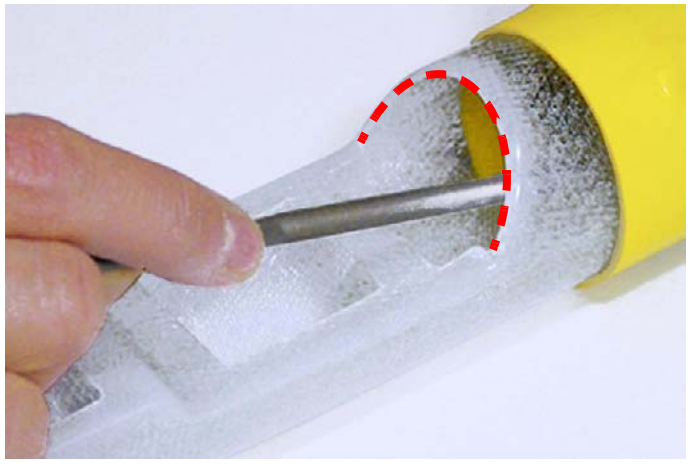

Fig.6: **File the border.**

- using a knife, remove the area outlined in figure 7.

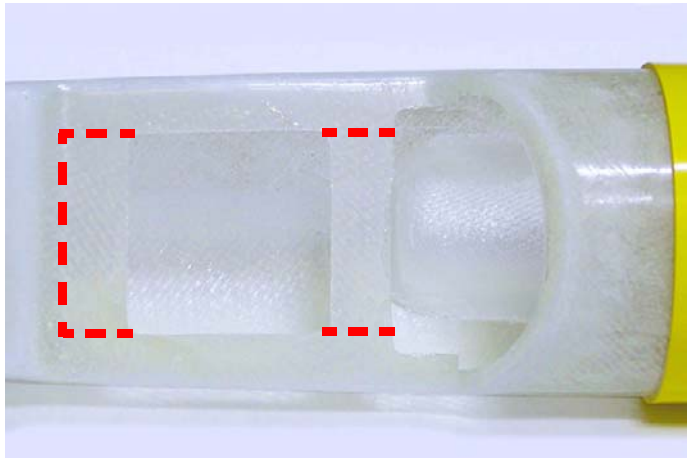

Fig.7: **Parts to remove.**

Finishing tail insertion holes (both versions)

- Using a drill bit 6 mm diameter (larger than the holes), trim exceeding metal edges from the tail insertion holes (see figure 8).

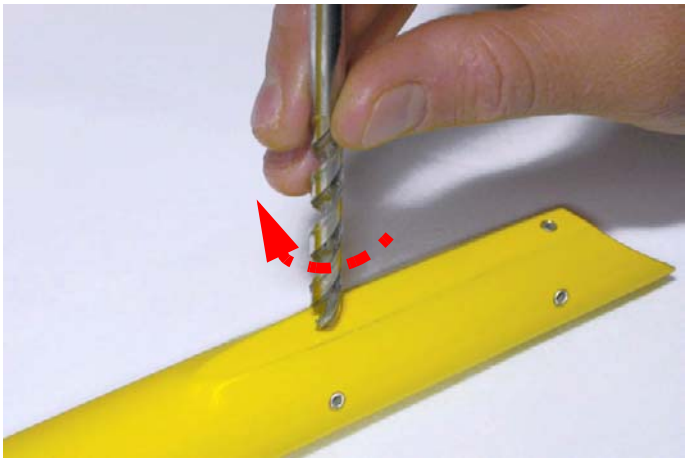

Fig.8: **Trim exceeding metal edges.**

Finishing fuselage end (both versions)

- Using a knife, remove the final part of the fuselage (see figure 9);

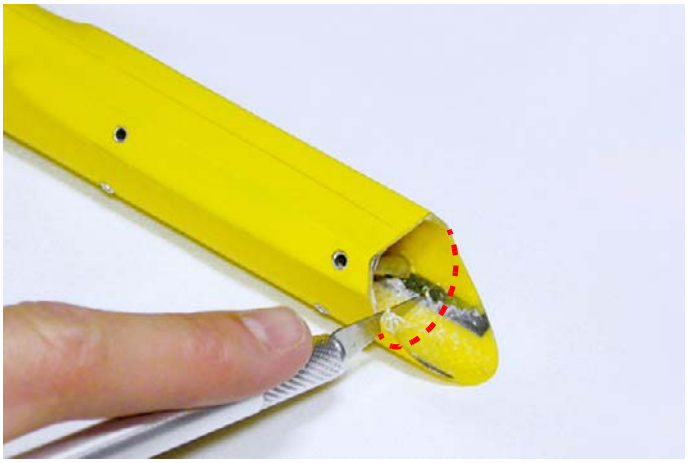

Fig.9: **Remove the final part of the fuselage.**

- using a file, remove, if present, any roughness inside the lower part of the fuselage ending (see figure 10).

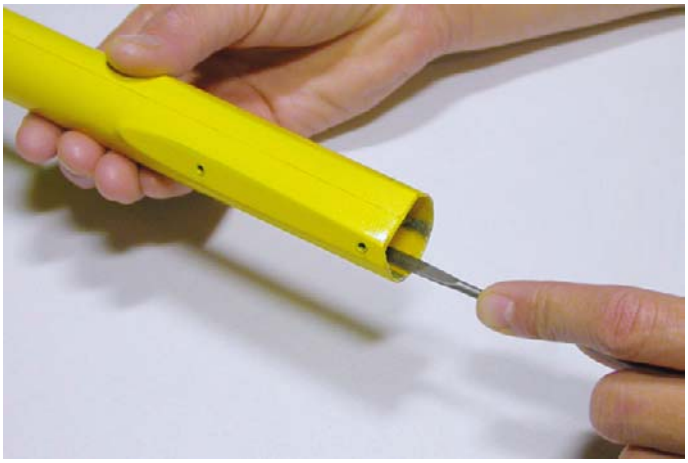

Fig.10: **Remove the internal roughness.**

Servos (both versions)

Preparing servos

- Mount grommets on each servo “SERV” (see figure 11);

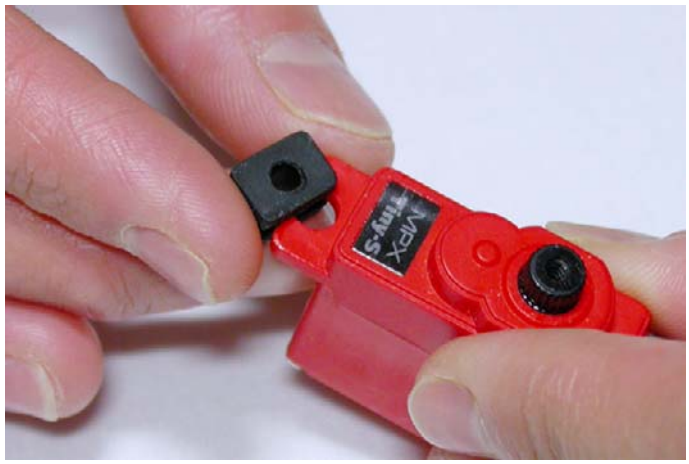

Fig.11: **Mounting grommets.**

- using some double adhesive tape, join the two servos together (see figure 12).

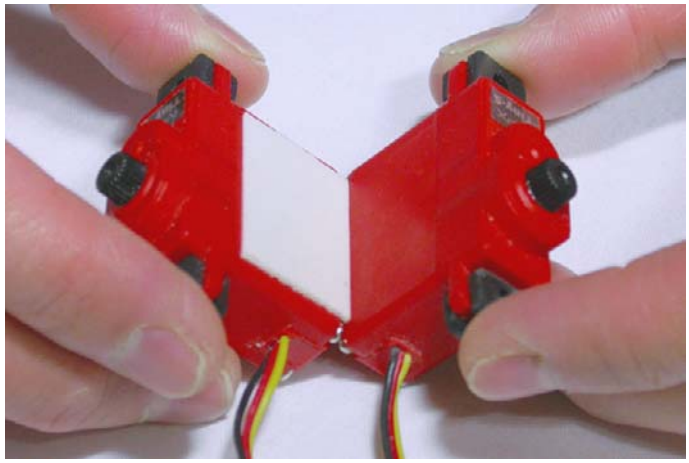

Fig.12: **Join servos together.**

Preparing supports

- Using a pencil, mark the middle of each support “SSER”;
- using a file, round the two ends of each support (see figure 13);

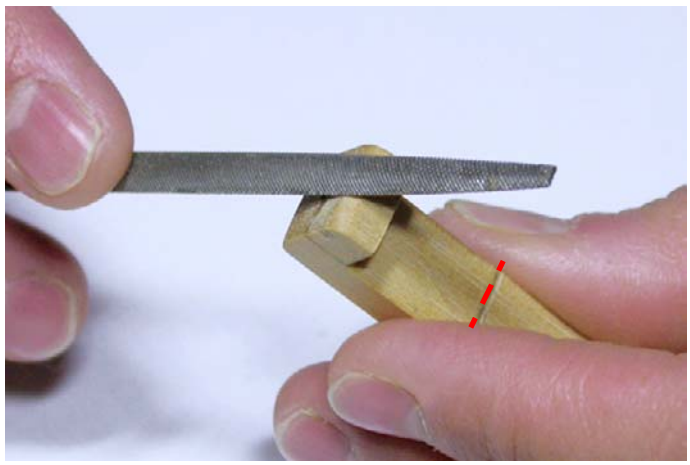

Fig.13: **Round the ends.**

- position one of the two supports “SSER” as shown in figure 14 (let the middle of the support to coincide with the middle of the servos junction point);
- using a pencil, mark the servos holes position;

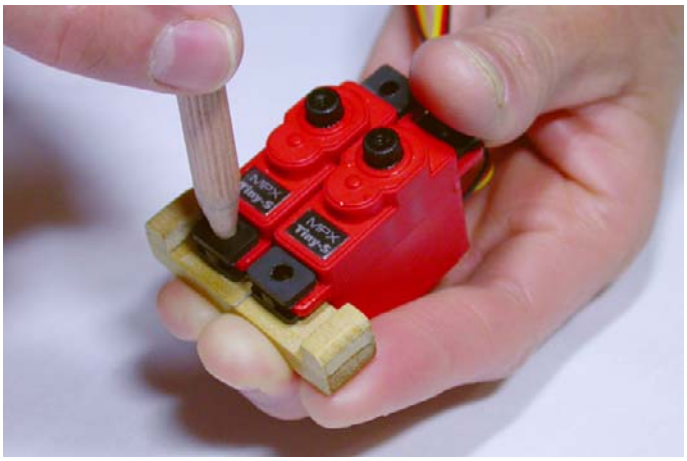

Fig.14: **Mark the holes position.**

- drill 2 mm diameter holes corresponding to the marked points (see figure 15).

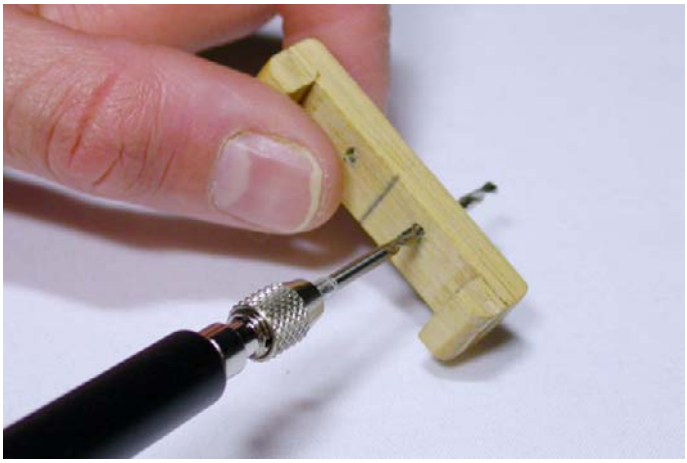

Fig.15: **Drilling points.**

Positioning supports

- Using some cyano or “5 minutes” epoxy, glue one support “SSER” under the side flanges of the structure as shown in figure 16 (the support must be aligned with the border of the structure);

Fig.16: **Positioning the first support.**

- glue the second support “SSER” distant enough to allow the insertion of the servos (see figure 17).

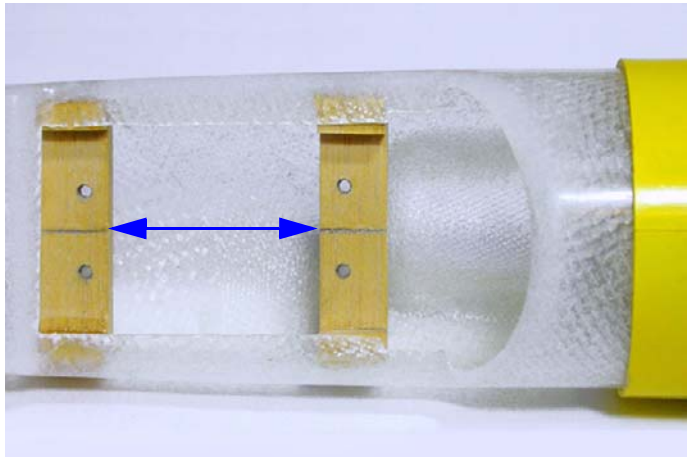

Fig.17: **Positioning the second support.**

Inserting and fastening servos

- Let servos cables pass under the support as shown in figure 18;

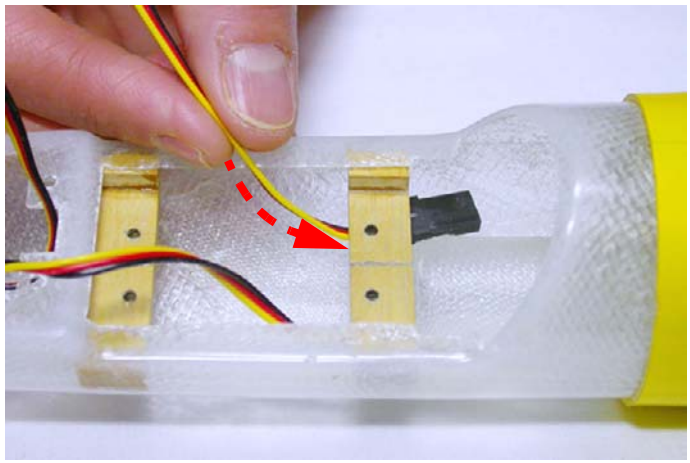

Fig.18: **Inserting cables under the suport.**

- insert servos and fasten with the proper fixing screws (see figure 19).

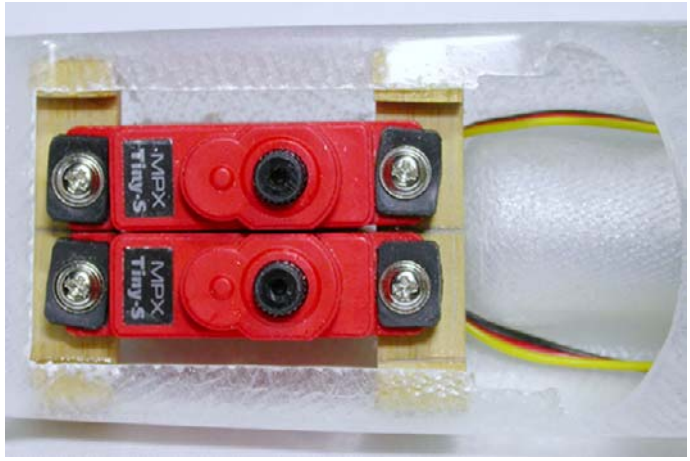

Fig.19: **Final servos position.**

Balancing weights (both versions)

- Using a file, remove the structure in order to make a gap at least 46 mm long (see figure 20);

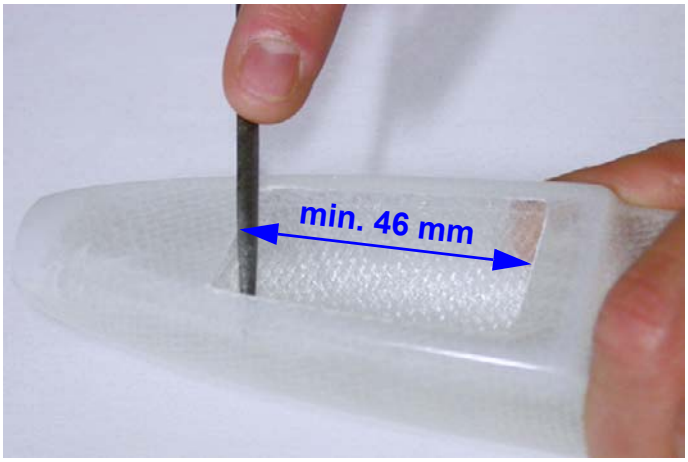

Fig.20: **Make a gap at least 46 mm long.**

- inside the nose of the fuselage, insert some lead bars for a total weight of approx. 80 grams (see figure 21);
- using some “5 minutes” epoxy, glue the bars.

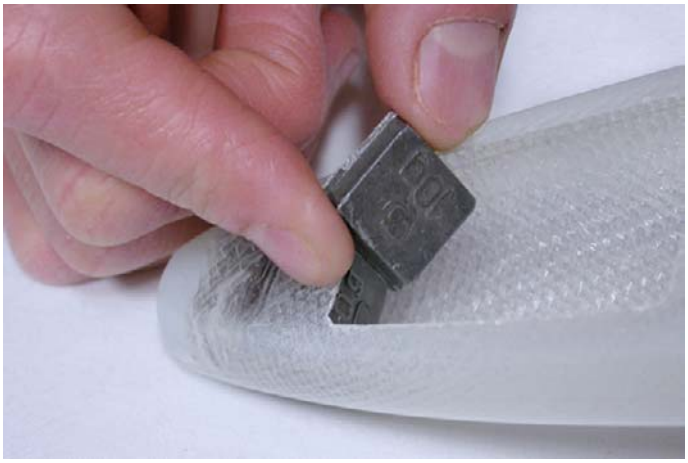

Fig.21: **Insert lead bars.**

ON/OFF switch (both versions)

- Position the ON/OFF switch label over the structure of the fuselage as shown in figure 22;
- using a fibre-tip pen, mark the label borders and holes;

Fig.22: **Marking label borders.**

- using a knife, make the ON/OFF switch housing (see figure 23);

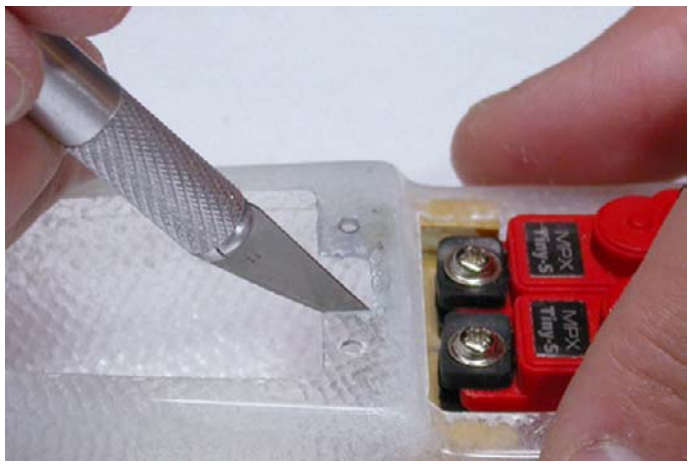

Fig.23: **Cutting out the aperture.**

- check that ON and OFF markings truly correspond to the status “switched ON” and “switched OFF”;
- check the movement of the ON/OFF lever;
- fasten switch using the proper screws (see figure 24).

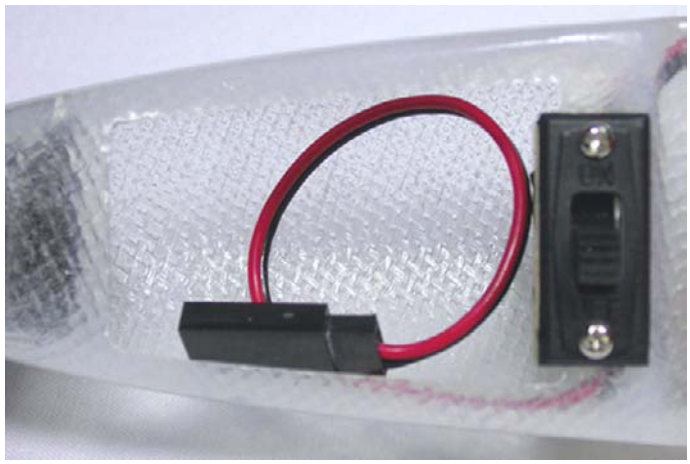

Fig.24: **ON/OFF switch in position.**

Note: if the switch is provided with the battery recharge plug, position the charge cable in order to easily extract when needed.

Battery pack (both versions)

- Join four AAA size cells in a battery pack with arranged as shown in figure 25;

Note: the connector must be chosen in compliance with the ON/OFF switch.

- wrap the battery pack with some heath shrink sleeve;

Fig.25: **Battery pack.**

- cut two strips made of polyethylene (5 mm thick, dimensions 60 x 20 mm) and insert them beside the battery housing (see figure 26);

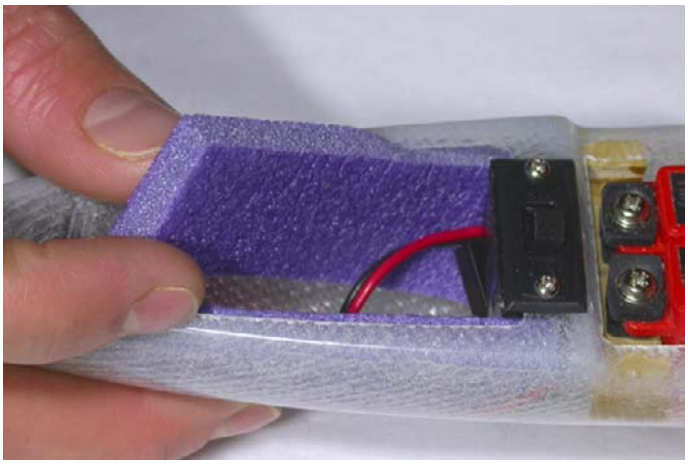

Fig.26: **Insert the shock absorbing strips.**

- insert the battery pack into the housing (see figure 27).

Fig.27: **Battery pack in position.**

Servo horn (both versions)

Preparing horns

- Using side cutters, cut the servo horns in surplus (see figure 28);

Fig.28: **Cut the servo horns in surplus.**

- using a drill 1.5 mm diameter, enlarge the servo hole in the horn (see figure 29).

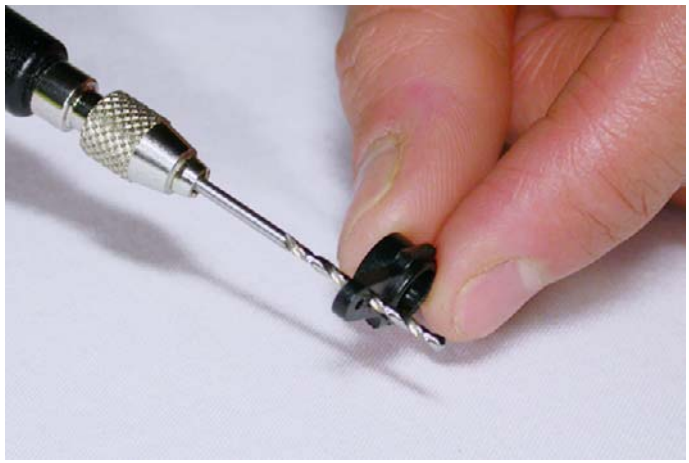

Fig.29: **Enlarging the servo horn hole.**

Positioning servos

- Mount servos horns as shown in figure 30;

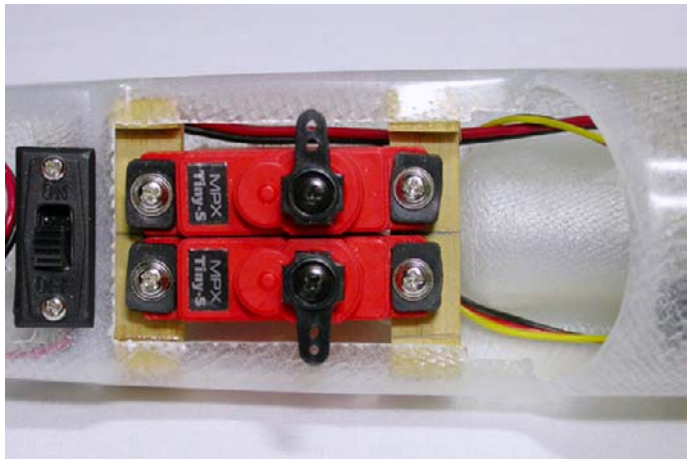

Fig.30: **Mounting servos horns.**

Pushrods (both versions)

Preparing pushrods

- Using a file, remove part of the clevis "FORC" in order to obtain the shape displayed in figure 31;

Note: file the other clevis on the opposite side.

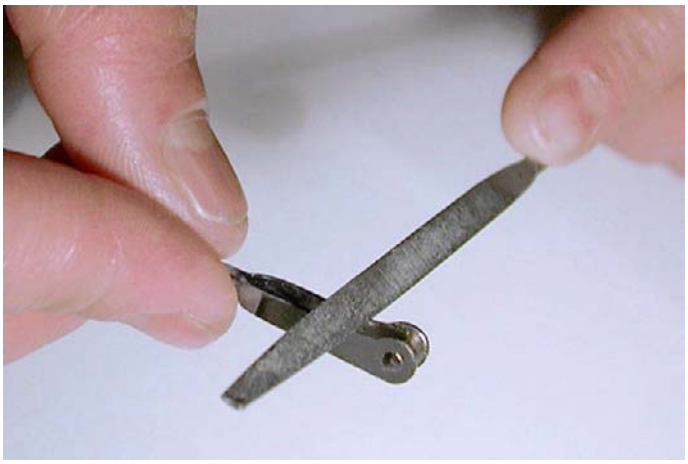

Fig.31: **Remove part of the clevis.**

- first using a sharp knife, then finishing with a file, smooth the end of each ball link socket "UNIB" (see figure 32) in order to prevent interference with the fuselage;
- using side cutters, cut two of the metal pushrods "RINV", from the side without thread, for a length of 10 cm;

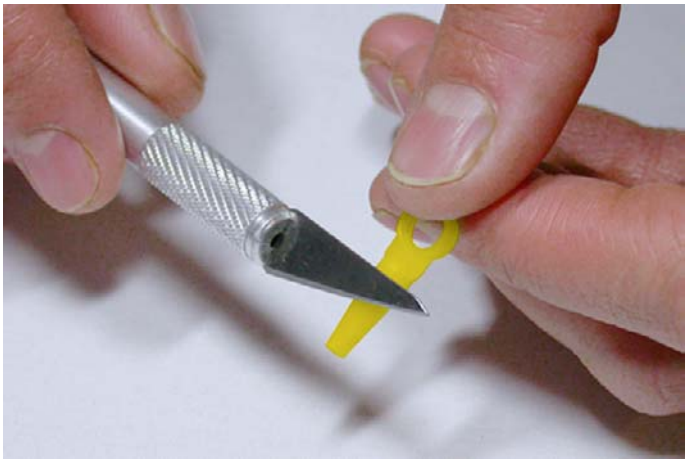

Fig.32: **Smoothing a ball link socket.**

- screw to (the threaded side of) each one of the two shortened pushrods "RINV" a nut "DADO" and a clevis "FORC" and, to (the threaded side of) each one of the other two pushrods "RINV" a ball link socket "UNIB" (see figure 33);

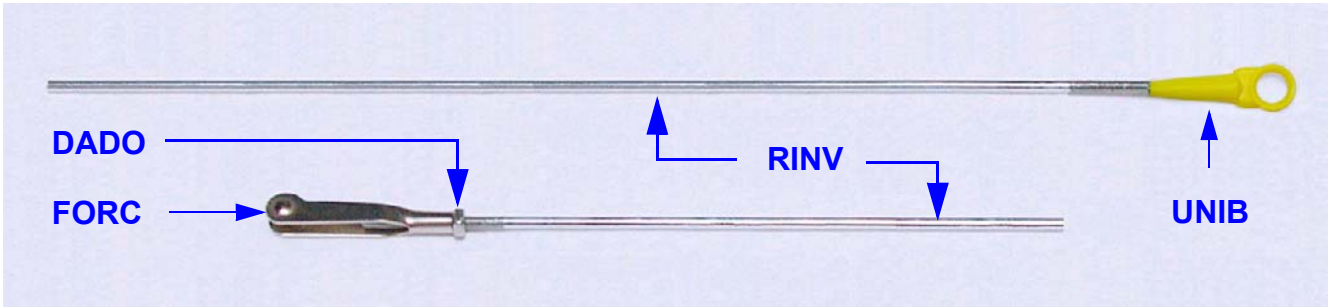

Fig.33: **Pushrods.**

- using side cutters, carefully make some dents in the (non threaded part of the) rod "RINV", for a length of 6 or 7 cm, in order to increase the adhesion of the epoxy (see figure 34), but careful not to cut through or weaken it the wire rod;
- spread some "5 minutes" epoxy on the dent part of the pushrods "RINV";

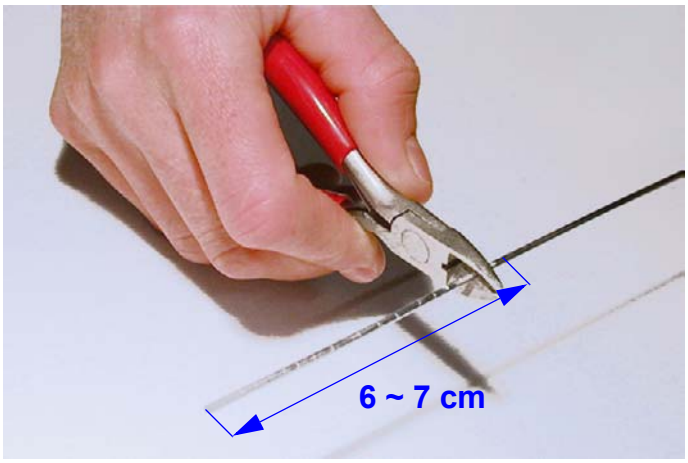

Fig.34: **Making some dents on the rod.**

- insert, into each carbon pushrod "ASTA", a pushrods "RINV" with ball link socket, keeping 8 cm exposed and, on the opposite side, a shortened pushrod with nut and clevis, keeping 2.5 cm exposed (see figure 35);

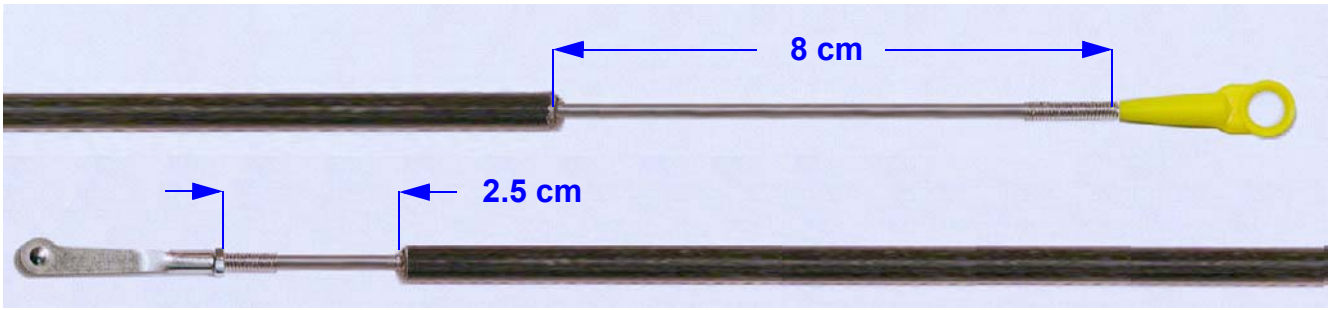

Fig.35: **Carbon pushrods ends with metal pushrods correctly inserted.**

- wait until the glue is dry.

Inserting pushrods

- Insert the two complete pushrod groups into the fuselage and connect the clevises to the servos horns (see figure 36);

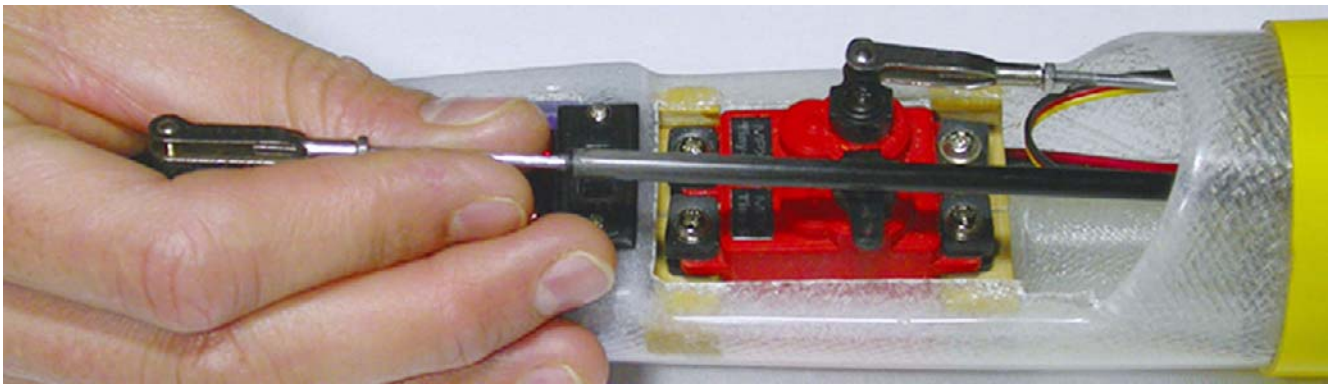

Fig.36: **Insert and connect the pushrod groups.**

Wing servos connection

The electrical connection between wing servos and receiver is made with a set of connectors like the ones shown in figure 37.

The DS version requires just one set of connectors, while the standard version needs two.

- Take the external dimensions of the “MPXF” connector.

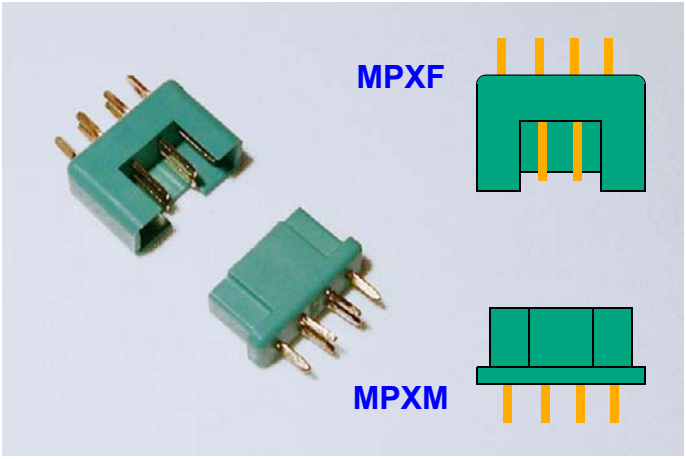

Fig.37: **Wing servos connectors set.**

Wing servos connections (standard version only)

Holes for the wing servos connections

- Spread some masking tape from the wing rod hole to the wing alignment pin hole (see figure 38);
- at a distance of 20 mm from the center of the wing rod hole, using a knife (with a well sharpened blade), make a hole having the same dimensions of the “MPXF” connector;

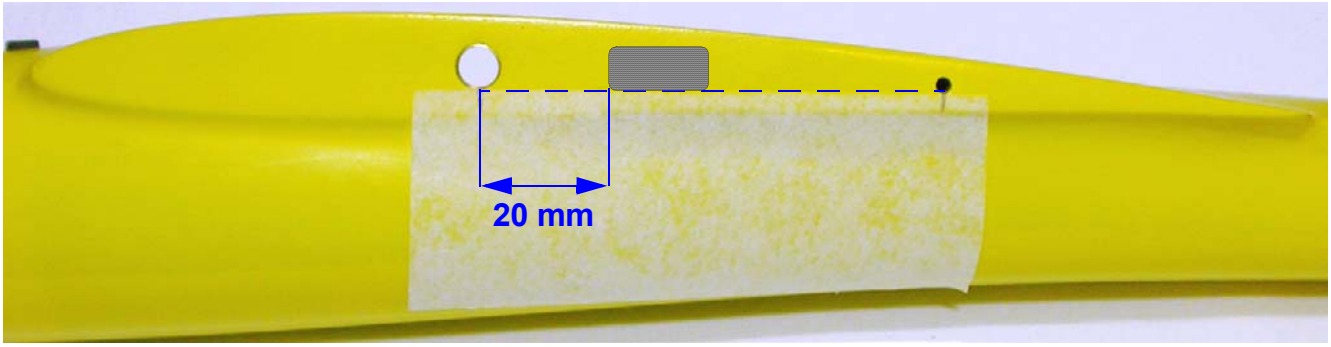

Fig.38: **Position of the hole.**

- using a flat file, finish the shape of the hole (see figure 39) continuously checking the dimensions;
- on the other side as well repeating the measurements and distances (in order to obtain two identical holes in perfect alignment);
- (gently) remove the masking tape.

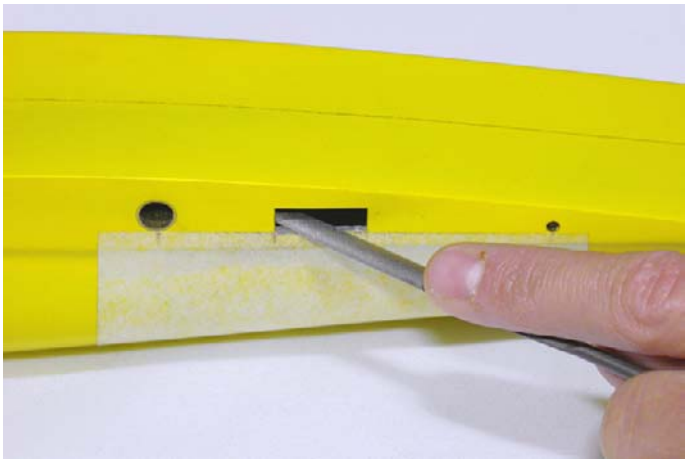

Fig.39: **Finish the shape of the hole.**

Preparing the wing root holes

- Insert the wing rod “BAIO” into the wing tube in the fuselage (see figure 40);

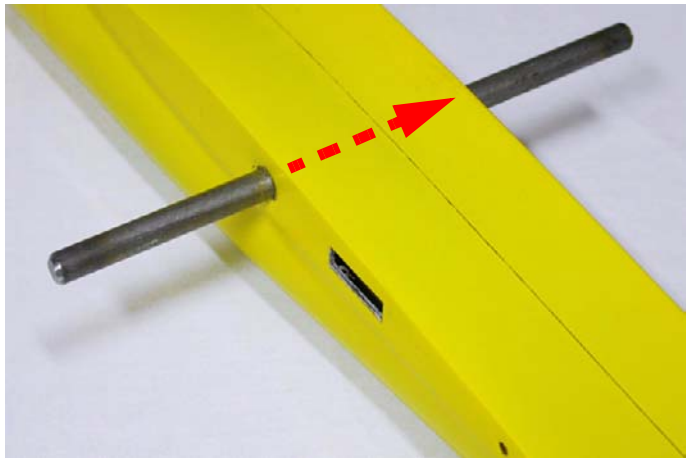

Fig.40: **Insert the wing rod into the wing tube.**

- insert a wing-panel (see figure 41);

Fig.41: **Insert a wing-panel.**

- using a pencil lead or a metal scriber (at least 6 cm long), mark the shape on the wing root tracing it from the hole already done (see figure 42);

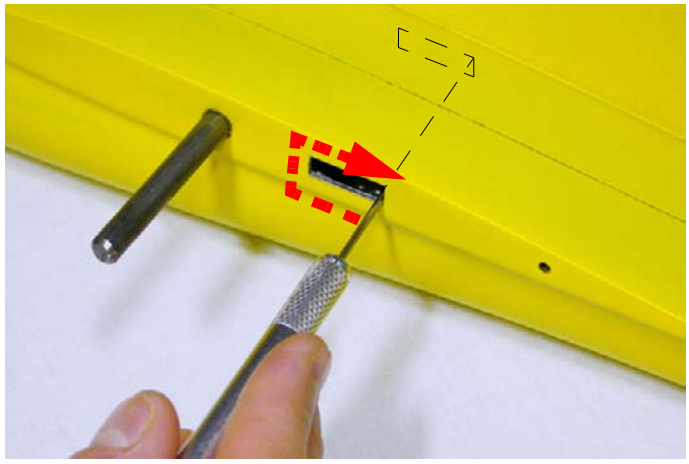

Fig.42: **Trace the contour of the hole.**

- remove the wing-panel and trace better the contour (see figure 43);
- repeat the operation also for the other wing-panel.

Fig.43: **Trace better the contour.**

How to make this hole on the wing-panels will be described later.

Preparing electrical connections

- Before soldering, insert the free tip of every wire, into a 15 mm long heat shrink sleeve of suitable section;
- solder wires of the cables “UNIM” to the connectors “MPXF” as shown in figure 44.

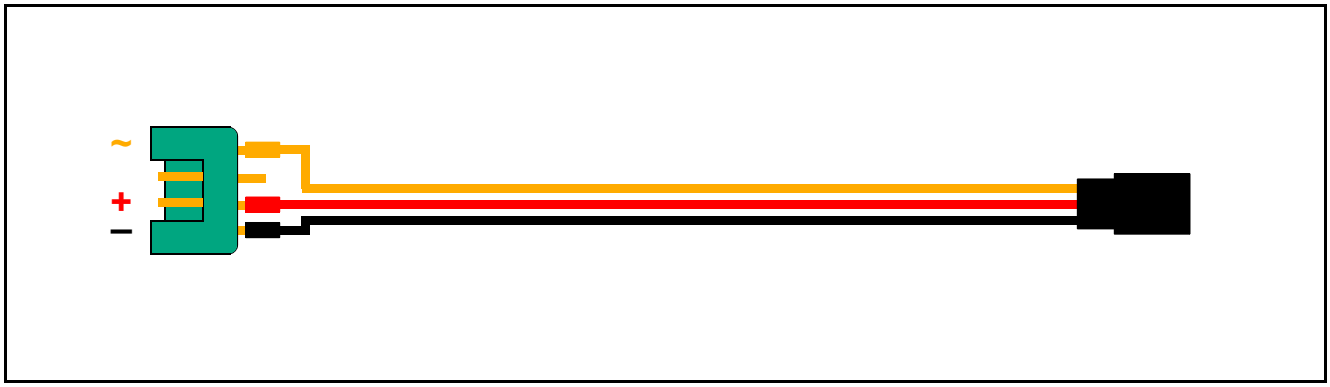

Fig.44: **Connection diagram from wing servos to receiver.**

Inserting the connections into the fuselage

- Insert the cables (from the side of the RX plug) into the hole made in the fuselage (see figure 45);

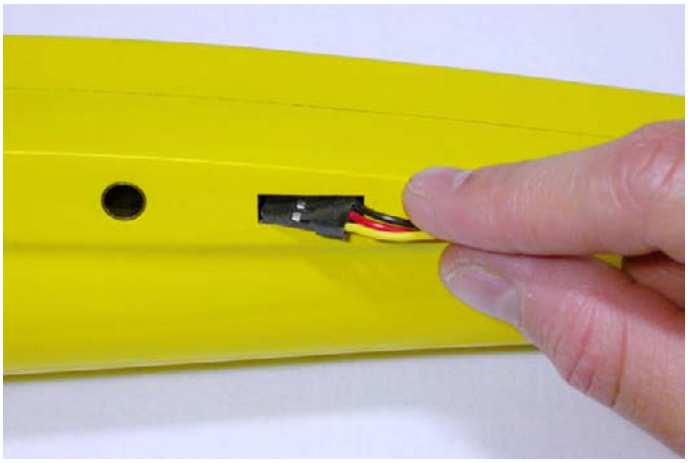

Fig.45: **Inserting RX plugs.**

- insert the cables up to the socket “MPXF” (see figure 46);

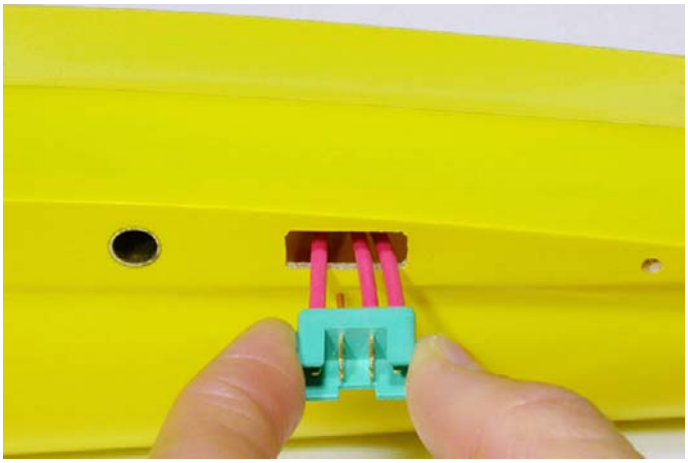

Fig.46: **Inserting a cable up to the socket.**

- spread some epoxy around the socket "MPXF" and insert it into the proper housing in the fuselage as shown in figure 47;
- wait until the glue is dry;
- repeat the operation also on the other side;
- pull out the connections from the front side of the fuselage.

Fig.47: **Socket in position.**

Wing servos connection (DS version only)

Connections diagram between wing servos and receiver

- Before soldering, insert the free tip of every wire, into a 10 mm long heat shrink sleeve of suitable section;

Note: each signal wire requires a sleeve with a diameter of 3 mm, while each one of the two groups for negative and positive wires requires a sleeve with a diameter of 6 mm.

- solder the wires coming from the four RX plugs "UNIM" to the MULTIPLEX six pin socket "MPXF" according to the diagram shown in figure 48.

Note: before soldering wires, check the connectors polarity (the signs + and - are impressed on the connectors).

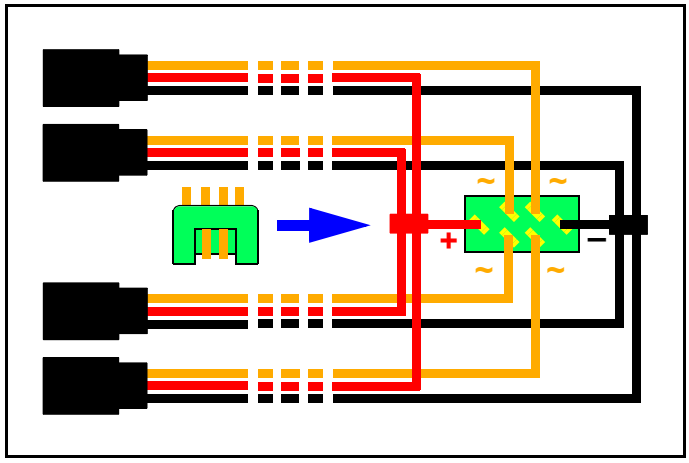

Fig.48: **Connections diagram.**

Hole for the servos connection

- Using a knife, make a 16 x 7 mm rectangular hole, placed to a distance of (at least) 40 mm from the wing fore fixing hole (see figure 49);

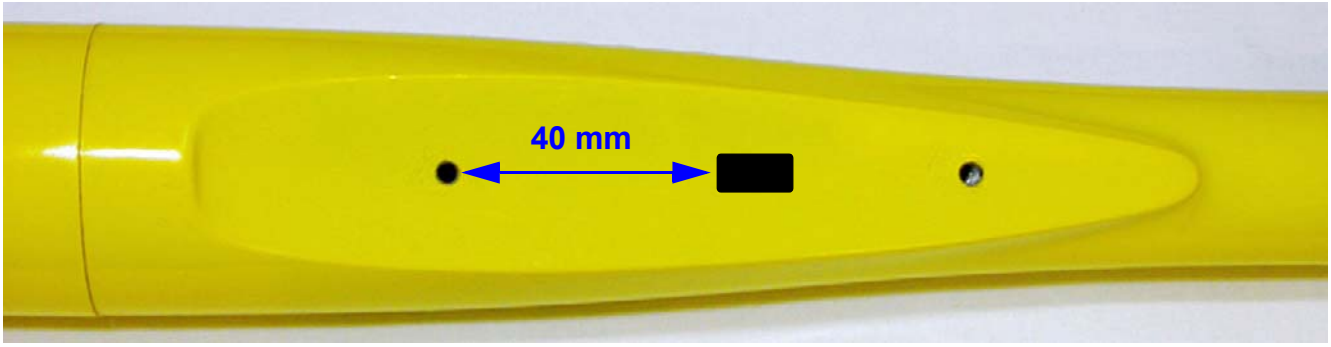

Fig.49: **Hole position.**

Note: the same distance must be kept (using the maximum precision) for the corresponding hole in the wing.

Inserting connections into the fuselage

- Insert, one at a time, the four RX plugs into the hole made in the fuselage (see figure 50);

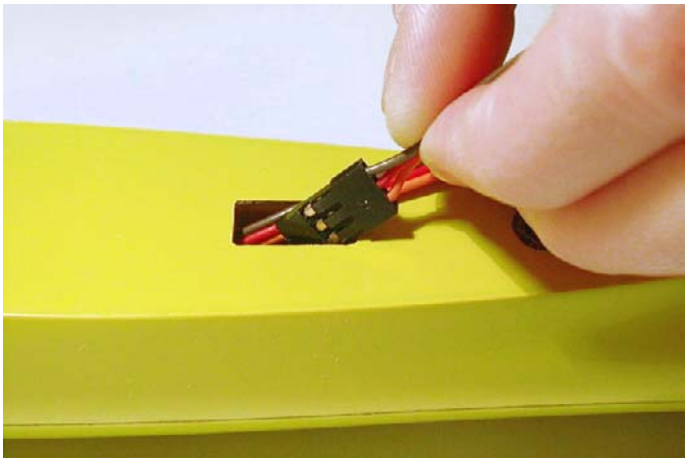

Fig.50: **Inserting RX plugs.**

- pull out the four connections from the fuselage as shown in figure 51;

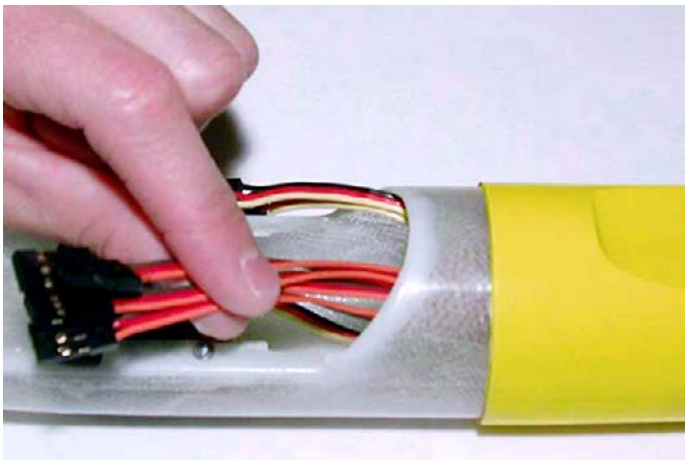

Fig.51: **Pull out connections from the fuselage.**

- position the socket “MPXF” as shown in figure 52.

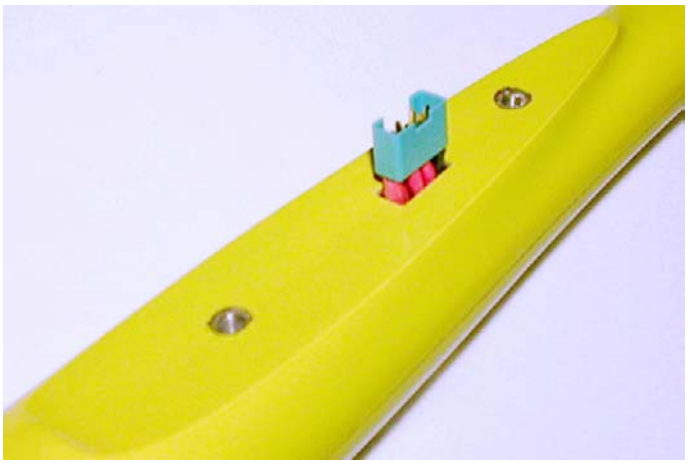

Fig.52: **Positioning the socket.**

Subsequently, when the wing will be joint to the fuselage (see “Joining the wing to the fuselage” at page 41) it will be possible to check the alignment between the socket “MPXF” and the connector “MPXM”: in case of a non correct alignment, it will be necessary to modify the dimension of the hole (see figure 48 at page 23).

Receiver (both versions)

Antenna's wire

- Drill 3 mm diameter hole in the fuselage in the position shown in figure 53;
- place a round servo grommet into the hole, in order to avoid any damage to the antenna's wire;

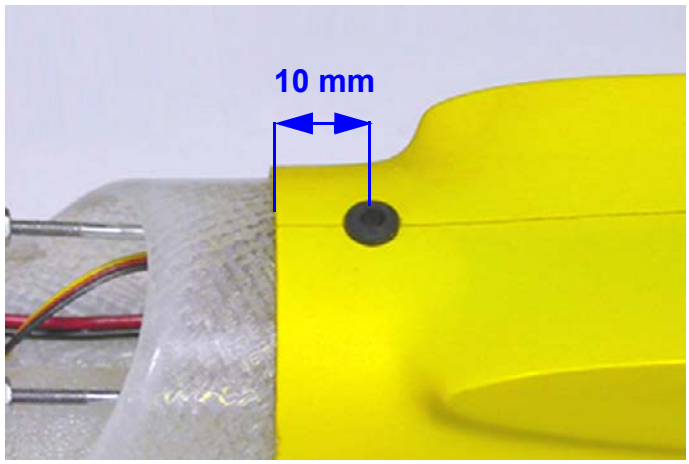

Fig.53: **Antenna's hole position.**

- let the wire pass through the hole as shown in figure 54.

The final positioning of the antenna will be shown later.

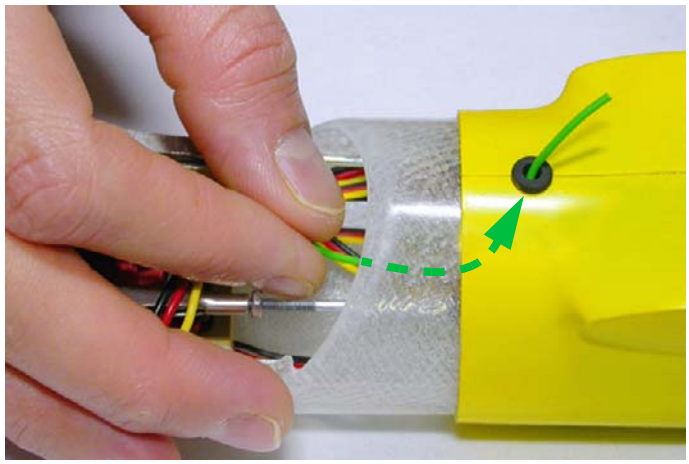

Fig.54: **Thread the antenna's wire through the hole.**

Receiver

- Spread some double adhesive tape under the receiver "RXAP";
- remove protection film from the double adhesive tape (see figure 55);

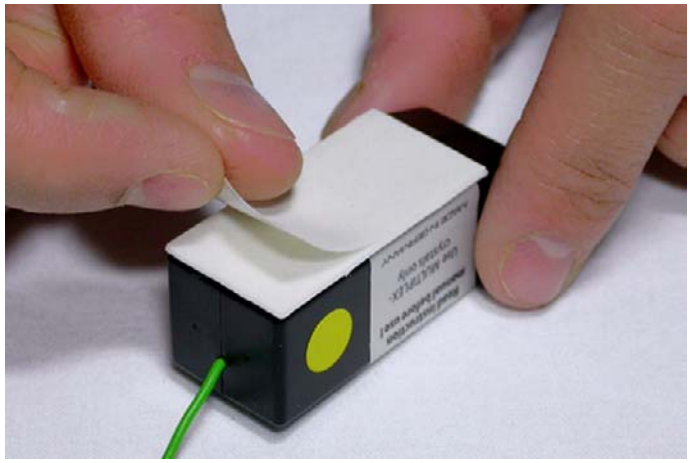

Fig.55: **Removing protection film.**

- plug the RX plugs to the receiver according to the diagram in figure 108 at page 49;

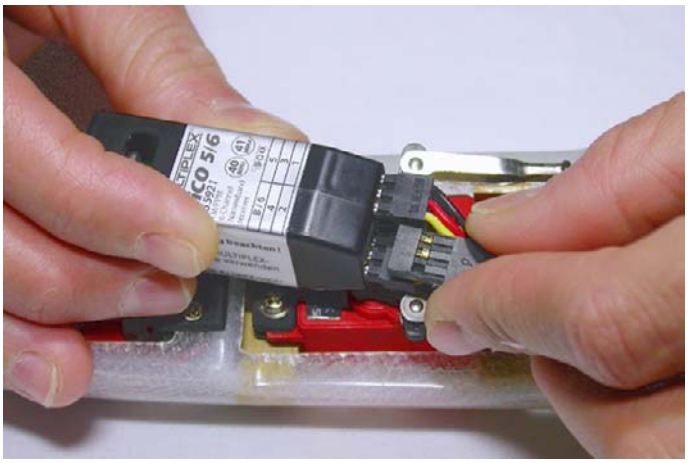

Fig.56: **Plug the RX plugs to the receiver.**

- insert the receiver “RXAP” into the fuselage, behind servos, as shown in figure 57;

Fig.57: **Positioning the receiver.**

- position the receiver as shown in figure 58;
- gently press on the receiver in order to fasten it to the fuselage;

Note: the frequency crystal housing placed in order to easily replace crystal, when needed, without removing the receiver.

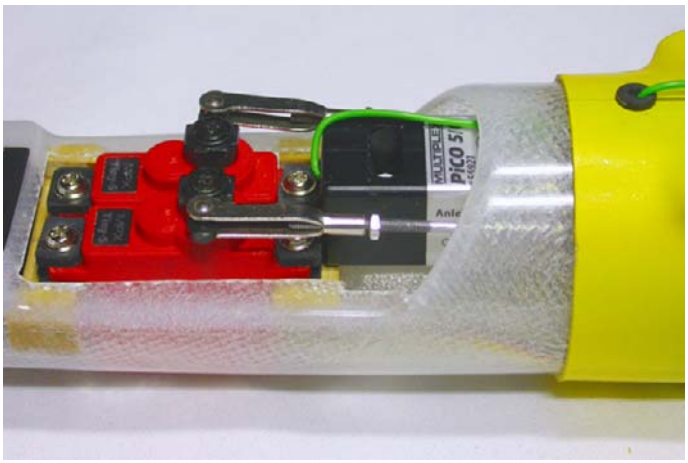

Fig.58: **Final position of the receiver.**

2.3 V-tail

Finishing tail panels (both versions)

Tail panels support pins

- Using a pair of pliers, bend a little bit the two tail connection pins in order to make them slightly diverging (see figure 59); this operation will avoid the tail to slip out from its supports during the flight;

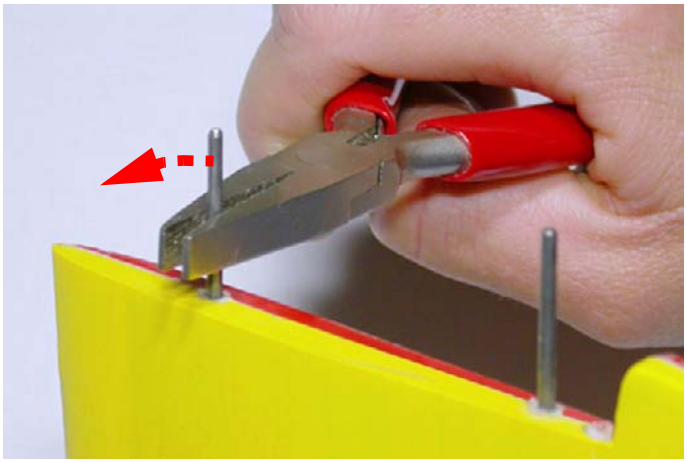

Fig.59: **Bend the two pins.**

- using a sharp knife, remove the glue in excess from the root of the pins (see figure 60).

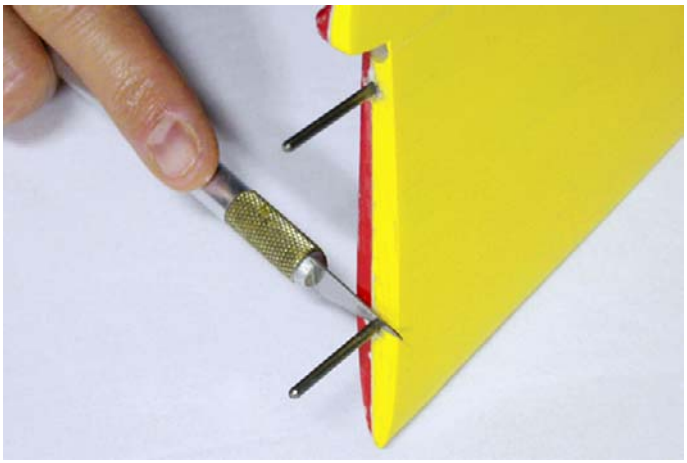

Fig.60: **Remove the glue in excess.**

Pushrods connections

- Fully fasten the ball “GIUN” on the screw “VITE”;
- screw the ball connector into the tail panel unit (see figure 61);
- repeat the operation for the other tail panel;

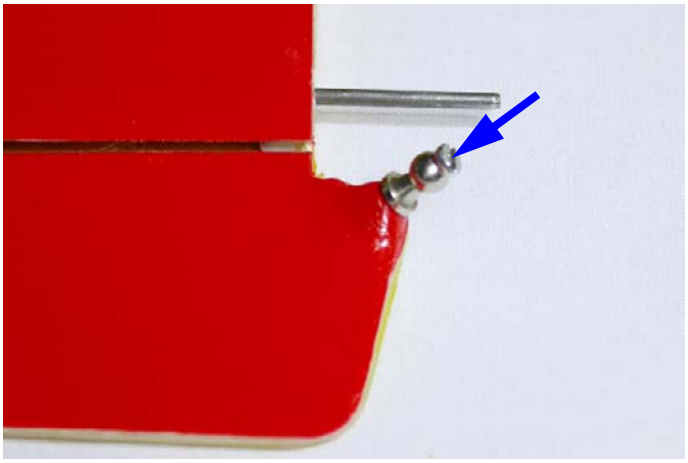

Fig.61: **Fastening the group screw-ball.**

- using a file, remove the area shown in figure 62;

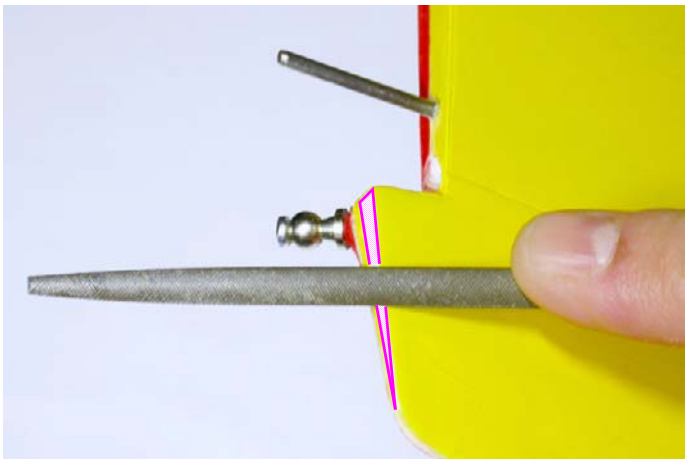

Fig.62: **Remove the marked area.**

- insert the tailplanes into the proper housings (see figure 63);

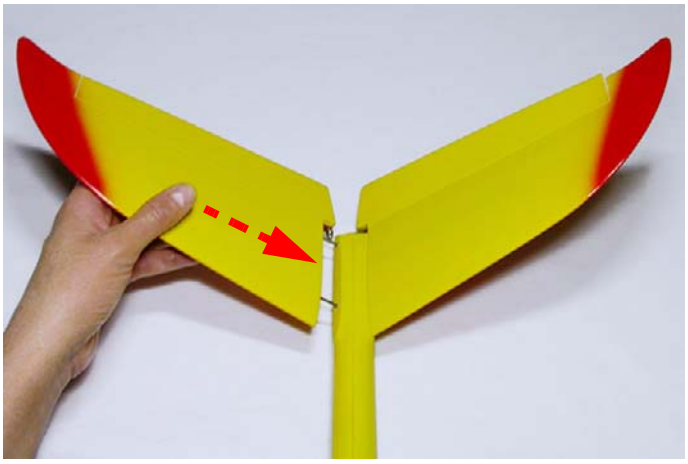

Fig.63: **Inserting tailplanes.**

- disconnect clevises from the servos horns (see figure 64);

Fig.64: **Disconnecting clevises.**

- clip the ball socket ends “GIUN” to the ball connectors “UNIB” (see figure 65);

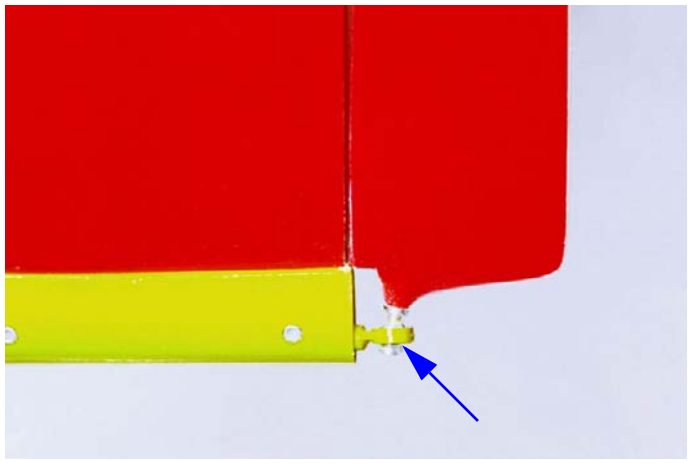

Fig.65: **Clip the ball socket ends to the connectors.**

- using some masking tape, keep the V-tail movable control surfaces aligned (see figure 66).

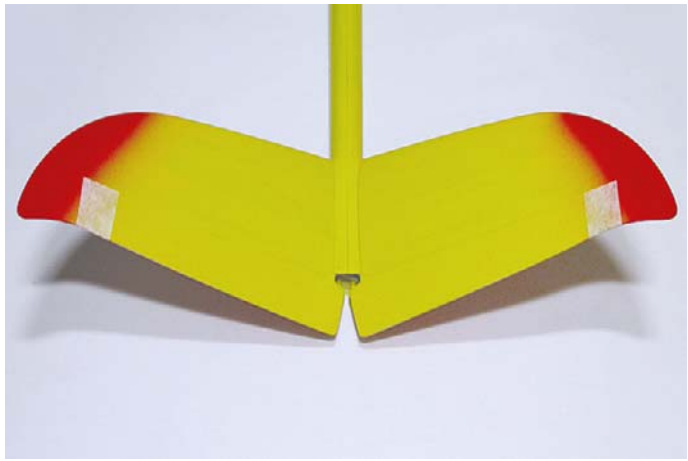

Fig.66: **Keeping control surfaces aligned.**

For each pushrod:

- loosen the nuts “DADO”;
- adjust the length of the pushrods (screwing or unscrewing the clevises “FORC”) in order to let the clevises position to coincide with the servos horns;
- connect the clevises to the servos horns (see figure 67);
- tighten the nuts.

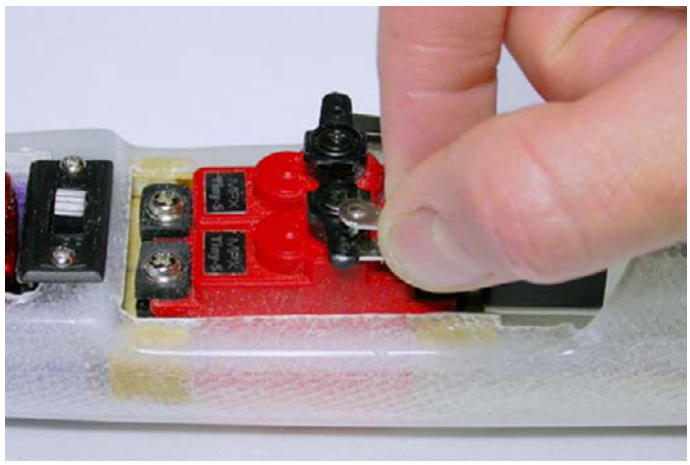

Fig.67: **Connecting clevises to the servos horns.**

Antenna (both versions)

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 68.

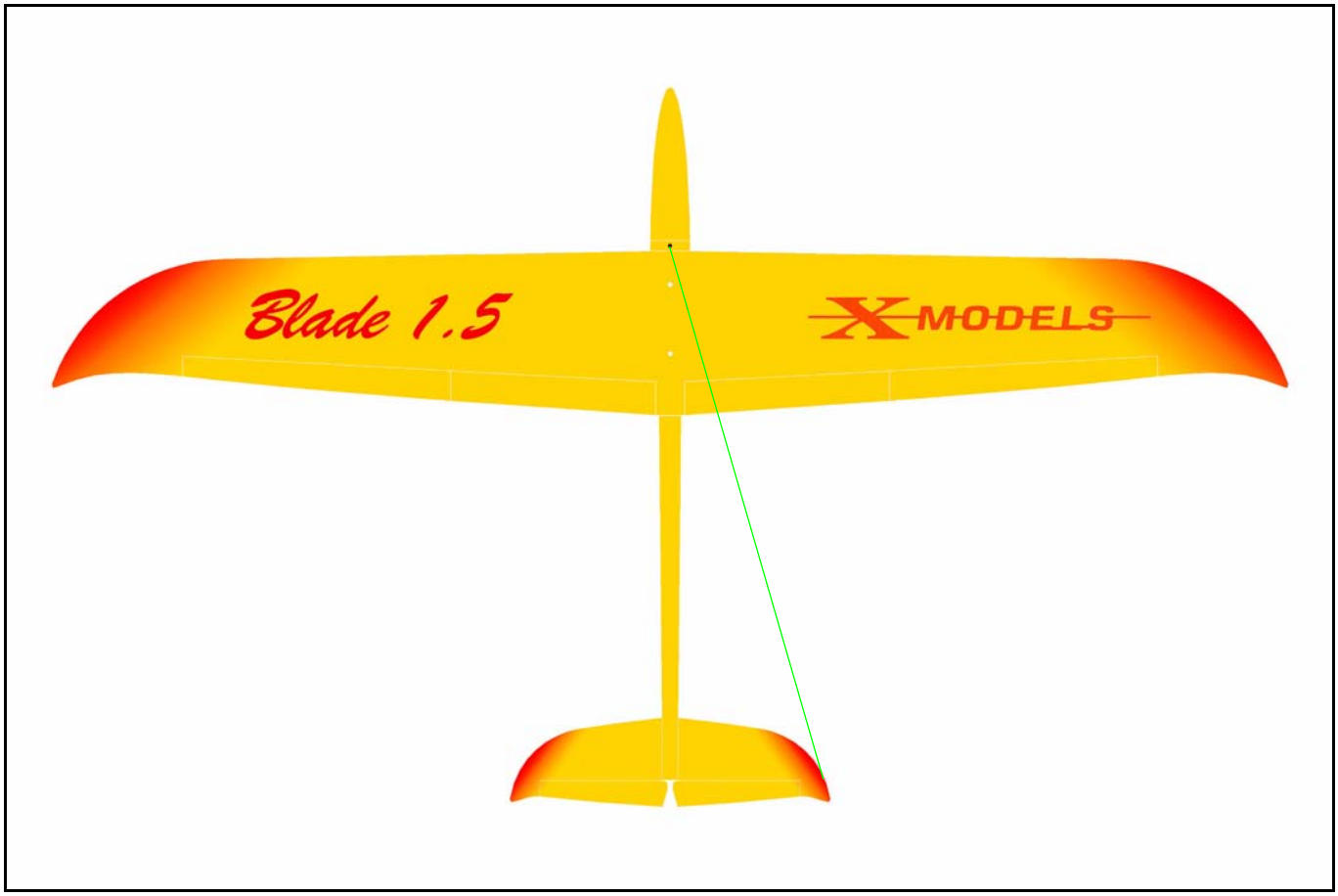

Fig.68: **Antenna's (recommended) position.**

Anyway, 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.

2.4 Wing

Servos housings

Wing servos must be put into suitable housings. The use of flat servos (max. 11 mm) with high torque (at least 10 Newton/centimeter) is recommended (i. e.: HI-TECH HS-125 MG).

Installing bushes for control horns (both versions)

Wing servos pushrods are connected to control surfaces (ailerons and flaps) through threaded horns and bushes inserted into the surfaces.

WARNING! the center of the hole must be, at least, 10 mm away from the leading edge of the movable surfaces (see figure 69);

- using a file (5 mm diameter, round section), finish the holes;

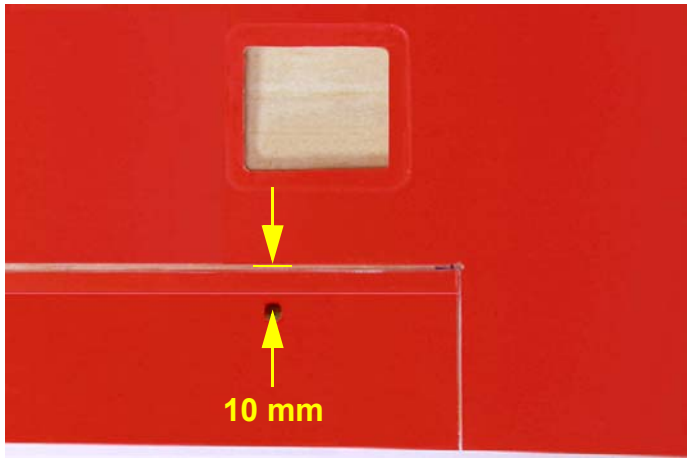

Fig.69: **Distance of the hole (wing seen from under).**

Standard version:

- Drill 4 mm diameter hole on each aileron in the point shown in figure 70.

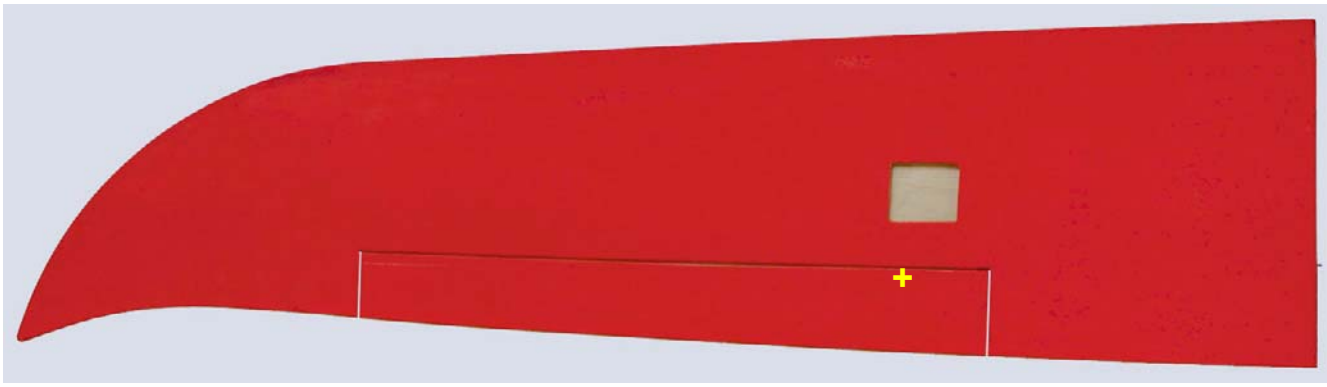

Fig.70: **Position of the bush.**

DS version:

- Drill 4 mm diameter holes on ailerons and flaps in the points shown in figure 71.

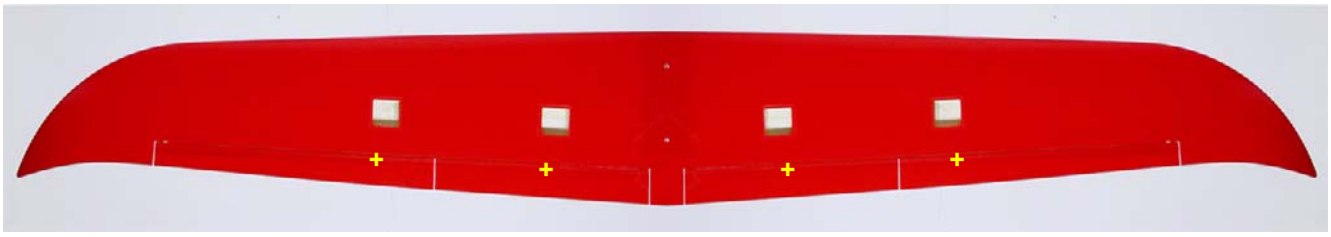

Fig.71: **Position of the bushes.**

- insert the threaded bushes “BOCC” in their holes from the top surface (see figure 72);
- with a drop of cyano, glue the bushes.

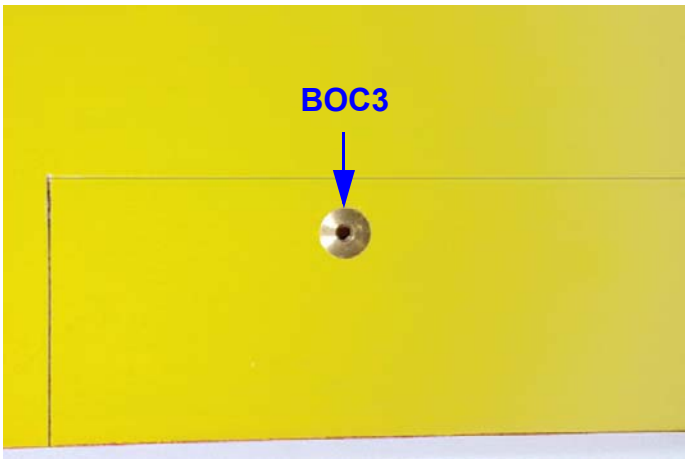

Fig.72: **Bush in position (wing seen from top).**

Holes for wing servos connection (standard version only)

The procedure is the same for both wing-panels.

- Using a drill (3 mm diameter) make the rectangular hole inside the marked contour (see figure 73);

Note: this operation requires the maximum precision (and a little bit of patience).

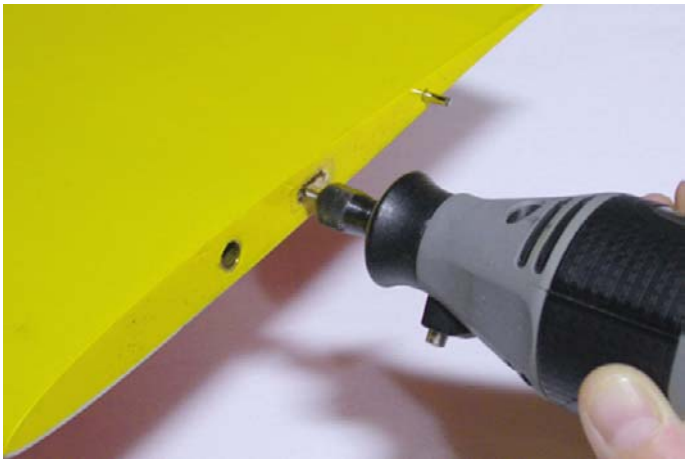

Fig.73: **Follow the marked contour.**

- using a knife (with a well sharpened blade) remove all the material inside the wing in order to make enough space for the connector;
- using a file, finish the hole (see figure 74);

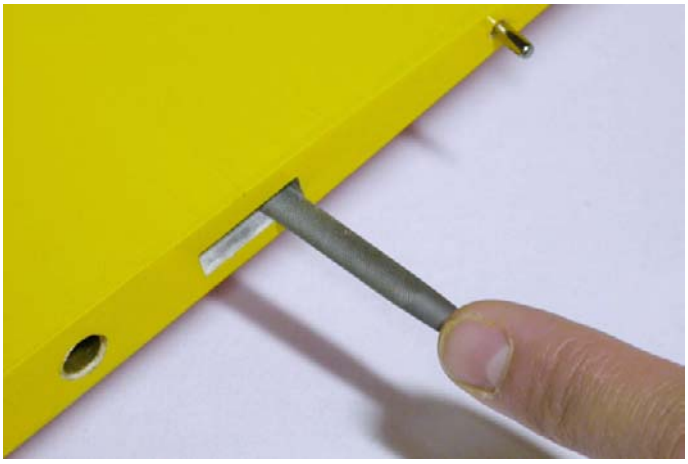

Fig.74: **Finishing the hole.**

- to check the precision of the hole, temporary insert the wing-panel and, looking through the hole made into the fuselage, locate the part to remove (see figure 75).

Note: a torch (or strong light source), shone directly through the fuselage aperture, will show up the part of the matching aperture that needs adjusting.

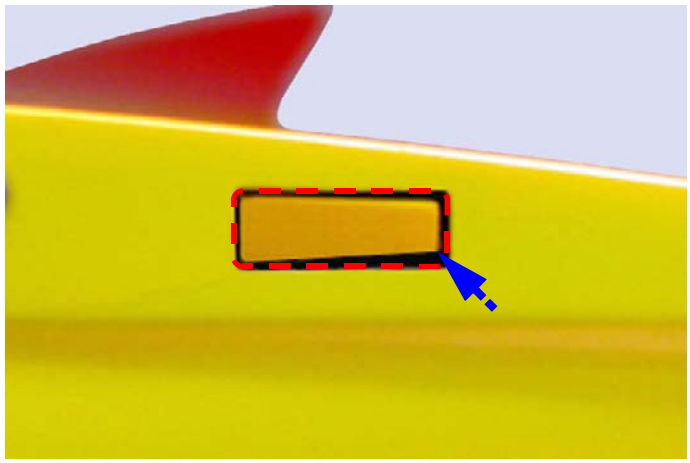

Fig.75: **Observing through the hole.**

WIng servos connection (standard version only)

For each servo:

- remove (cut) the RX plug;
- cut the cable "CAVS" for a length of 25 cm;
- cut and strip, for a length of approx. 5 mm, the tip of all the wires (either for the wires of the cable "CAVS" than for the ones of the servo);
- before soldering, insert the free tip of every wire of the cable "CAVS", into a 15 mm long heat shrink sleeve of suitable section (see figure 76);

Fig.76: **Wires ready for the soldering.**

- solder each servo wire to the corresponding wire of the cable "CAVS";
- let every heat shrink sleeve slide on its soldering;
- using a hair drier (at least 1000W), direct the (very hot) air blow over the sleeves and let them mould on the solderings.

Inserting cables into the wing

- Insert a Nylon wire (approx. 50 cm long) into the wing root hole (see figure 77) driving it up to the servo housing;

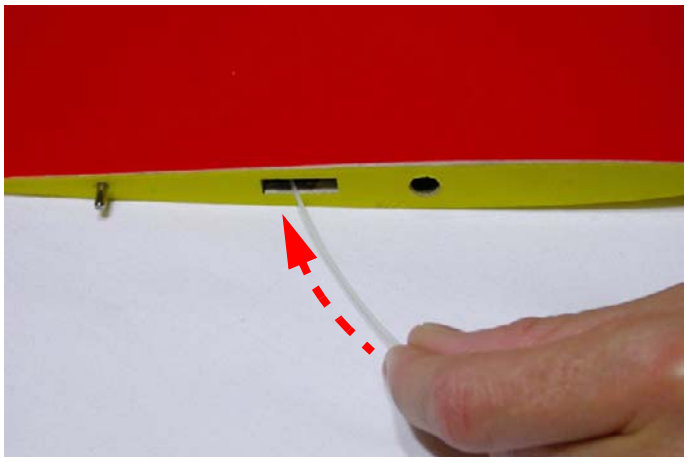

Fig.77: **Inserting Nylon wire.**

- using some adhesive tape (scotch), connect the other end of the cable "CAVS" (the one opposite to the servo) to one end of the Nylon wire (see figure 78);

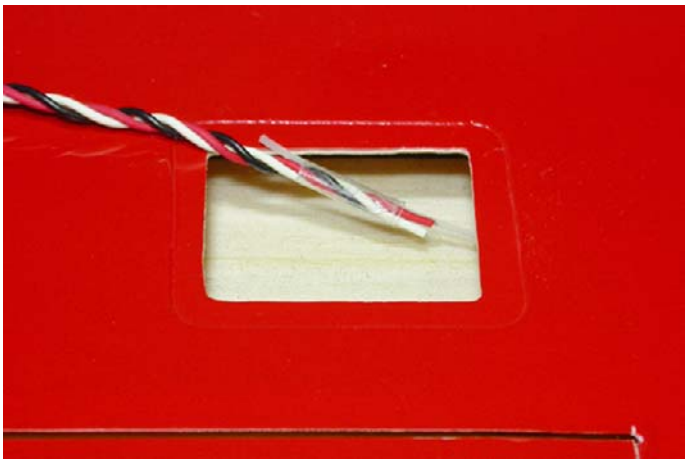

Fig.78: **Connecting cable to the Nylon wire.**

- pull Nylon wire out from the hole of the wing root until the cable "CAVS" comes out of the wing plug aperture, with the servo wires still attached (see figure 79);

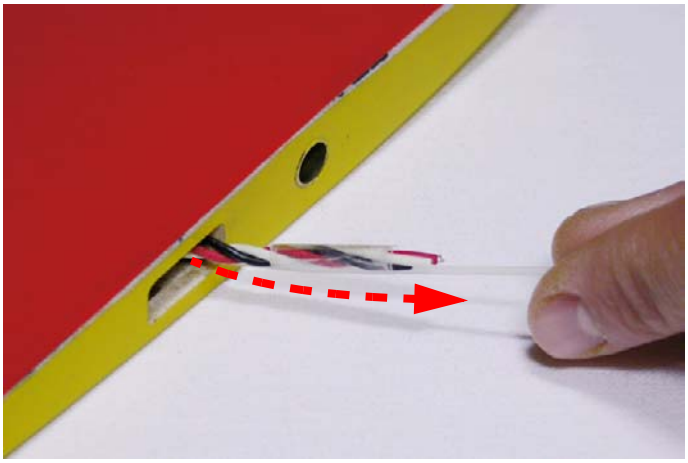

Fig.79: **Pulling out the Nylon wire.**

Soldering servos to connector

- Before soldering, insert the free tip of every wire of the cable "CAVS", into a 15 mm long heat shrink sleeve of suitable section;
- solder the wire servos extensions to the connector "MPXM" following the diagram in figure 80;

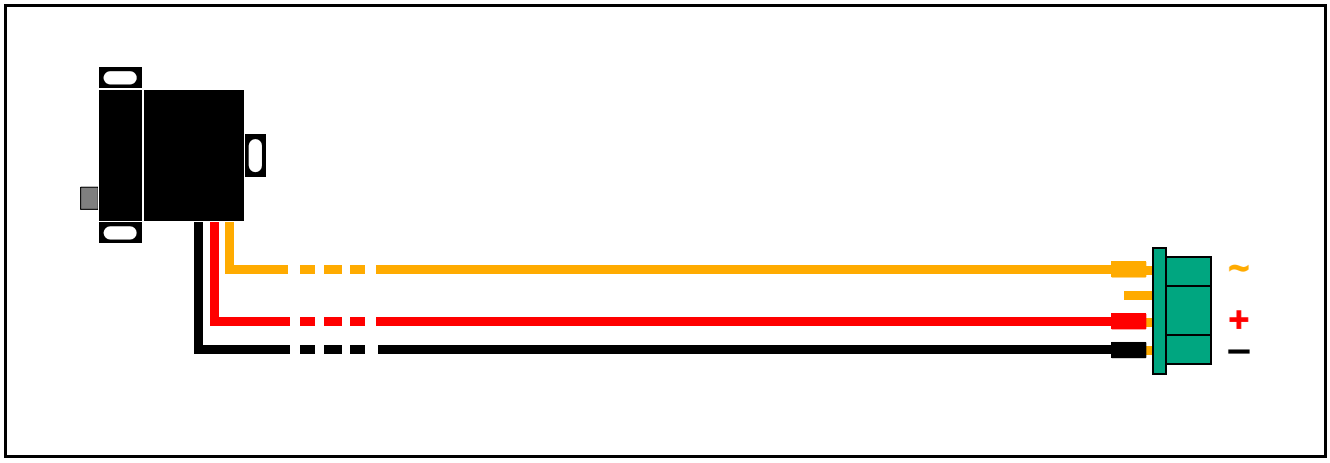

Fig.80: **Wires connection diagram.**

- after all soldering of the wires, slide the heat shrink sleeves over the solder joints;

- using a hair drier (at least 1000W), direct the (very hot) air blow over the sleeves and let them mould on the solderings;
- try to insert the connector adjusting the aperture until the connector fits easily into the hole, but not to loosely as to be out of position to the wing part (see figure 81);

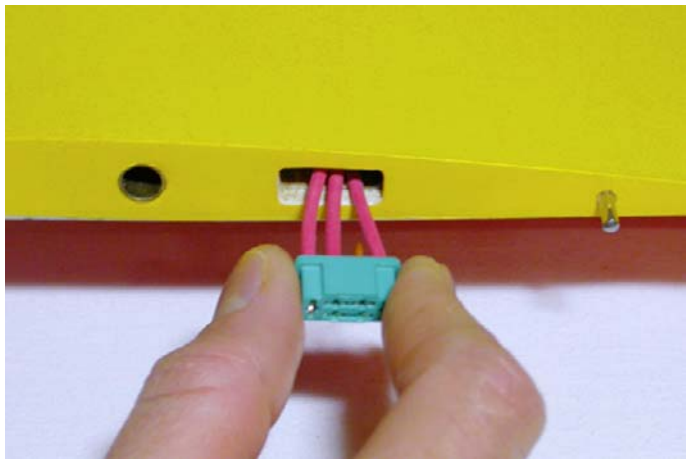

Fig.81: **Insert the connector.**

- spread some epoxy around the base of the connector;
- insert and perfectly align the connector to the wing-panel root (see figure 82);

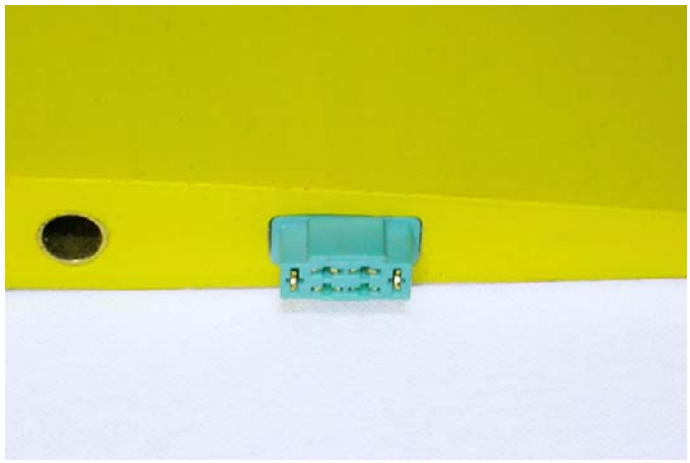

Fig.82: **Inserting the connector.**

- repeat the operation also for the other wing-panel.

Hole for wing servos connection (DS version only)

Whatever connection has been chosen, the wing servo connection must be done; the hole must coincide AS BEST AS POSSIBLE with the one made in the fuselage (see “Hole for the servos connection” at page 23);

- Using a knife, make a 16 x 7 mm rectangular hole ONLY ON THE LOWER SIDE of the wing, placed to a distance of (at least) 40 mm from the wing fore fixing hole (see figure 83).

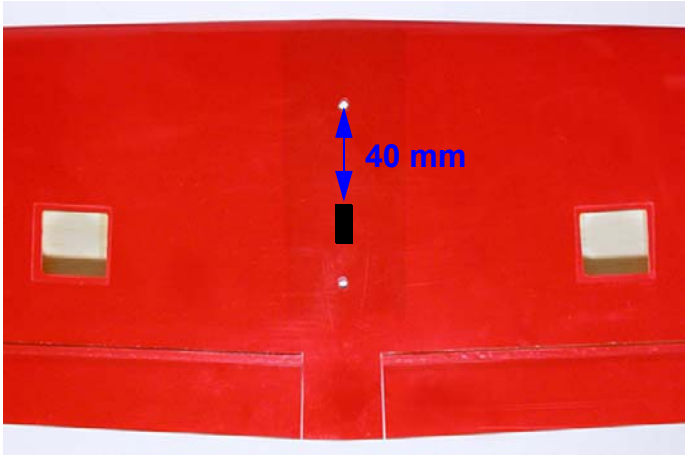

Fig.83: **Hole for the servos connection.**

Wing servos connection (DS version only)

Servos wires will be soldered to a six pins MULTIPLEX connector.

In this case you will make the things easier, cheaper and lighter but you have to overcome your fear (!) of cutting the servo original wires.

- Before soldering, insert the free tip of every wire, into a 10 mm long heat shrink sleeve of suitable section.

Note: each signal wire requires a sleeve with a diameter of 3 mm, while each one of the two groups for negative and positive wires requires a sleeve with a diameter of 6 mm.

- solder wires to the MULTIPLEX six pins connector “MPXM” following the diagram shown in figure 84;

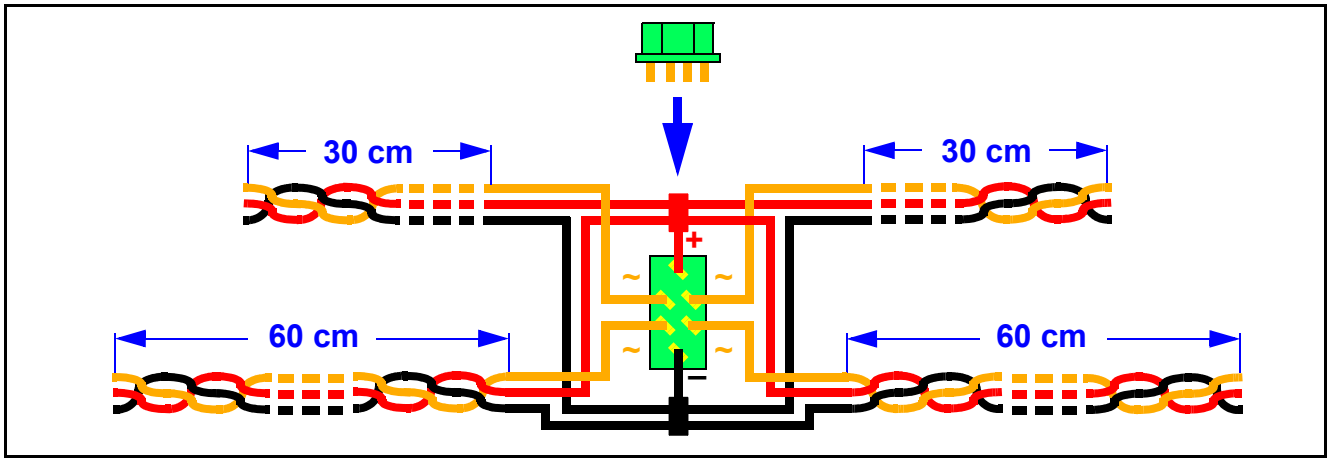

Fig.84: **Connection diagram for the wing servos wires.**

- after all soldering of the wires, slide the heat shrink sleeves over the solder joints;
- using a hair drier (at least 1000W), direct the (very hot) air blow over the sleeves and let them mould on the solderings.

Positioning cables

The cables will be inserted into the wing from the central hole to the housings (see figure 85):

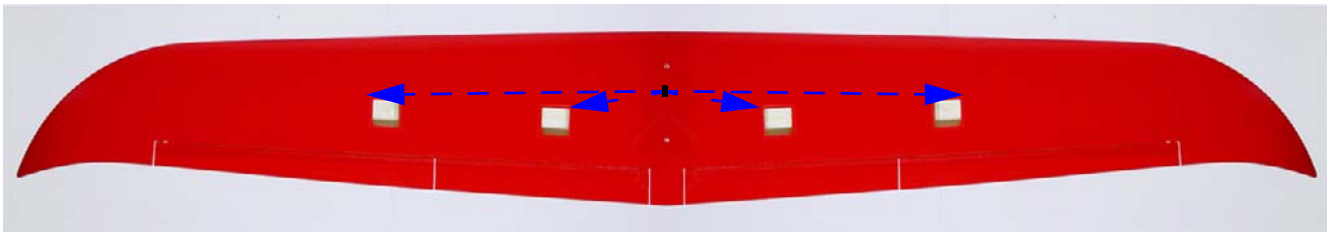

Fig.85: **Cables insertion.**

- insert the four cables (or the four RX cables) and let them come out from the servos housing holes (see figure 85);
- using side cutters, remove the RX plug;
- before soldering, insert the free tip of every wire into a 15 mm long heat shrink sleeve of suitable section;
- solder servos wires following the diagram shown in figure 109 at page 50;

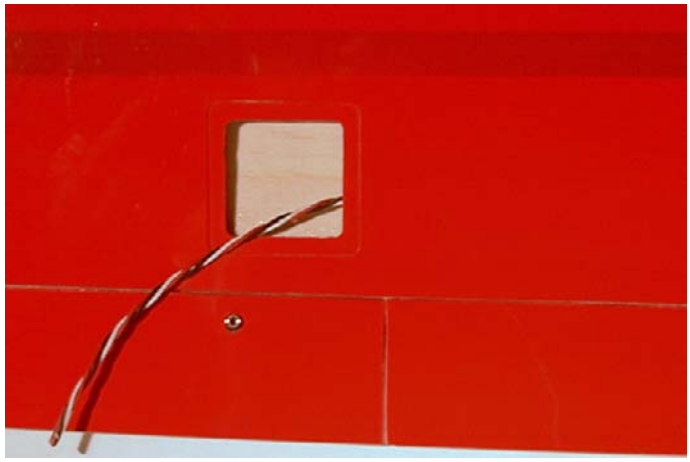

Fig.86: **Cable.**

- after all soldering of the wires, slide the heat shrink sleeves over the solder joints;
- using a hair drier (at least 1000W), direct the (very hot) air blow over the sleeves and let them mould on the solderings.

WARNING! Ensure that any "jet" of hot air, when shrinking sleeves over solder joints, does NOT get directed over the wing surface, to prevent damage or distortion to the panel.

Gluing MULTIPLEX connector

- Spread some epoxy around the base of the connector "MPXM";
- position the connector as shown in figure 87.

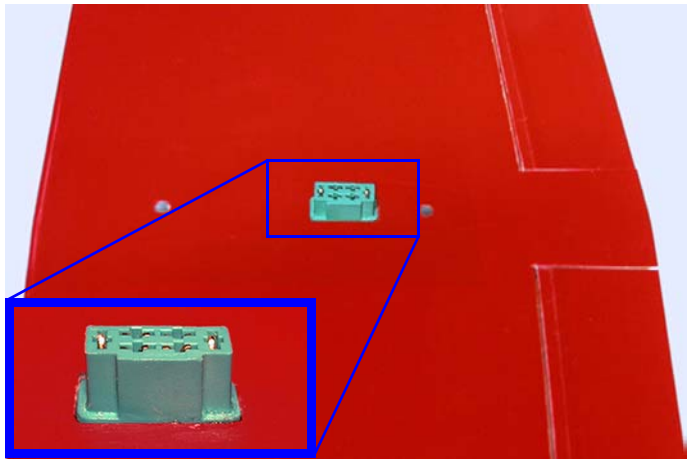

Fig.87: **Connector position (and detail).**

Mounting servos inside the wing (both versions)

Housing servos

For each wing servo:

- first ensure that the servo horn (and the servo) is set to its neutral position when connected to the RX;
- fasten the horn to the servo;
- remove protection film and apply the double adhesive plate to the servo (see figure 88);

Fig.88: **Apply the double adhesive plate.**

- insert the servo into the housing (the horn must be on the EXTERNAL SIDE OF THE WING and towards the trailing edge (see figure 89);
- press the servo to fasten it.

Fig.89: **Servo housing.**

Wing servos pushrods

- Screw the nut "DADO" and the clevis "FORC" on the threaded pushrod "RINV" (see figure 90);
- insert the threaded horn "PERN" into the clevis "FORC";

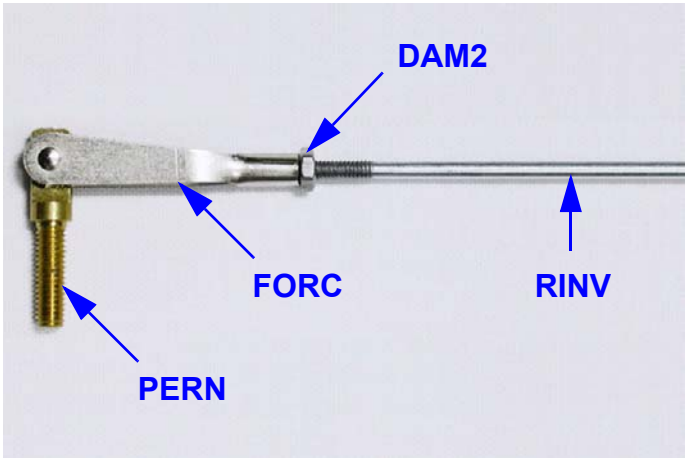

Fig.90: **Horn, clevis, nut and threaded pushrod.**

- screw the threaded horn “PERN” in the bush “BOCC”;
- using a fibre-tip pen, mark the distance from the servo horn and the threaded horn (see figure 91);
- remove the clevis from the threaded horn;

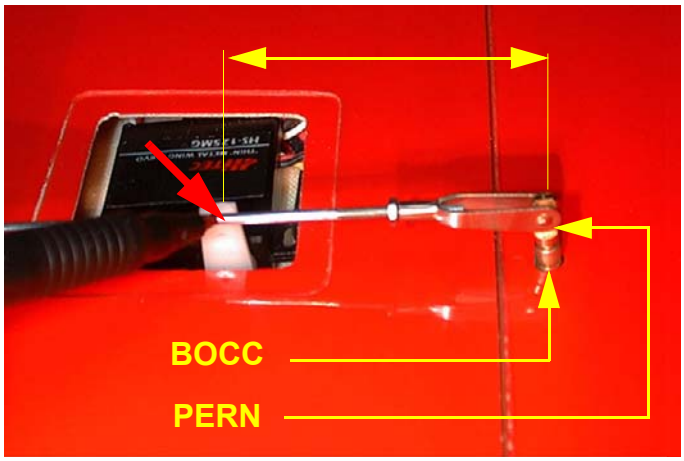

Fig.91: **Mark the distance on the pushrod.**

- using the Z pliers, make a “Z” bend on the pushrod “RINV”: the marked point must correspond to the reference point on the pliers as shown in figure 92;
- using side cutters, cut the pushrod approx. half centimeter behind the Z bend;

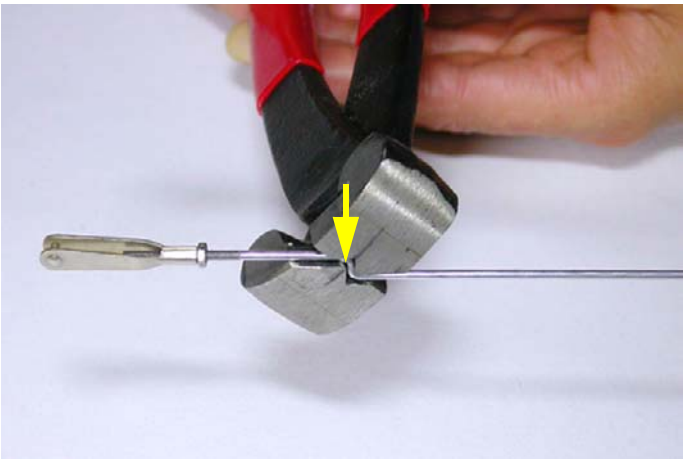

Fig.92: **Bend the pushrod.**

- insert the Z bent pushrod in the servo horn (see figure 93) and connect the clevis to the control horn.

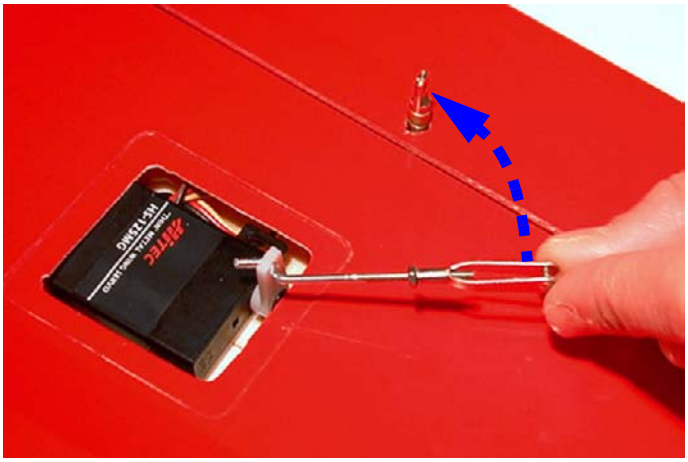

Fig.93: **Insert the pushrod and connect the clevis.**

Servo covers (both versions)

The wing servo covers are made from one shapes "WHSC" (standard version) or two (DS version).

From every shape, two covers can be made (left and right):

- take the distance (1) from the external edge of the servo housing and the servo horn (see figure 94);
- take the dimensions (2 and 3) of the external servo housing edges;

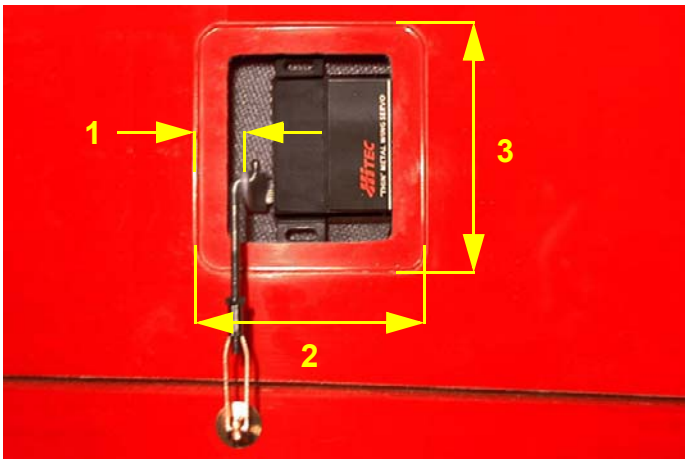

Fig.94: **Take the dimensions.**

- taking as reference the center of a bulge of the shape "WHSC" (see figure 95), carry the taken measure (1) from the external edge of the servo housing and the servo horn;
- from that point, using a pencil, draw a rectangle with the same dimensions (2 and 3) of the external housing edge taken before;

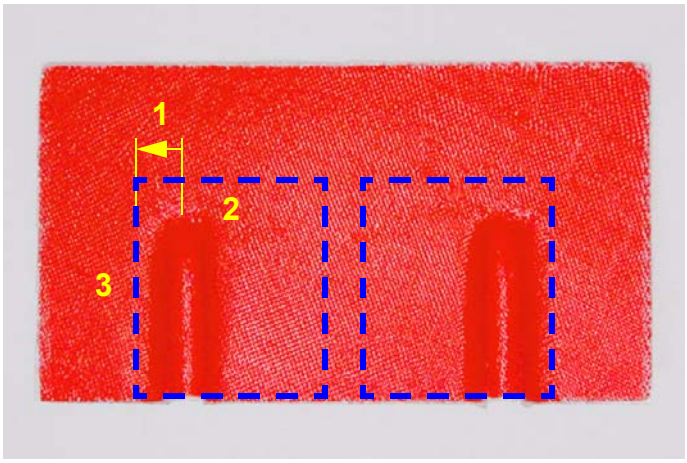

Fig.95: **Shape for two servo covers (left and right).**

- symmetrically, make the other servo cover from the other half of the shape;
- (for DS version only) repeat the procedure for the other shape in order to obtain the four servo covers required;
- using a file, finish every cover fitting it to the corresponding housing;
- (for DS version only) using some thin double adhesive tape, apply the inner covers (see figure 96).

The outer covers will be applied to the wing just after the lateral model balancing that will be described later.

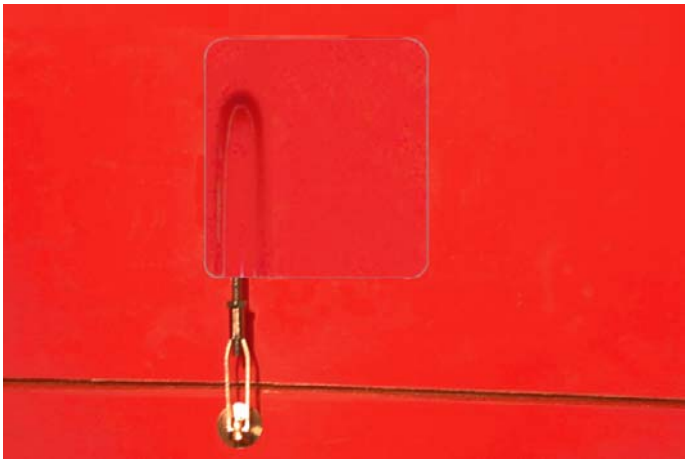

Fig.96: **Servo cover in position.**

2.5 Joining the wing to the fuselage

Two parts wing (standard version only)

- Insert the wing rod “BAIO” into the wing tube in the fuselage (see figure 97);

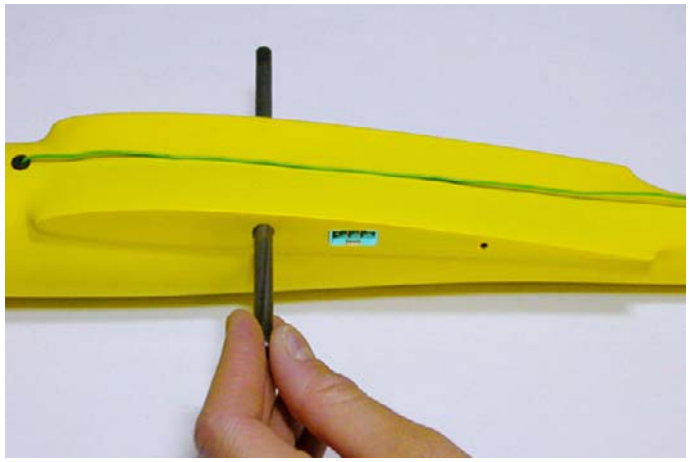

Fig.97: **Insert the wing rod.**

- insert the rod into the wing-panel root hole (see figure 98);
- insert the wing completely, fitting the electrical connections and the alignment pin;

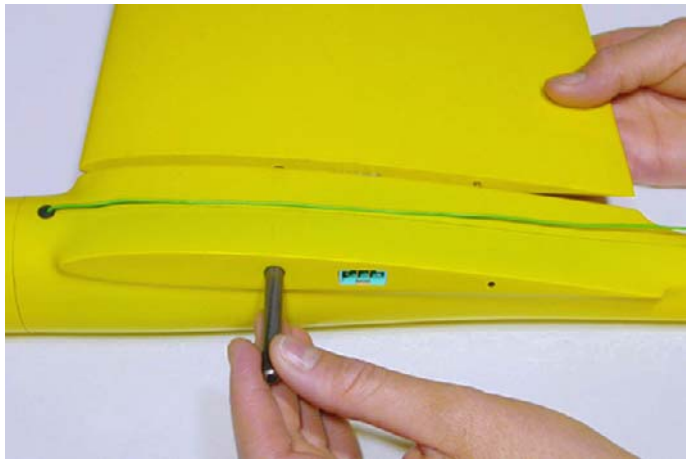

Fig.98: **Inserting the wing-panel.**

- repeat the operation for the other wing-panel too.

One piece wing (DS version only)

Connecting wing-servos to receiver

Before mounting the wing to the fuselage, it's necessary to plug the wing servos connections:

- plug the connector coming from the fuselage to the wing servos socket (see figure 99).

Note: if both wing connectors have been glued into place, then is only necessary to join the wing to the fuselage.

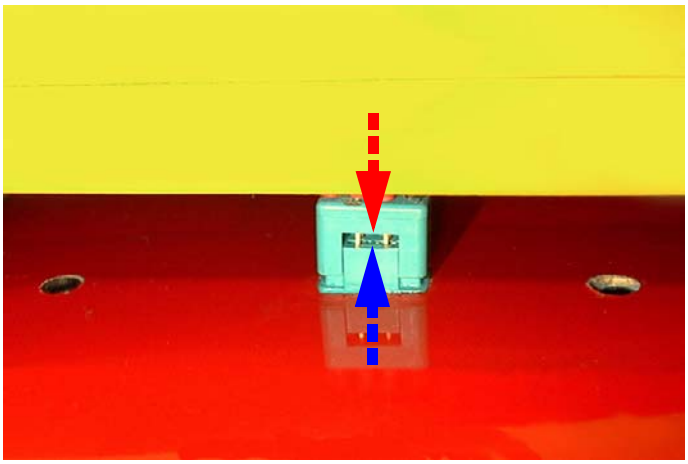

***Fig.99:*Connecting wing servos.**

Mounting the wing on the fuselage

- Join the wing together with the fuselage aligning the holes for the wing mounting screws;
- insert the screws "VBLA" into the wing holes;
- using a screwdriver, tighten the two locking screws (see figure 100) up to perfectly fit together wing and fuselage.

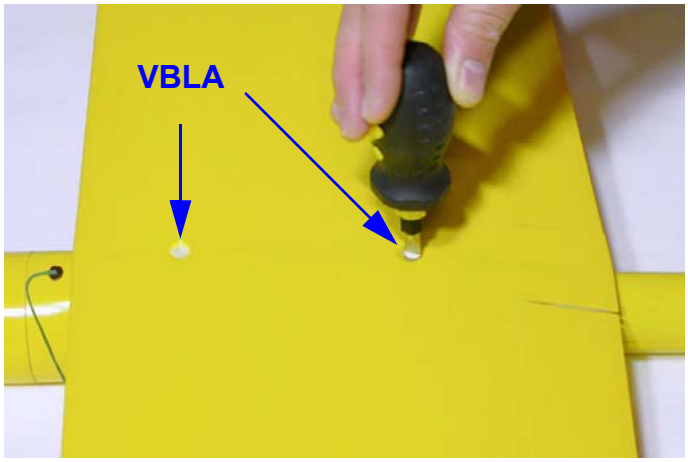

***Fig.100:*Tighten the two locking screws.**

2.6 Tail connection

Mounting the tail panels (both versions)

- Mount the tail panels as shown in figure 101;

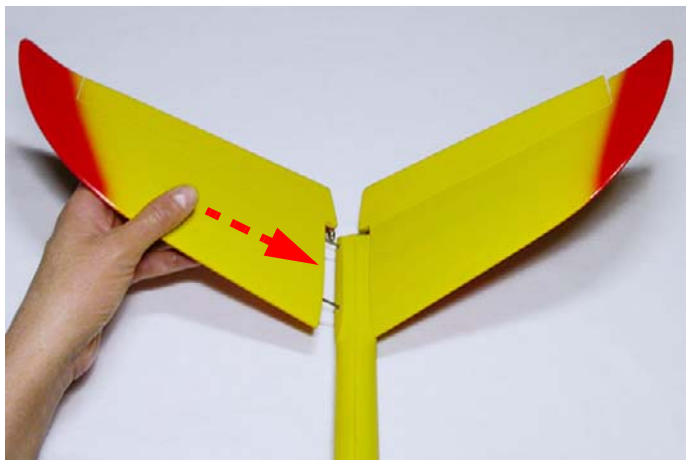

Fig.101: **Mounting tail panels.**

- insert the ball link sockets “GIUN” to the ball joints “UNIB” (see figure 102).

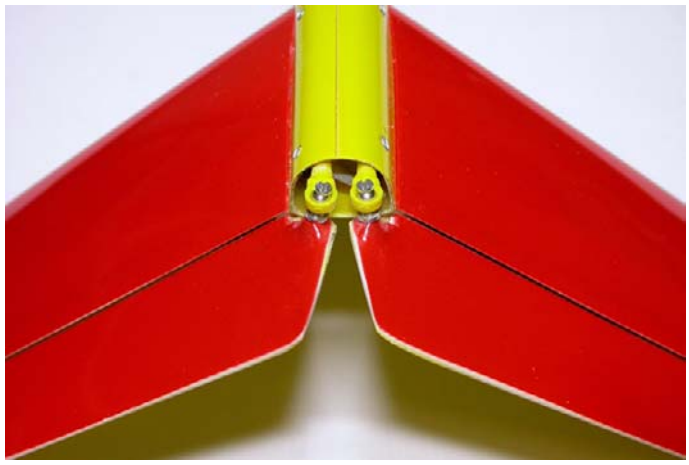

Fig.102: **Inserting the sockets to the ball joints.**

2.7 Nose

Installing the nose (both versions)

- Install the nose cone “CONO” and adjust the mating end to match the joint to the fuselage (see figure 103);
- check that the servo will move freely also with the nose cone on.

Fig.103: **Installing the nose cone.**

CHAP. 3 MODEL SETTINGS

3.1 Servos settings

Identifying the control surfaces

Refer to figure 104:

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

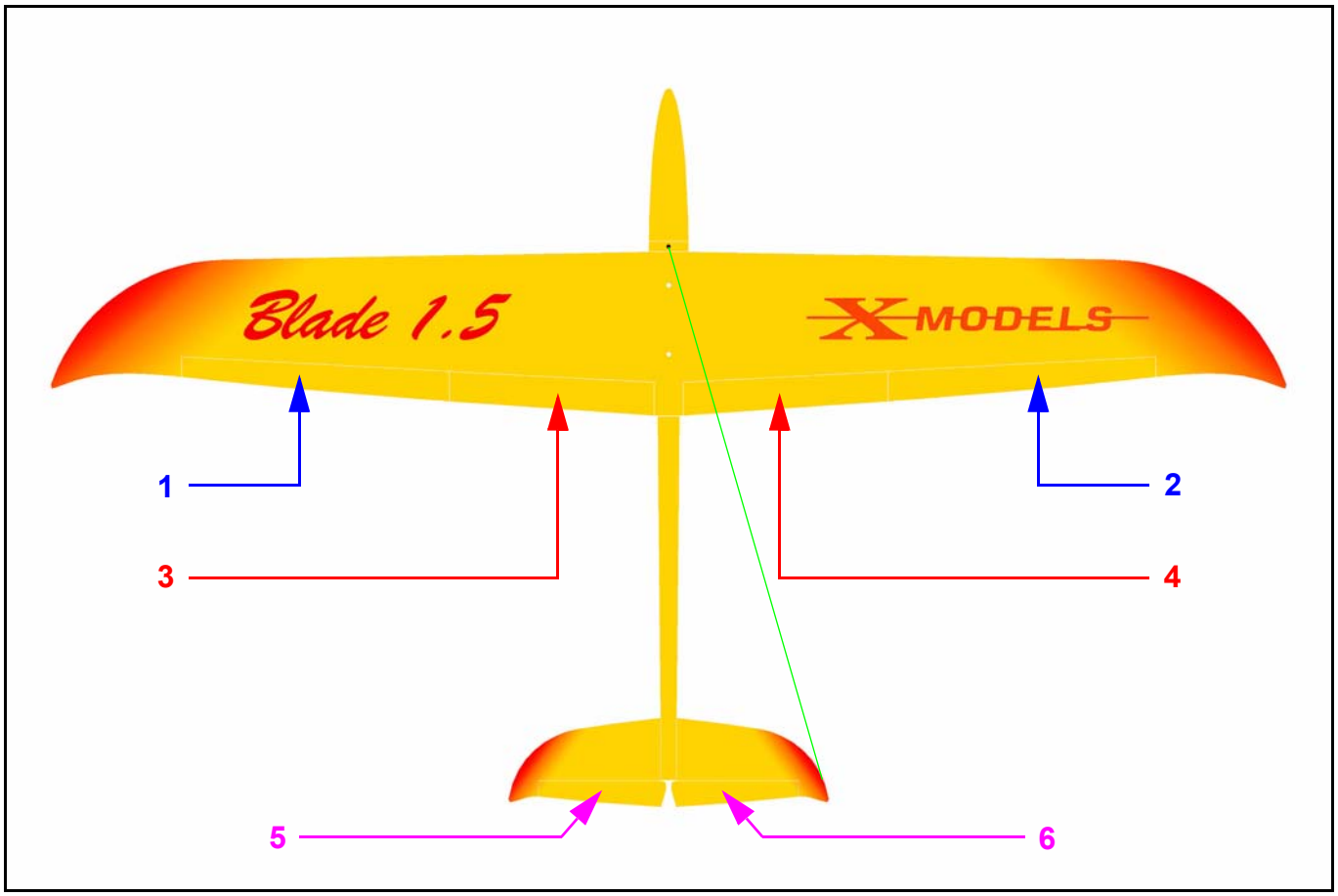

Fig.104: **Control travel.**

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 ..... min. 10 mm, max. 14 mm;
Down ..... min. 8 mm, max. 10 mm.

Note: you may reduce differential for aerobatic flights.

Flaps (DS version only)

Up ..... 2 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-tail

Up ..... min. 8, max. 10 mm;
Down ..... min. 8, max. 10 mm.

Note: measurement taken at the fuselage side.

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%.

DS version only:

Elevator to flap: ..... up 5 mm / down 5 mm;

Flap to Aileron: ..... up (speed) 2 mm / down (thermal) 1.5 mm;

Aileron to flap: ..... up (speed) 2 mm / down (thermal) 2 mm;

Butterfly: ..... aileron up 20 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).

3.2 Model balancing

The CG of the model must be placed at **77 mm** from the wing leading edge at the wing root (see figure 106).

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

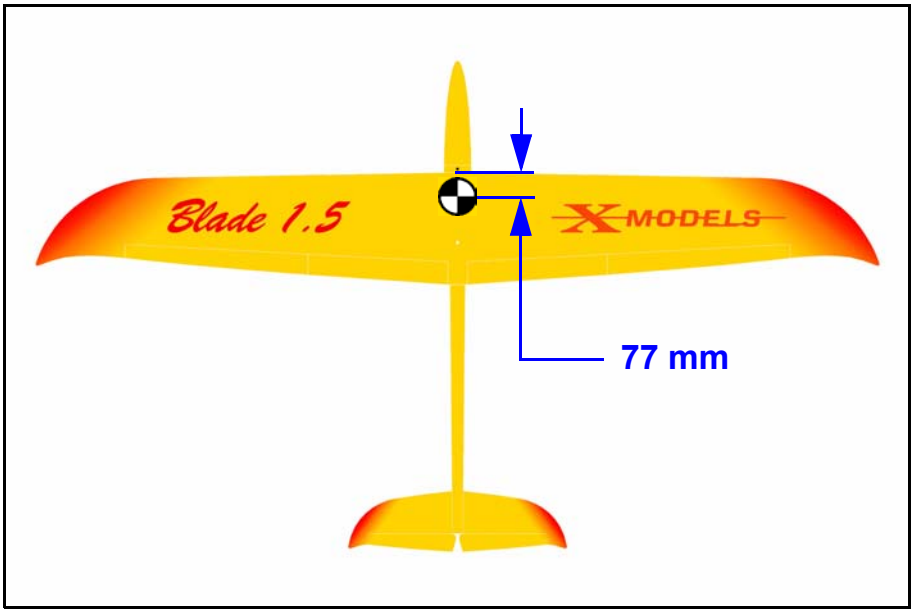

Fig.105: **CG position.**

Checking and correcting the CG position (both versions)

- Mark with a piece of tape the CG position under the wing and hold the model with your fingers: the model must stay level;
- remove 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.

- once positioned the CG in the correct point, secure the lead used to balance, in the nose, so it cannot move again.

Checking and correcting the lateral balance (both versions)

Before to apply the outer servo covers, we recommend to check (and eventually correct) the model lateral balancing.

Checking

- 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 106);

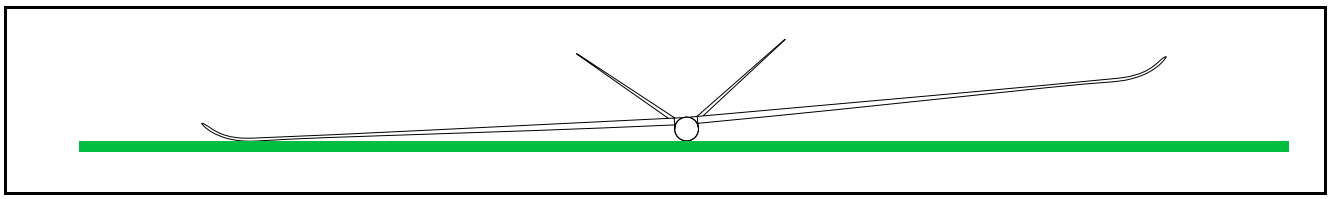

Fig.106: **Checking for lateral balance.**

- repeat this more times.

Correcting

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 (see “Checking” at page 47).

If the wings halves are dropping randomly, the model is ok; in this case:

- apply the servo covers (see figure 96 at page 40).

How to add ballast (both versions)

Flying in the wind (dynamic fly) requires the addition of ballast in order to increase the stability of the model in turbulent air.

The ballast must be put around the CG (in this way the CG will not change too much); for this reason, the carbon fuselage has been equipped (in its lower part) with a cylindric housing for the ballast (see figure 107) approx. 140 mm long and with a diameter of 16 mm. The housing can lodge ballast for an amount of approx. **400 grams**. The best shape for the ballast is one or more crop ends (approx. 20 mm long) obtained from a lead bar of proper section (approx. 15 mm).

A less amount of lead (ex. 100 g), must be firmly inserted in the center of the tube; for this reason, wooden spacers must be inserted into the tube either in front than behind the lead.

When fitting single ballast `slugs`, and not filling up ballast tube fully, ensure that the wooden spacers are positioned either side of ballast slugs, to keep the ballast in the centre of the ballast tube and on the CG!

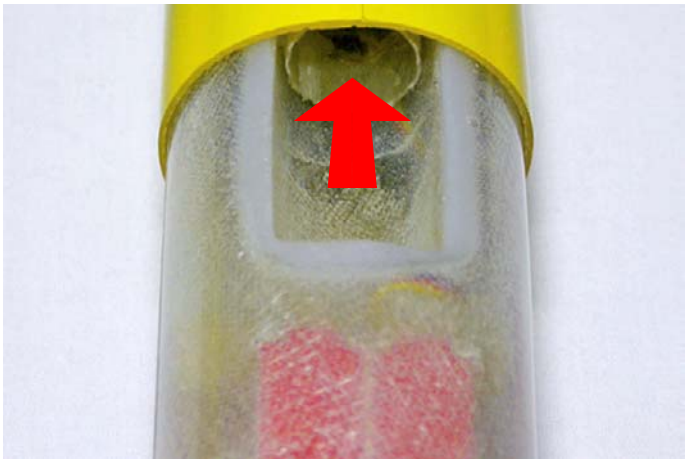

Fig.107: **Ballast tube.**

Once inserted the ballast, we recommend to accurately check the CG position.

CHAP. 4 CONNECTIONS DIAGRAMS

Here are shown the complete connection diagrams (with battery pack, ON/OFF switch, receiver and servos) for each version of the model.

Note: the connection to the receiver outputs depends from the radio control type and receiver you are using.

Blade 1.5 standard - connections diagram

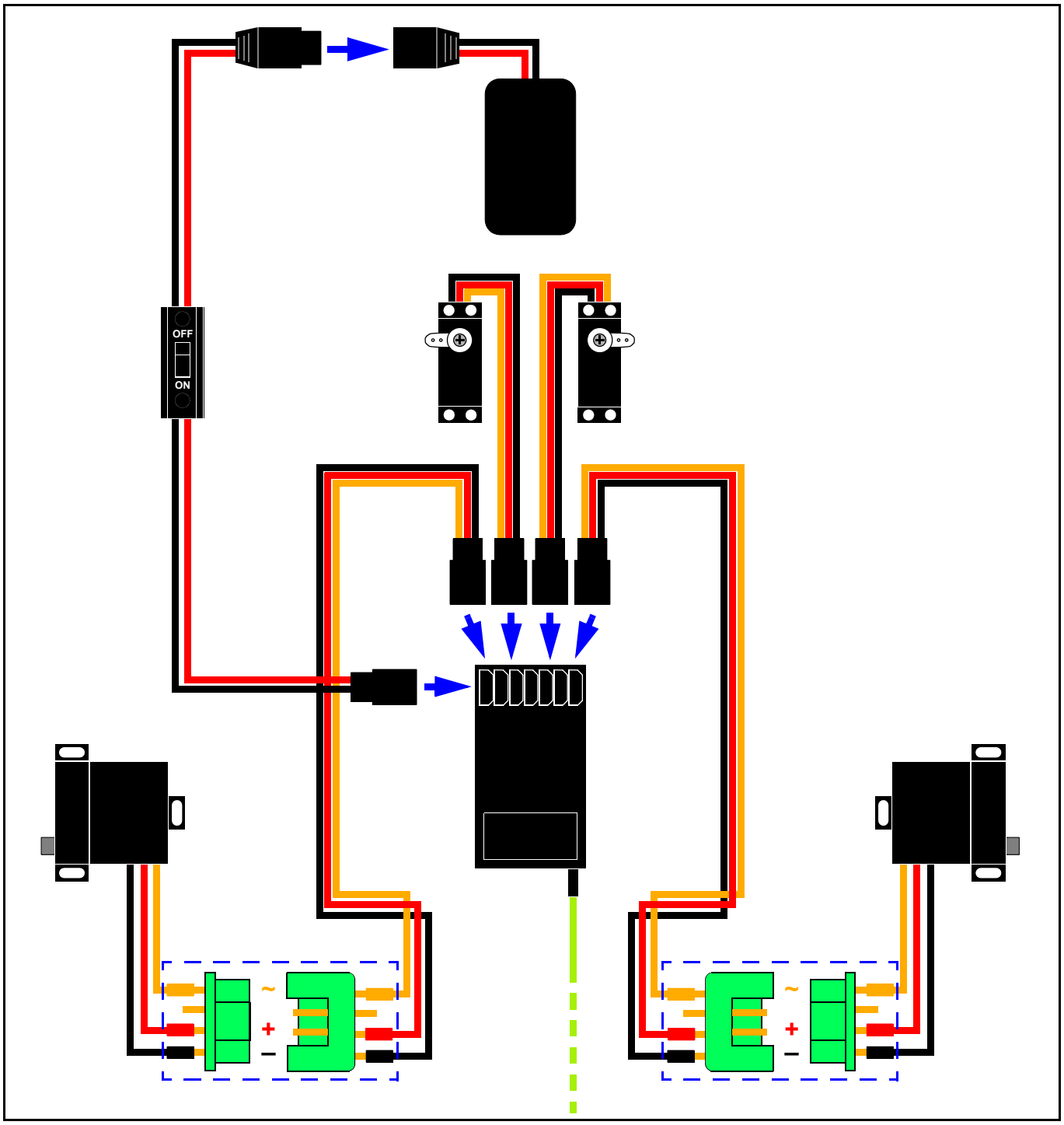

Fig.108: **Electrical connections - standard version only.**

Blade 1.5 DS - connections diagram

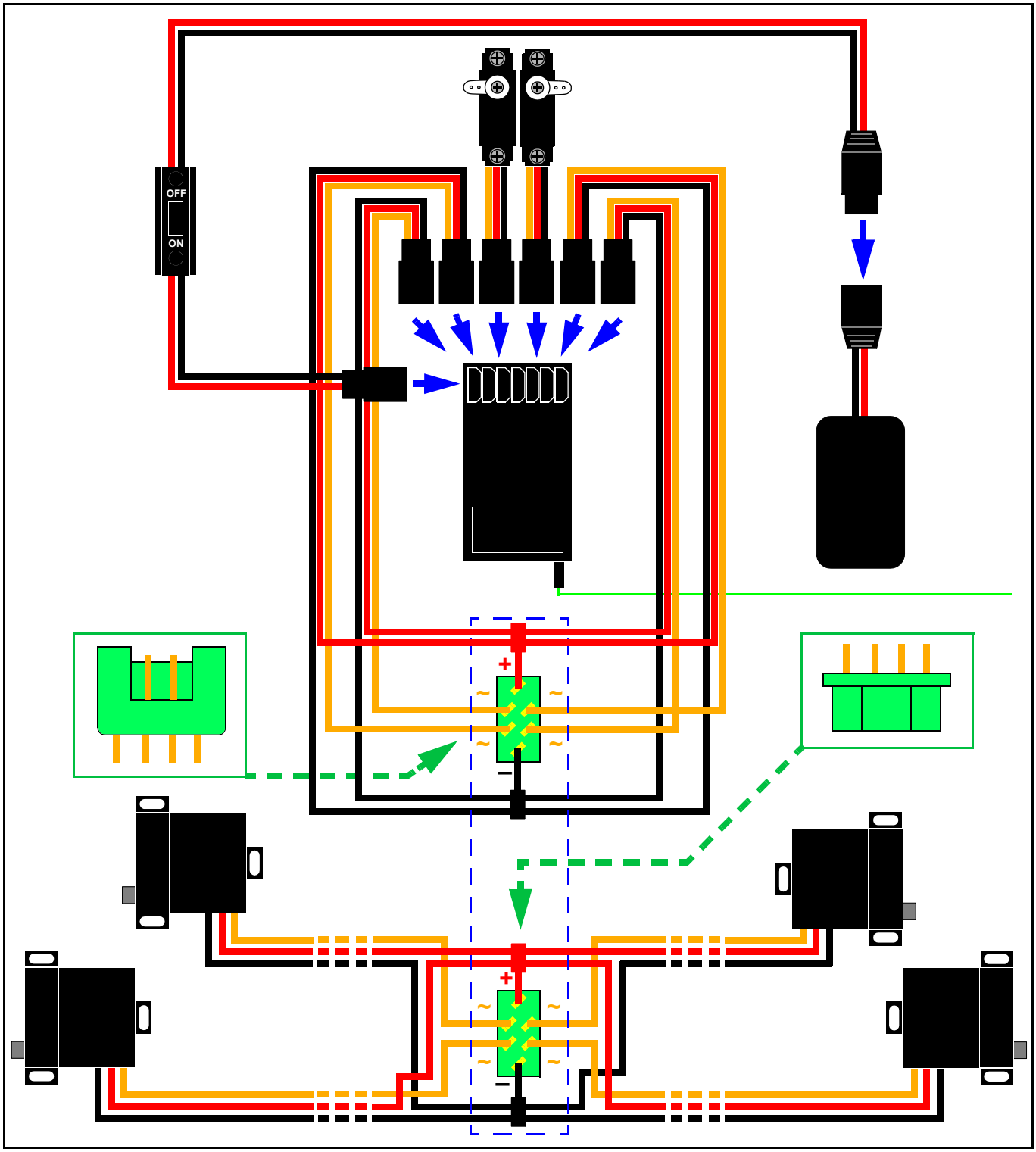

Fig.109: **Electrical connections - DS version only.**

Note: if You want to use a receiver with six sockets, the only way is to use a RX “Y’ plug joining together a servo connector with the battery pack one.