minicopter

Diabolo 600

6000

Manual

minicopter

Rheinstahlring 47
34246 Vellmar
Germany
+49 561 988 2800
info@minicopter.de
www.minicopter.de

Introduction:

Congratulations on your new Diabolo 600. This model closes the hole between the smaller Diabolo 550 and the Diabolo 700/800. It is possible to fly the model with a single 6s battery pack. Best results you will get with a 10s battery pack. Then you get an agile and very precious flying model. Generally we had a main aspect on this model that it becomes very light. With a frame weight of less than 1600 grams the Diabolo 600 is one of the lightest helicopters available in that size. Alternatively the Diabolo 600 can also be converted in an ultralight Diabolo 700 or on the other hand can be flown with small 550 blades.

I wish you a lof of fun during assembly and flying of your Diabolo 600.

Gerd Guzicki

To this manual:

Following many wishes this manual was assimilated to the manual of the Heli-Baby NT which was specially designed for beginners to help especially them with basic mounting technics and to answer many questions reading the manual. So this manual contains more than 200 pictures in different perspectives to keep no question unanswered. Also recommended tools are shown. If you see a botttle of Loctite then it means you should use Loctite in this step.
Independend if you have already assembled many helicopters or of it is your first one: Assemble the model careful and without any stress. Being concentrated on the work is the precondition for a perfect result.

Maintenance and Security

A radio controlled model helicopter and a speed helicopter especially is not a toy. A mistake can result in serious accidents and injuries.

Please keep the following rules always in your mind:

- During motor tests on the workbench, remove main and tailrotor blades and take care that nothing touches the rotating rotor heads.

- On electric helicopters you cannot calculate the risk of a sudden starting motor. So move quickly out of the range of main and tailrotor after you have connected the flight battery.

- If you adjust or program the ESC or FBL on the workbench, remove two of the three motor cables to eliminate the risk of a sudden motor start.

- Keep a distance to the model of at least 5m (15ft.) to the model during hovering.

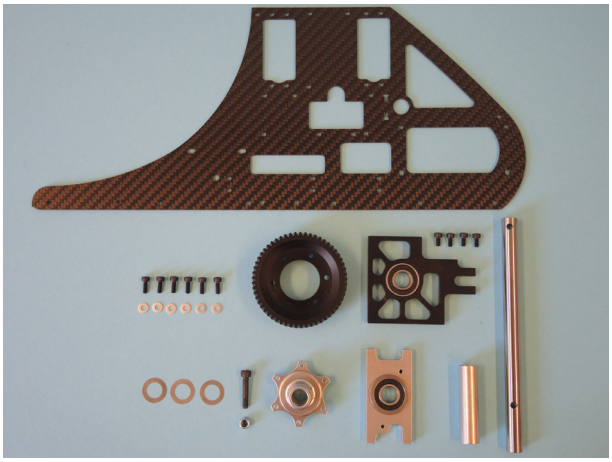
- Never aim helicopter towards a person or another living object with your model and keep a distance to them of at least 20 metres (60ft).

- Remove all Lipo batteries from the model during stocking, and put them on a fireproofed container on a fireresistant floor.

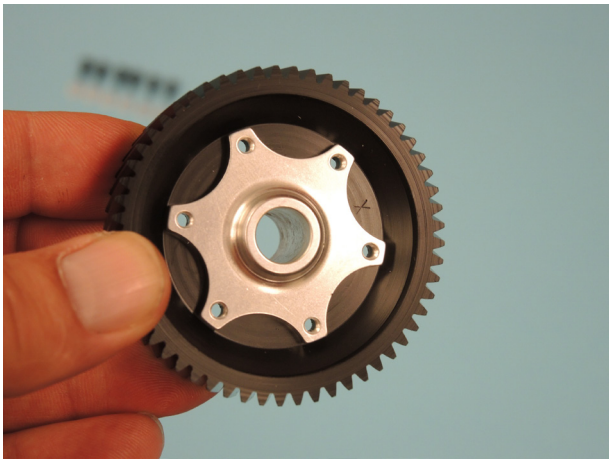
- Attention with kids and pets! Children are only seeing in the model helicopter a toy and do not see the danger of the turning rotorblades. If you are flying and hear children then climb up with the model over your head, inform the child, clear the situation and land on a safe place. Similar rules apply to unroped dogs.

- In case of pending crash, activate throttle hold to turn off ESC.

Beutel1: Main rotor shaft unit
Parts overview

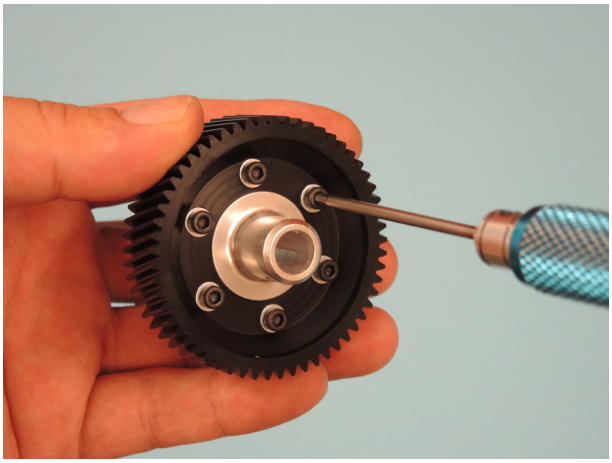


Attach the main gearwheel hub D604 with the side, marked with a „X“ in the main gearwheel D13 and check the screw holes for corresponding together.



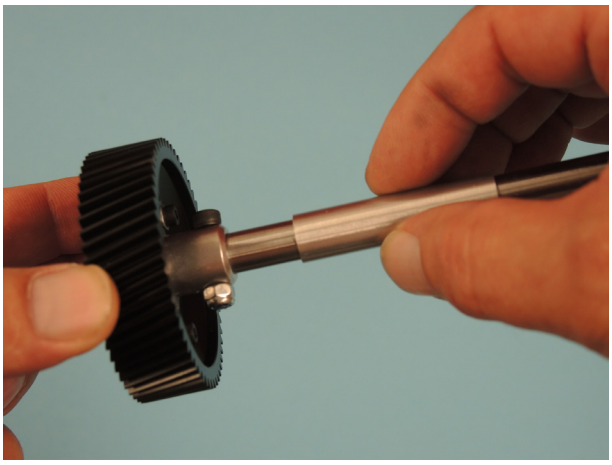
Add six washers M3 002 to six screws M3x8 D197 and apply Loctite on the threads.

Mount the screws, but still do not tighten them. If all screws are attached then tighten them crosswise.

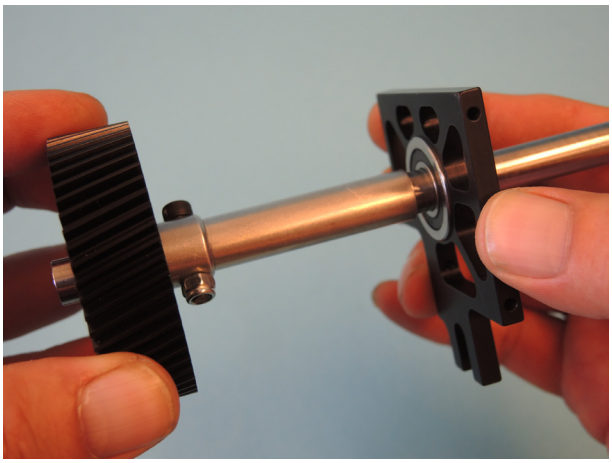


Put the mainrotor shaft D605 into the mainwheel hub, put a jesus bolt D77 through both and tighten the bolt well with a lock nut M4 009. If the screw does not easily fit then turn the shaft in the hub 180 degree and try again.

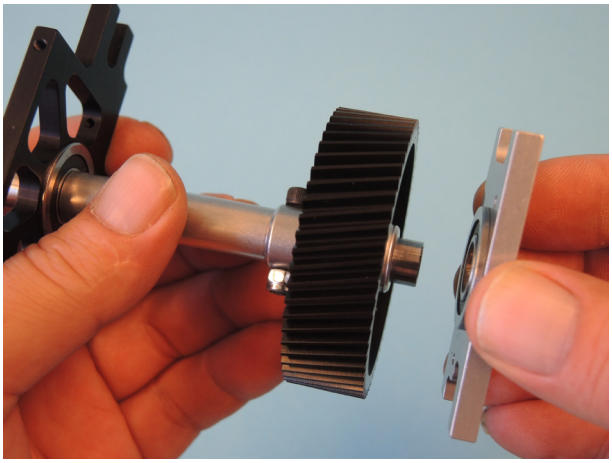
Push the spacer bush D606 on the shaft.



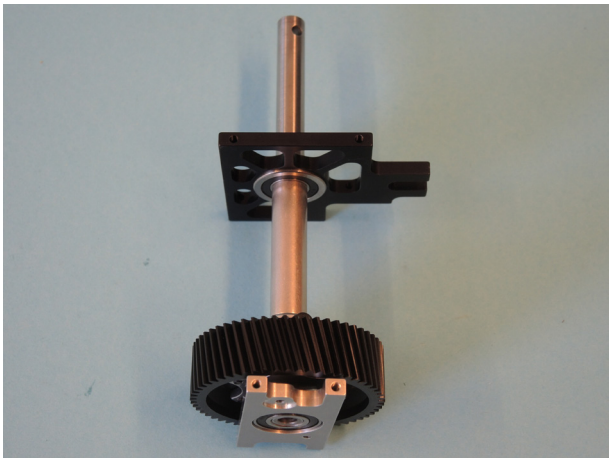
Push the upper main shaft bearing plate D607 on the mainshaft. The flange of the ball bearing D71a must show to the spacer bush.



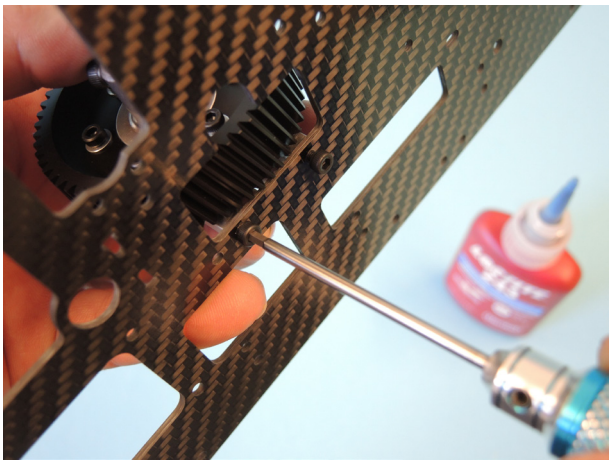
Push the lower mainshaft bearing block D608 on the lower end of the mainshaft. The flange of the ball bearing D71a must show to the main gearwheel D13.



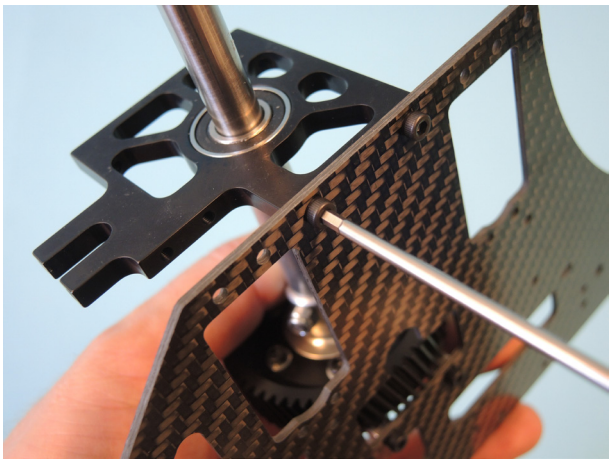
View of the assembled unit ready to mount in the frame. Note that the curved contour in the lower ball bearing block D608 must be on the left side (view in flight direction).



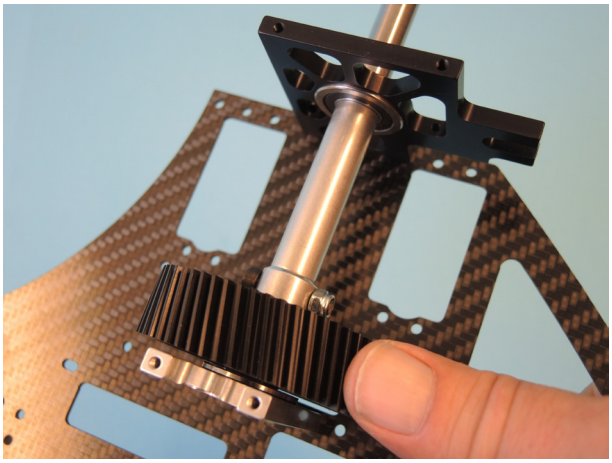
Attach the lower ball bearing block D608 on the upper right frame D602 with two hex bolts M3x6 D196 using Loctite. Tighten the bolts first if the screws of the upper mainshaft bearing block D607 are also mounted.



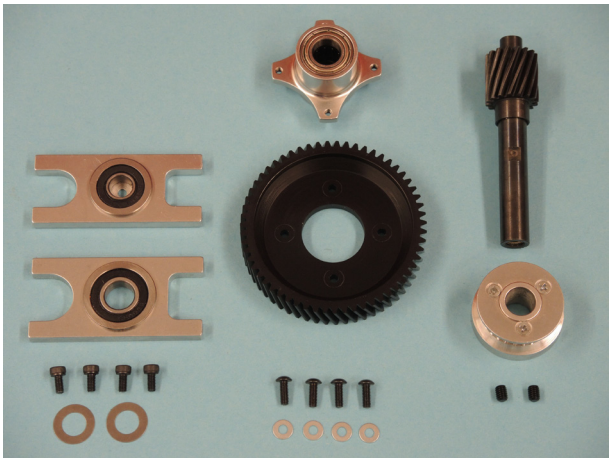
Attach the upper ball bearing block D607 with two hex bolts M3x6 D196 still without Loctite and tighten it only a bit, because later you must open the bearing block again to insert the elevator servo in its slot.



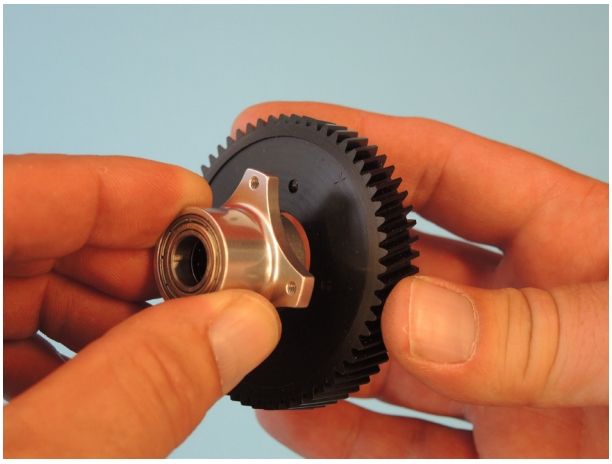
After tightening the four screws check the mainshaft for easily turning without any endplay.



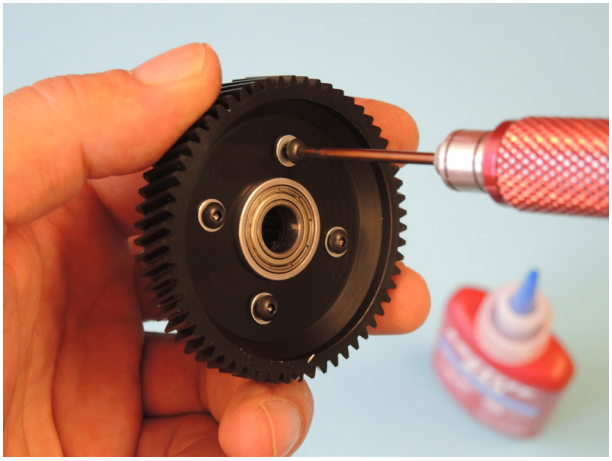
Bag 2: First stage shaft
Parts overview



Push the freewheel hub D509 from the „X“ marked side in the first stage gearwheel D611 and check mounting holes for corresponding.



Add four washers M3 002 on four hex lense screws M3x8 D199 and attach Loctite to the therads, screw them into the holes and tighten the screws crosswise.

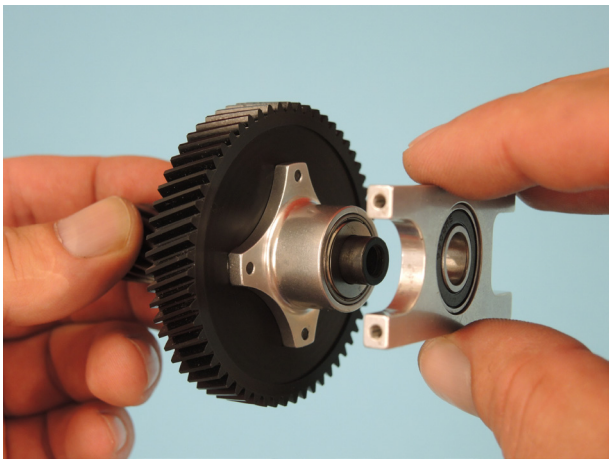


Push the belt wheel D610 on the pinion shaft D609 upto the end. First add now a grub screw M4x5 035 with Loctite on the area of the shaft with the flat spot and tighten it. Then add a second grub screw M4x5 035 in the second threaded hole with Loctite and tighten it. Finally add a washer shim 10x16x0,2 033.

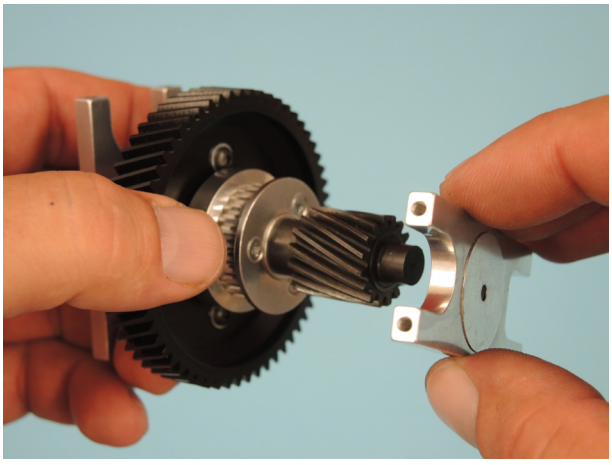
Push the mounted freewheel unit on the pinion shaft D609.

Add a washer shim 10x16x0,2 033.

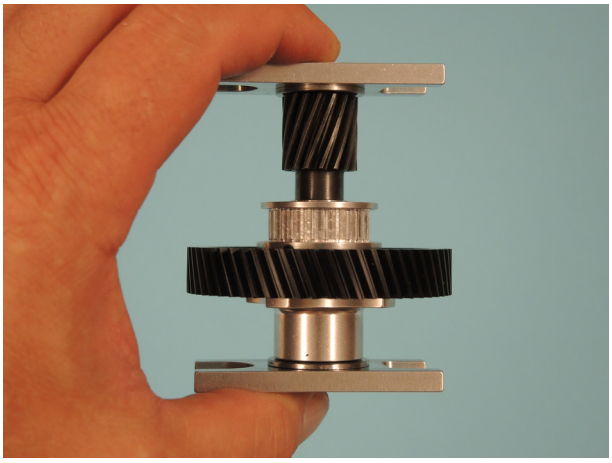
Push the lower bearing block D612 with the flanged bearing D70 onto the shaft showing with the flanged side of the ball bearing to the freewheel unit. Note the different inner contour of the bearing block. The rounded side is the longer side that is on the left side (view in flight direction).



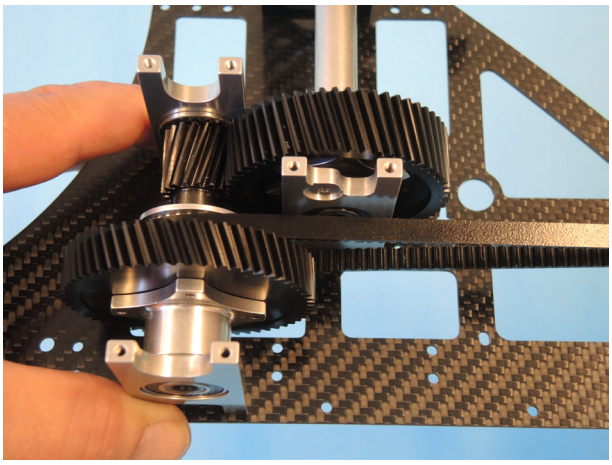
Push the upper bearing block D613 (with the cover plate) and the flanged bearing D70 onto the upper pin of the pinion shaft showing the flange of the bearing to the toothed gear wheel.



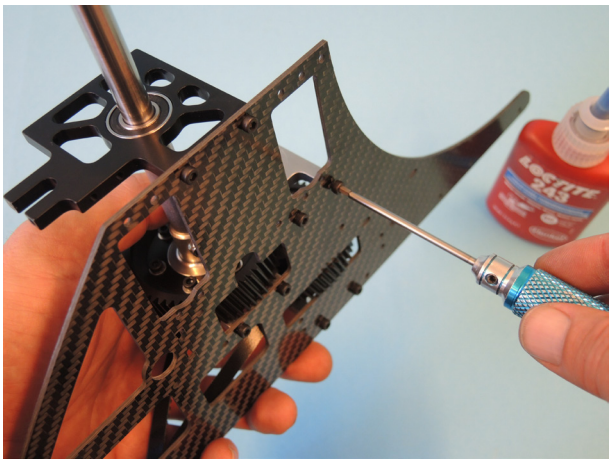
Overview over the mounted first stage unit ready to mount in the frame. Please note that the bearing blocks are assymetric , the rounded contour is longer than the rectangular contour and is placed on the left side (view in flight direction).



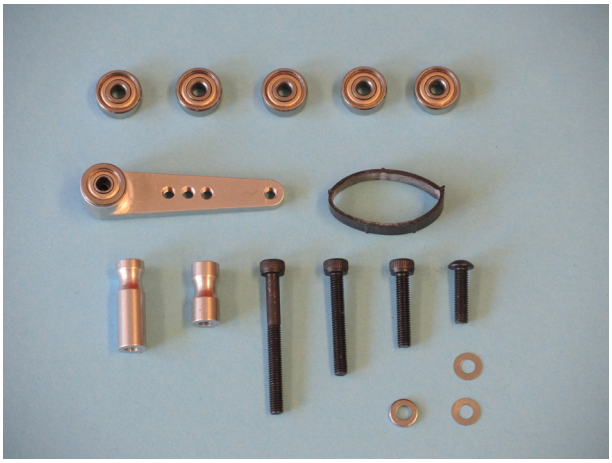
Add the toothed belt 713 in the belt wheel and position the unit as shown on the corresponding holes of the frame.



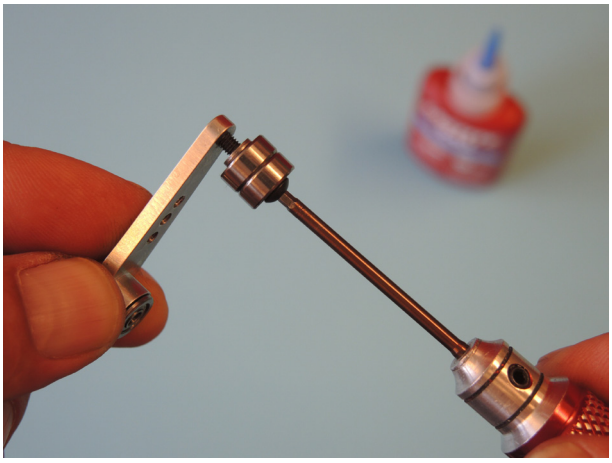
Mount the first stage with four screws M3x6 D196 using Loctite. First mount all screws loose. If all screws are mounted then tighten them. After that check the gear mesh. There must a small play be noticable. Is the mesh too small then open all screws of mainshaft and first stage again, pull the mainshaft unit backwards during tightening and the first stage forward and check the gear mesh again.



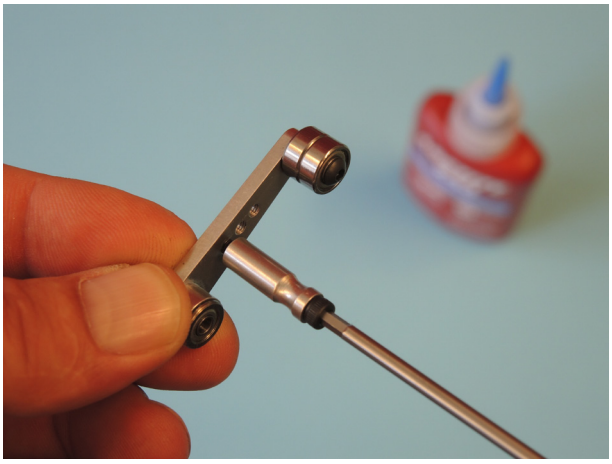
Bag 3: Belt tightener
Parts overview



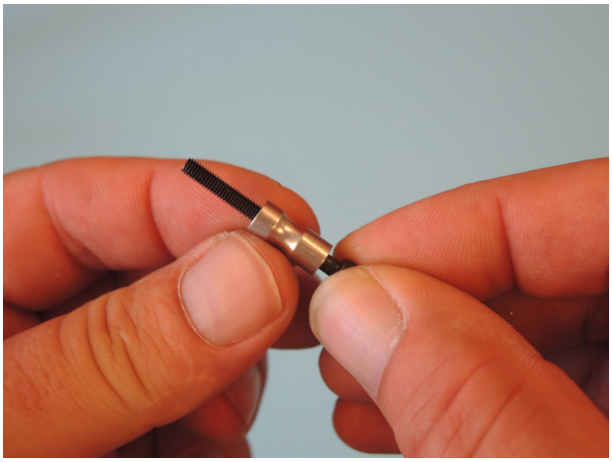
Two ball bearings 3x10x4 064 are pushed on a lense screw M3x12 982, followed from a washer shim 3x6x1 051 and will be attached with Loctite on the belt tightening lever D614.



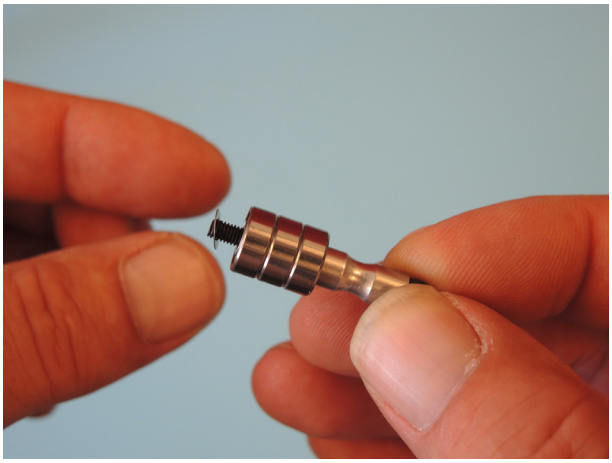
A hex bolt M3x22 D332 is pushed into the longer dampening rubber ring holder D615 and mounted with Loctite on the first hole of the belt tightening lever. The other holes are thought for personally experiments.



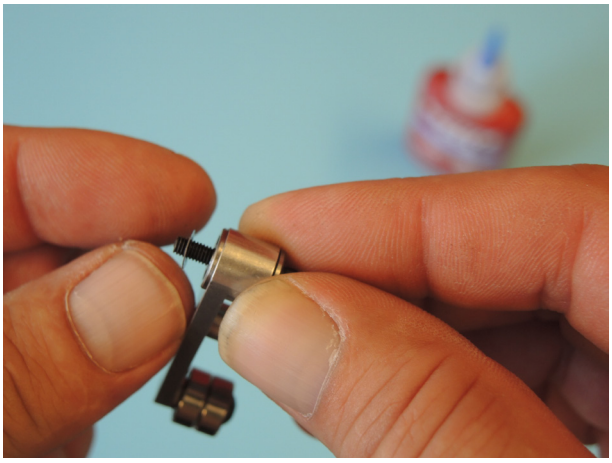
A hex bolt M3x30 D337 is pushed into the shorter dampening rubber holder (longer end of the holder outside).



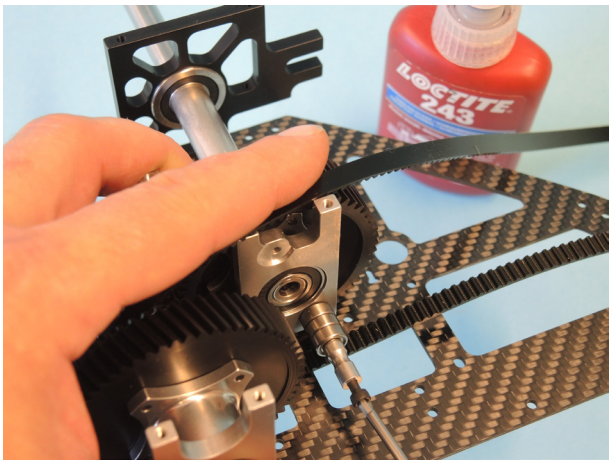
Three ball bearings 3x10x4 and a washer shim 3x6x0.2 455 are following.



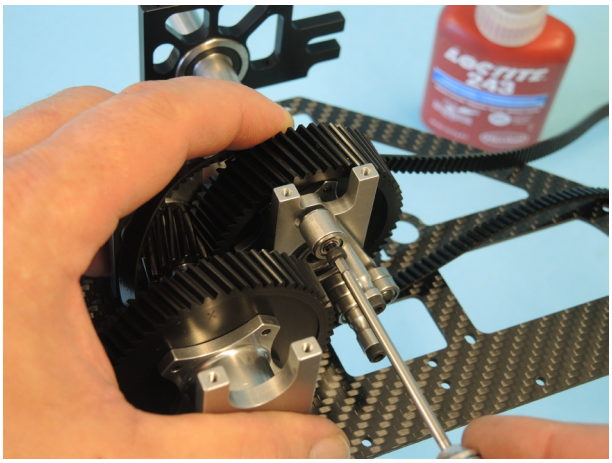
A hex bolt M3x16 D329 ist pushed into the belt tightening lever D614 and a washer shim 3x6x0.2 455 will be added.



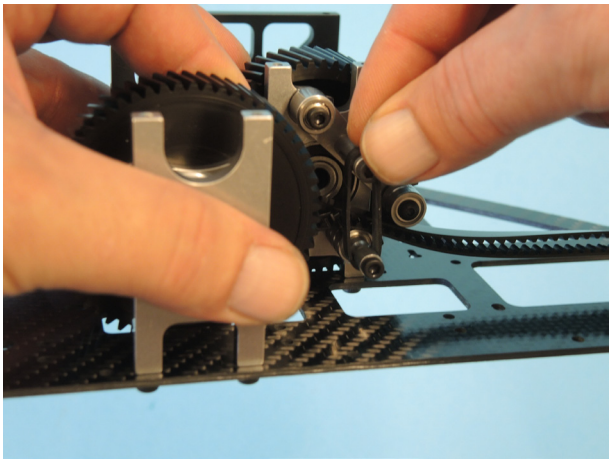
The fixed roller is now screwed with Loctite into the right hole of the lower mast bearing block (seen in flight direction). After tightening the screw all bearings will be checked for clearness.



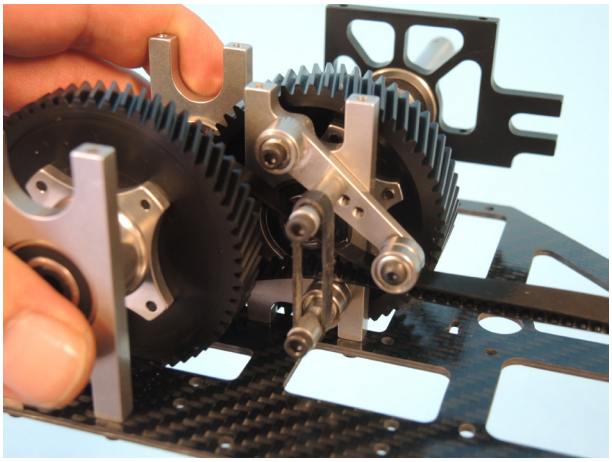
The premounted belt tightening lever will be screwed with Loctite into the left hole of the lower mast bearing block (seen in flight direction). Please check before that the washer shim 3x6x0.2 455 is placed between the upper bearing of the lever and the lower mast bearing block. After tightening check the lever for easy turning.



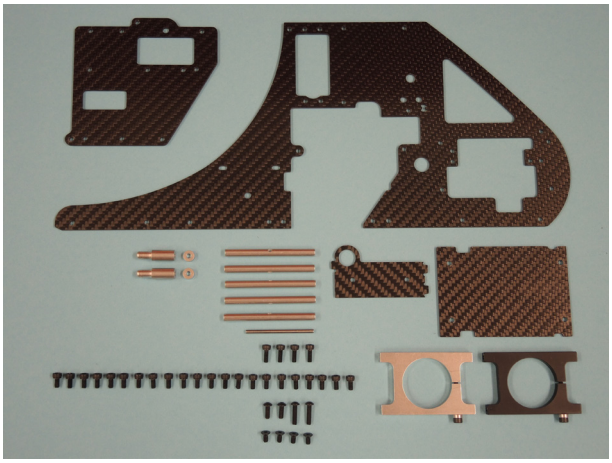
The dampening rubber ring D617 will be placed on the two grooves of the rubber ring holders.



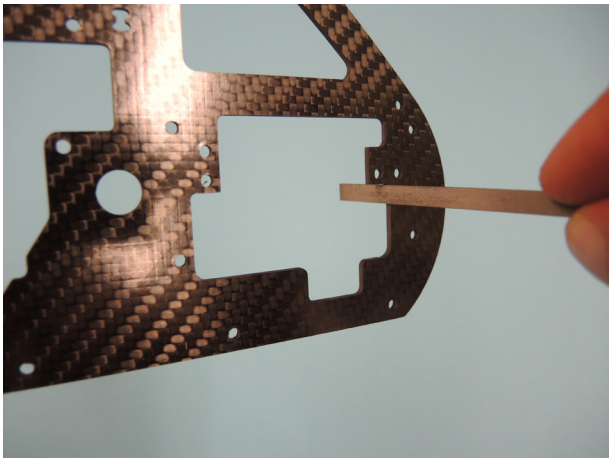
Overview from the mounted unit.



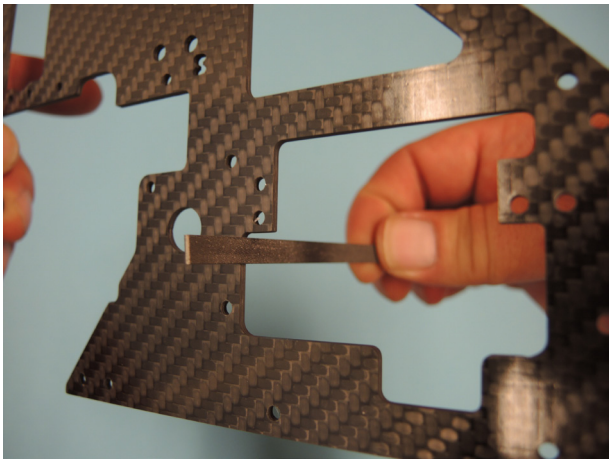
Bag 4: Frame completion
Parts overview



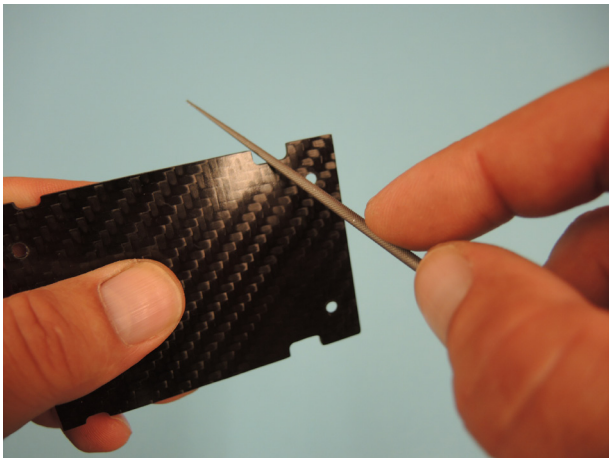
Before starting the mount the shown corners of the tailservo cutout should filed rectangular (radius removed). So later the tailservo mounting blocks are sitting exactly vertical.



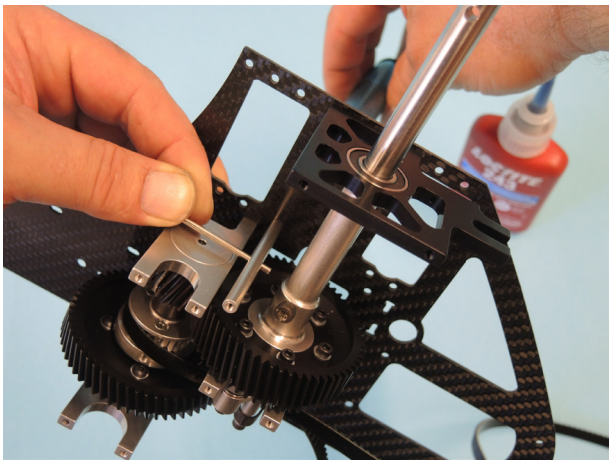
Filing rectangular the front corner of the tailservo cutout. For some certain tailservo cables it would be good to round additionally the area on the upper right corner of the cutout a little bit.



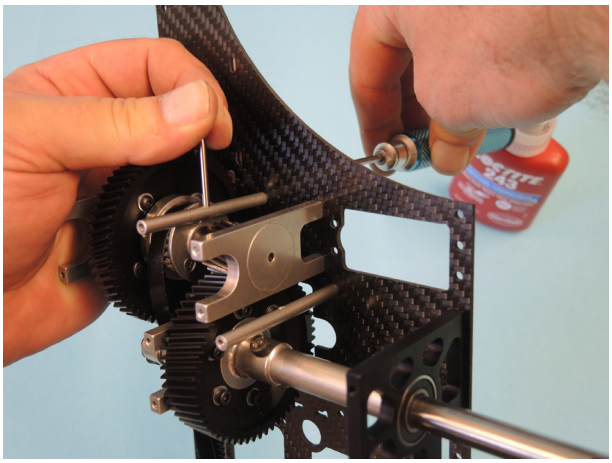
Break the edges of the cable slots in the gyro platform careful with a small needle file.



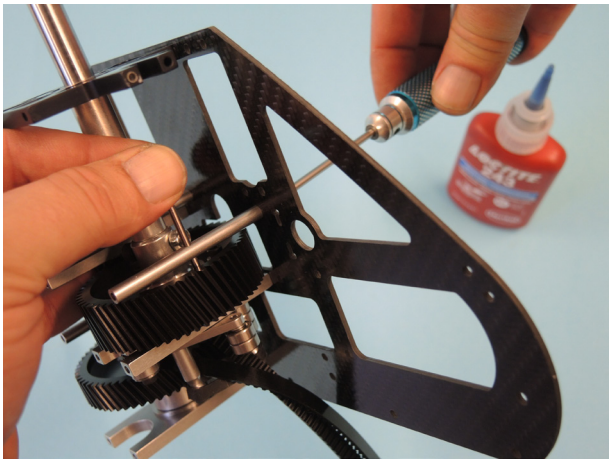
The frame completion starts with attaching the five frame connectors D622. The four connectors, that are fixing later the left cover plate D603 must be tightened very careful with Loctite on the right frame to avoid loosing during maintenance. For locking the bolts during tightening use the mounting wire D115 that must be placed in the center bore of each connector.
Start with the upper front connector using Loctite and a hex bolt M3x6 D196.



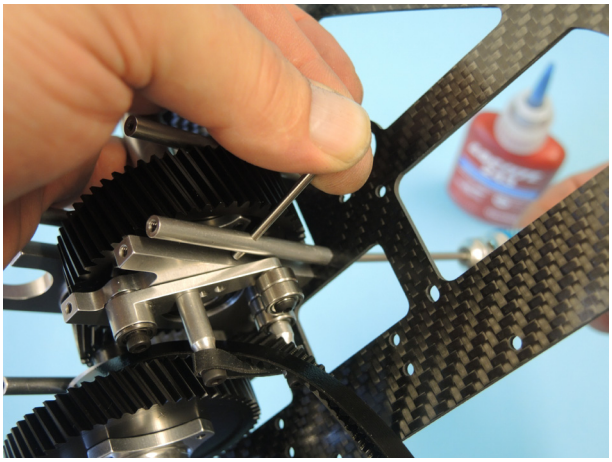
Then mount the front connector...



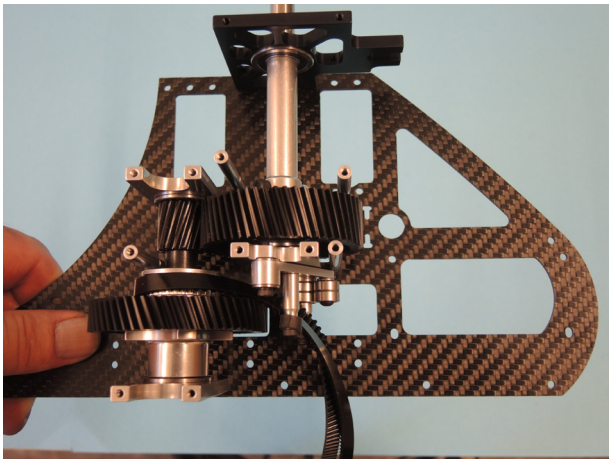
...followed from the upper rear connector...



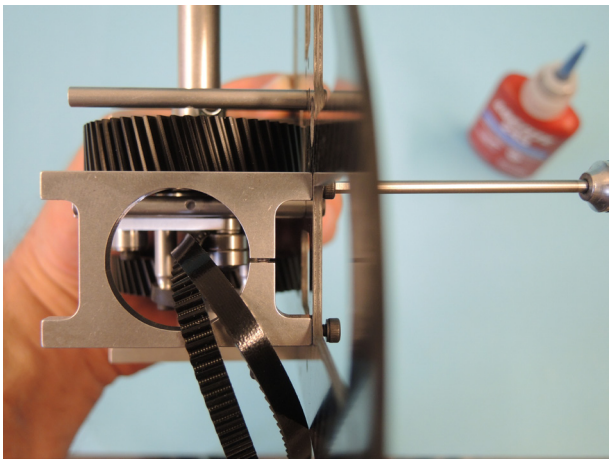
... and finally the lower rear connector.



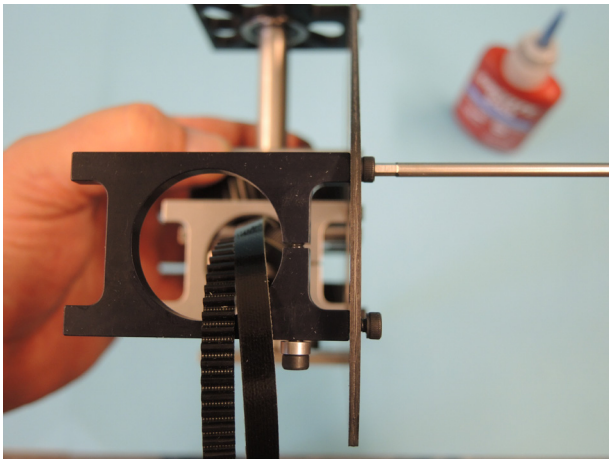
View of the mounted unit.



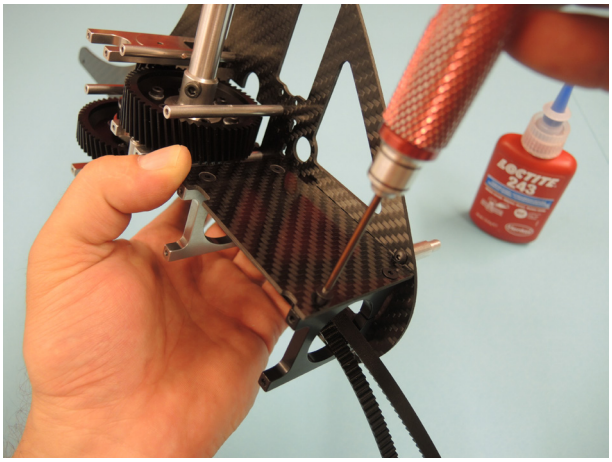
The front tailboom holder clamp D620 is attached with two hex bolts M3x6 D196. Apply Loctite only on the upper screw. On the lower screw Loctite will be applied later after tightening the long tailboom tightening screws (long slot in the frame) and as long it will be loose. The front holder is not anodized to guarantee electric conduction between boom and frame. Check if a 3mm thick aluminum spacer D620a is placed under the long screw M3x35 D338.



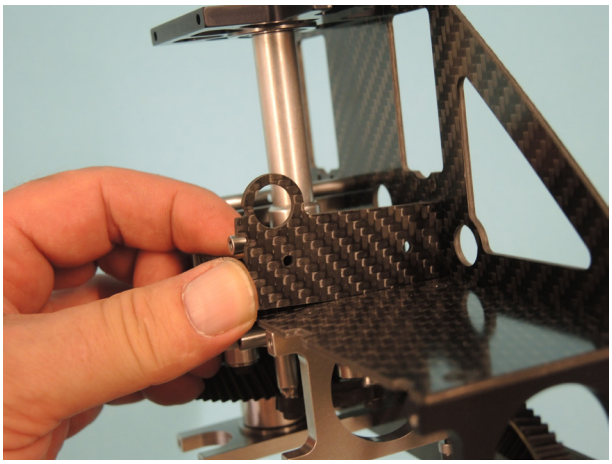
The rear tailboom holder clamp D620s is attached with two hex bolts M3x6 D196. Here the upper bolt will be tightened with Loctite too and the lower bolt is still kept loose without Loctite.



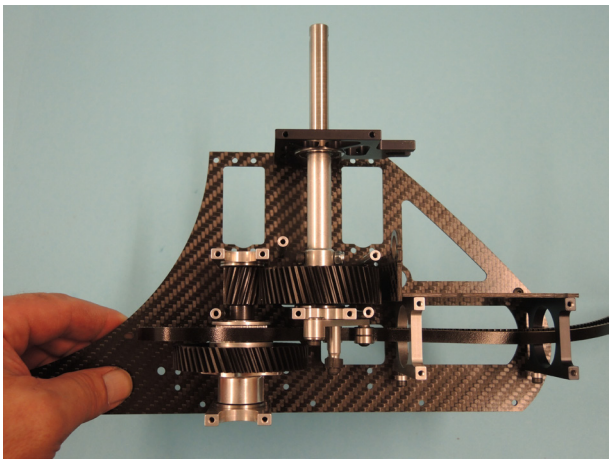
Attach the rear canopy holder D618 with a lense screw M3x8 024 on the upper right frame D602 as shown. Now the gyro platform D621 will be mounted using four countersunk screws M3x6 974 and Loctite.



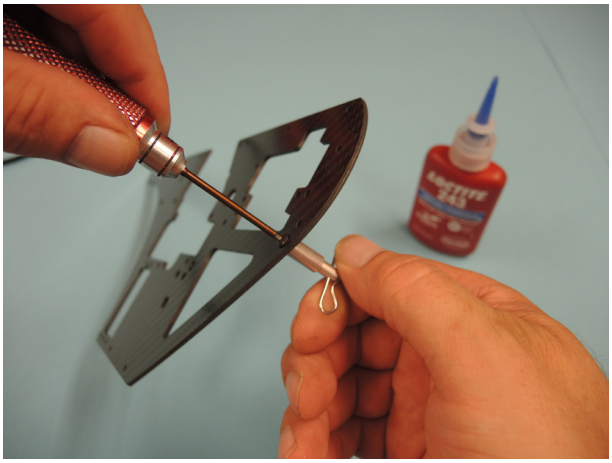
Put the vertical frame stiffener D623 into the slot of the right frame and check for clearness, eventually file the edges a bit. Check the same on the slot of the upper rear frame D601.



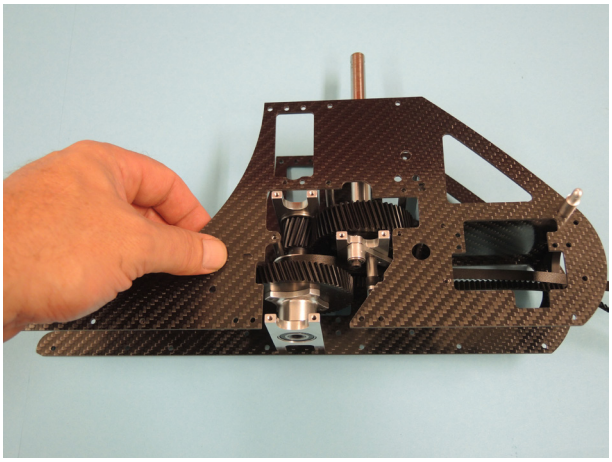
View of the mounted mechanic.



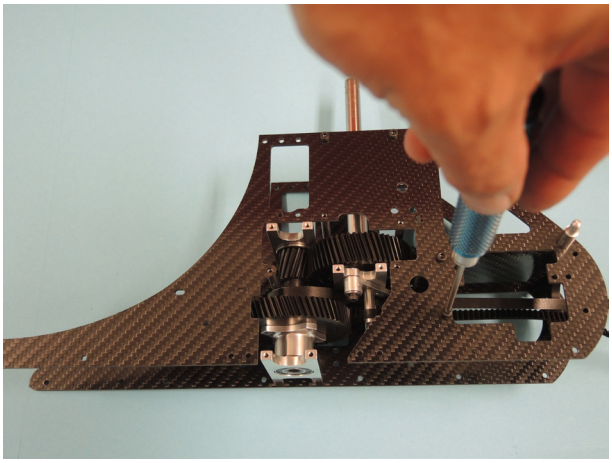
Attach the second rear canopy holder D618 on the upper left frame D601 with a lense screw M3x8 024 using Loctite.



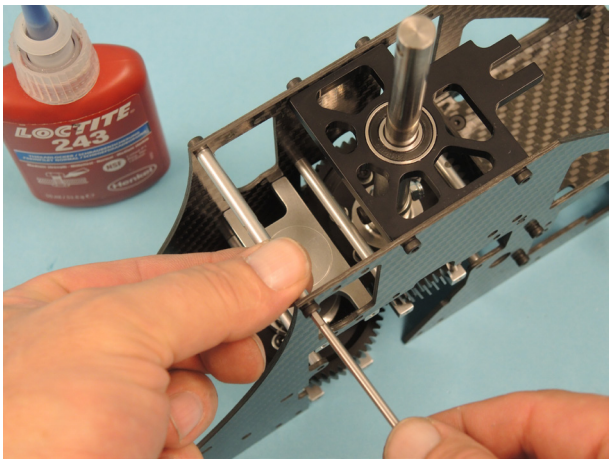
Now place the upper right frame D601 on the unit and check all holes for correct corresponding.



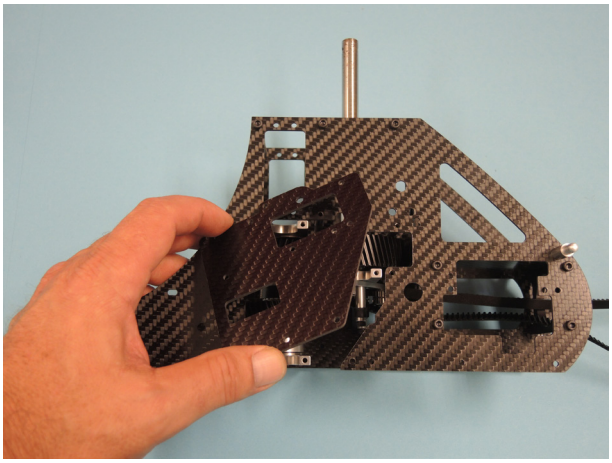
Add four hex bolts M3x6 D196 on the tail-boom clamps with Loctite but still do not tighten them.



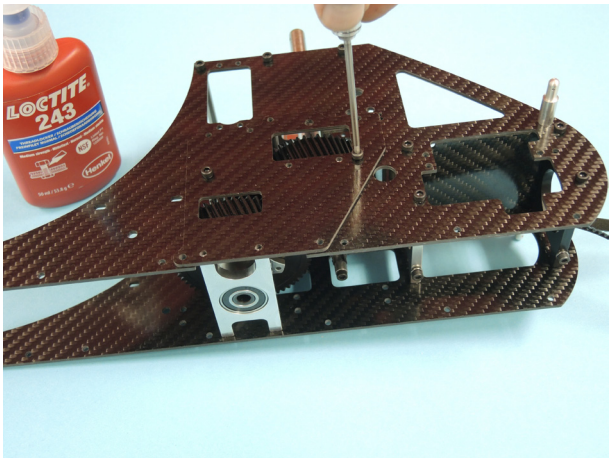
Attach the upper front frame connector using two hex bolts M3x6 D196 and Loctite. Keep it still loose. Connect the frame with the upper mainshaft bearing block D607 using two hex bolts M3x6 D196 without Loctite and keep it also still loose. Use no Loctite here because the upper mainshaft bearing block will be loosed later again for mounting the elevator servo.



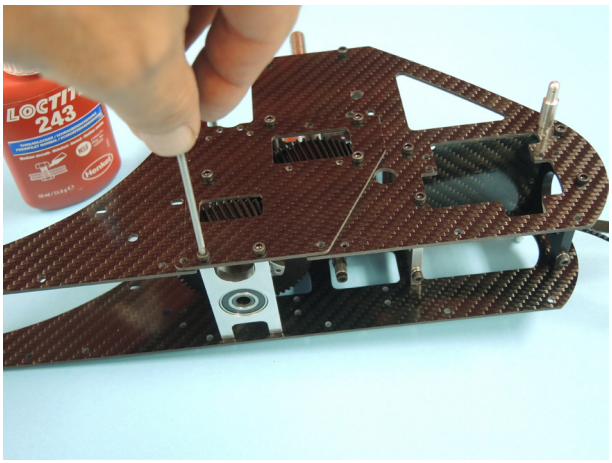
Add the cover plate D603 and check for corresponding holes.



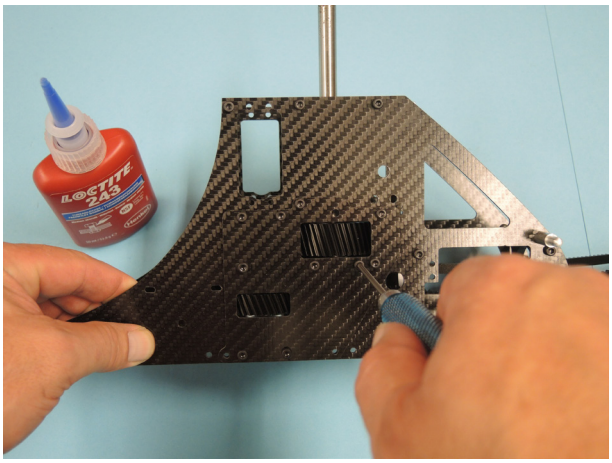
Mount the cover plate with the frame connectors D622 using four hex bolts M3x8 D197 using Loctite and keep them still loose.



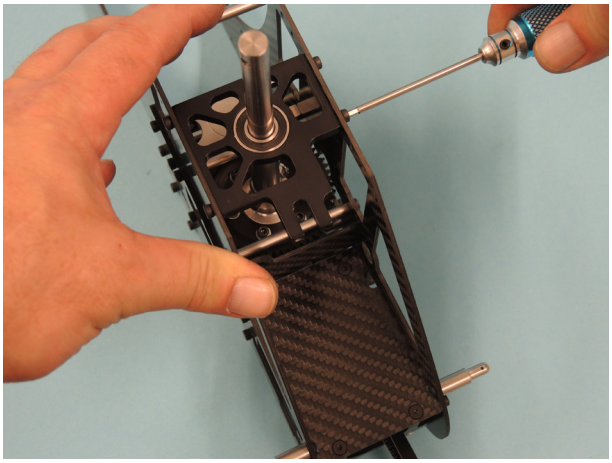
Connect the cover plate with the first stage bearings blocks D612 and D613 using four hex bolts M3x6 D196 and Loctite. Keep them still loose.



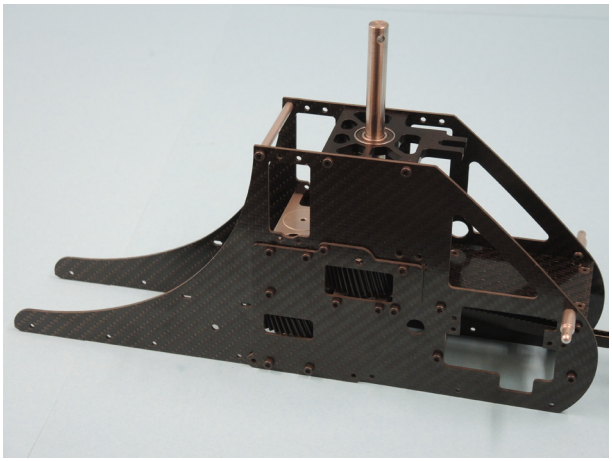
Connect the cover plate with the lower mainshaft bearing block D608 using two hex bolts M3x6 D196 and Loctite. Keep them still loose.



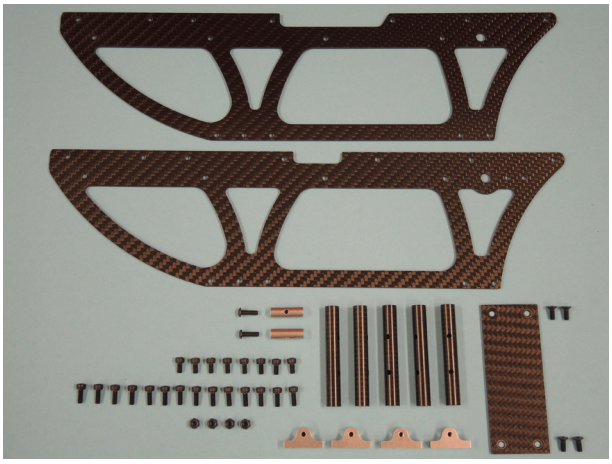
Now press the complete frame on a flat surface and tighten all screws on both frame sides (except the two lower right tail boom clamp screws).+---+



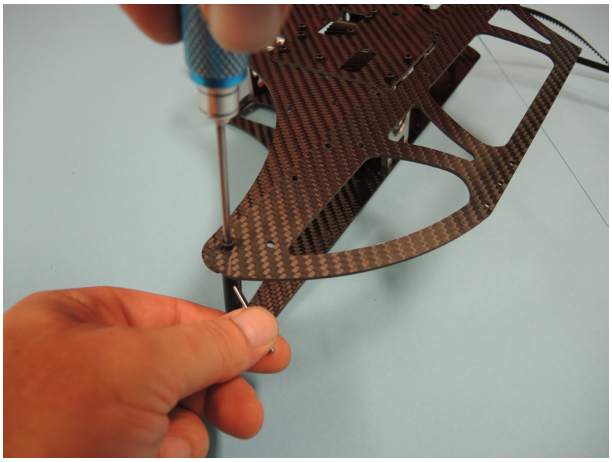
Check the gear mesh again and if necessarry follow the procedure of the assembly of bag 2. The mechanic should now stay on the ground without any tilting. If not, loose srews again and retighten them.



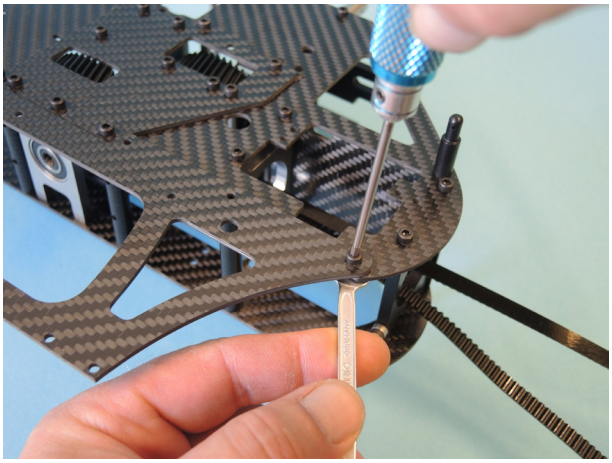
Bag 5: Lower frame
Parts overview



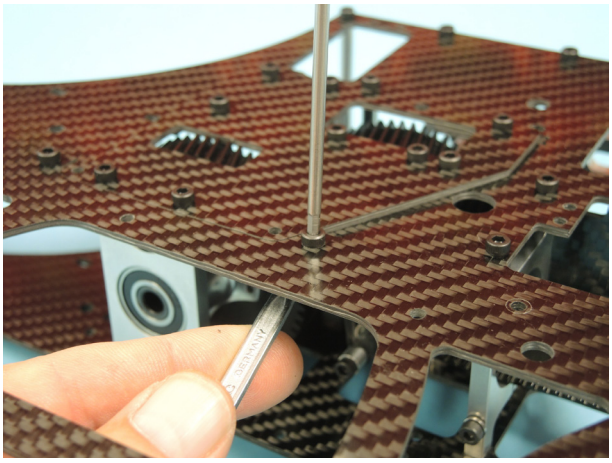
Attach the lower left side frame D624 on the mechanics with five delrin connector rolls D626 and five hex bolts M3x10 D328. Start with the front connector. To avoid turning of it during screwing use the mounting wire D115.



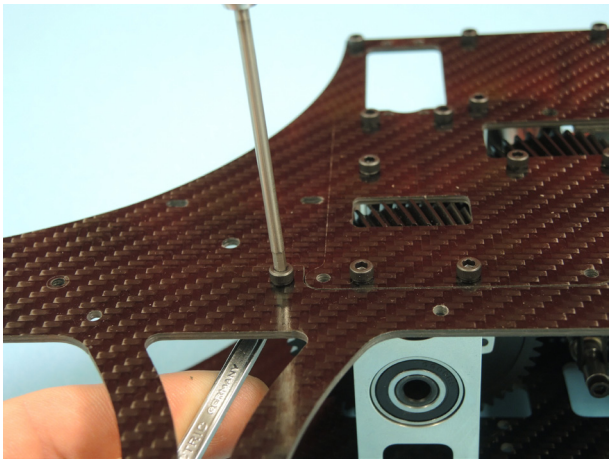
Then add a hex bolt M3x8 D197 at the rear end and tighten it with a lock nut M3 008s.



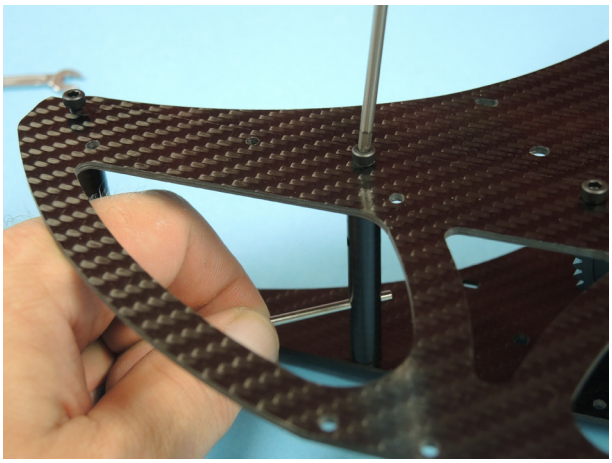
For the shown point use again a hex bolt M3x8 D197 and a lock nut M3 008s ...



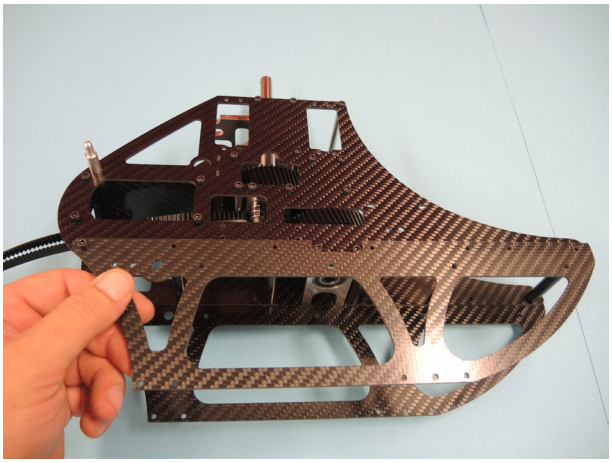
... and also this shown point will be connected with a hex bolt M3x8 D197 and a lock nut M3 008s. Attach the delrin connectors D626 after that to make the tightening of the screws easy.



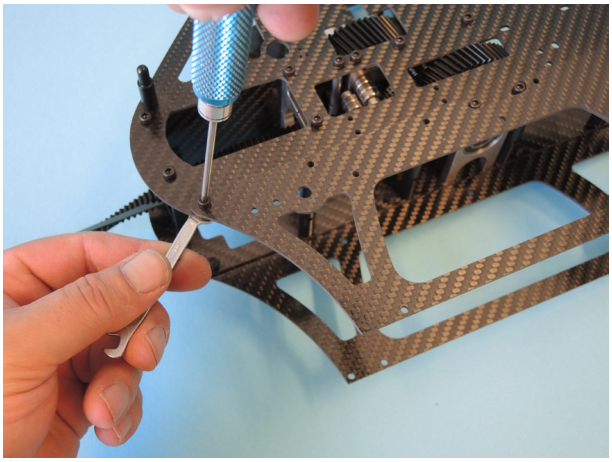
Add the remaining four delrin connectors D626 with four hex bolts M3x10 D328. It is recommended to tighten the connectors at this point only as far as they can be still turned a little bit. So the later mount of controller and battery plate will be easier.



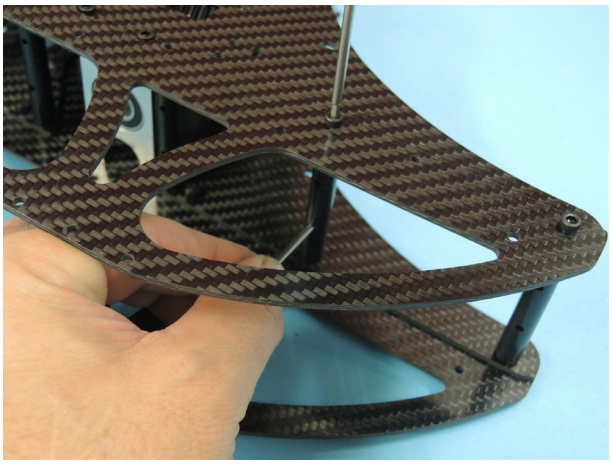
Attach the lower right frame D625 and check all holes for corresponding.



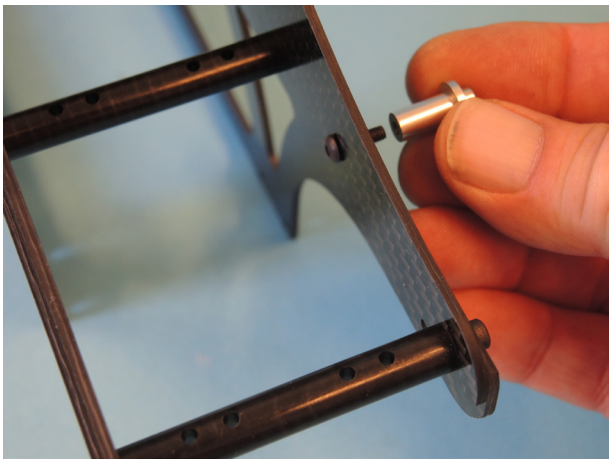
Add at the rear end (as on the left side too) a hex bolt M3x8 D197 and a lock nut M3 008s and tighten it.



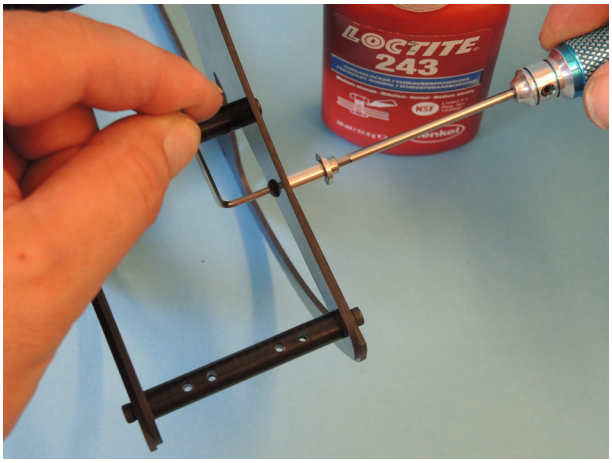
Add five hex bolts M3x10 D328 to the connectors D626 and keep them in position with the mounting wire D115.



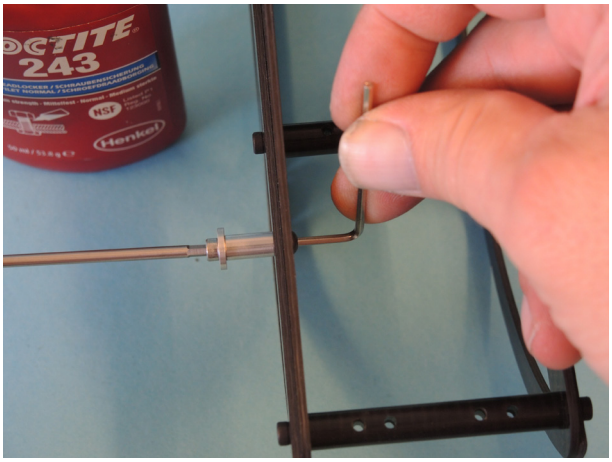
Attach the left canopy holder D619 with a lense screw M3x10 989. Use no Loctite here.



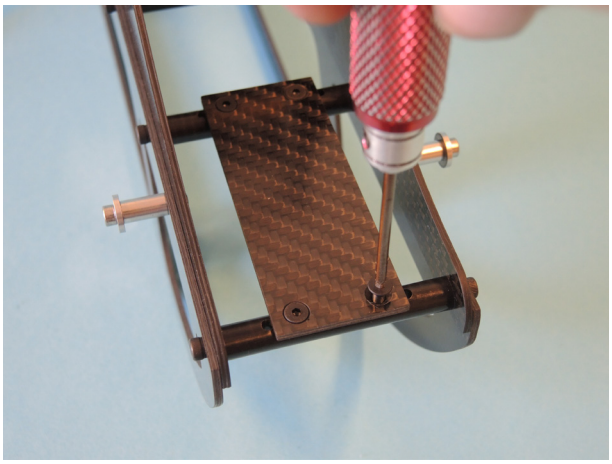
Tighten the holder with a 2mm allen key and the mounting wire D115.



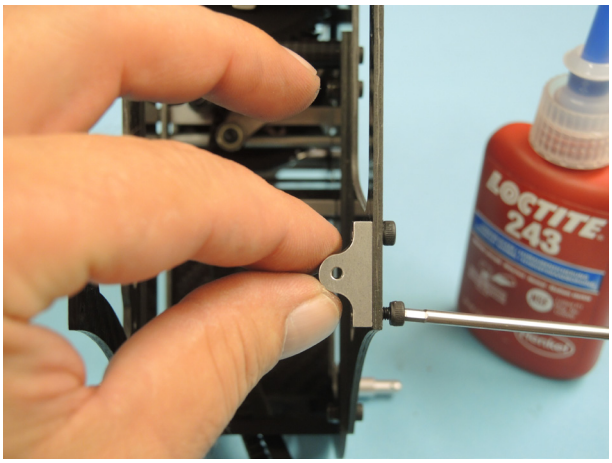
Attach the right front canopy holder D619 on the same way with a lense screw M3x10 989.



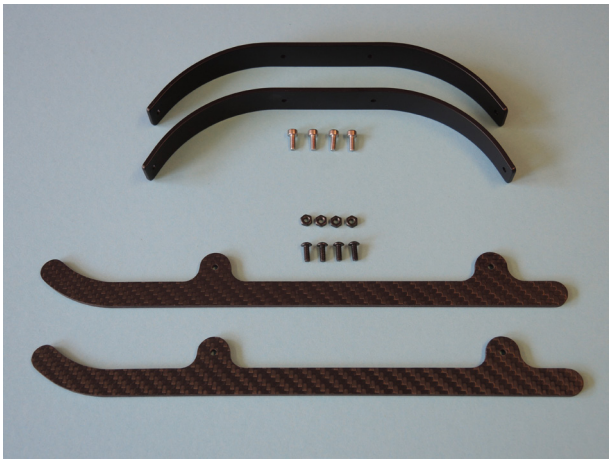
Attach the conroller platform D42 with four countersunk screws M3x8 025. Therefore place the holes in the connectors vertical. The mounting wire can help to find the vertical position.
Alternative controller plates (optional):
Hobbywing 120A LV V4 (6s): D434
Hobbywing 130A HV V4 (7-12s): D435



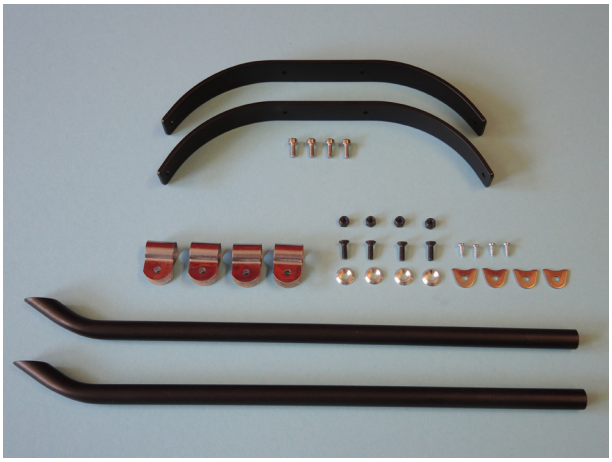
Four landing bow holders D627 are attached at the lower frame with eight hex bolts M3x6 D196 using Loctite.



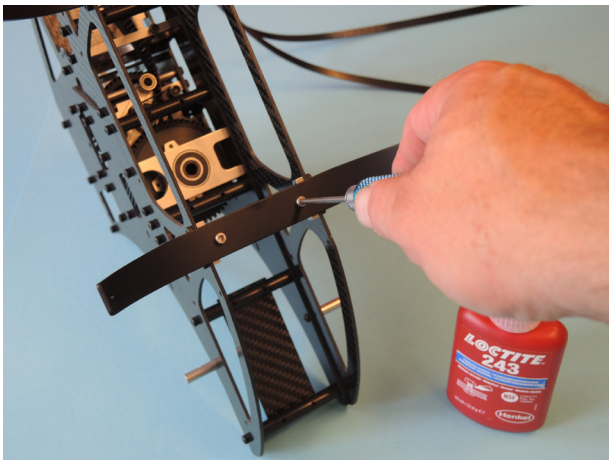
Parts overview of the landing gear with carbon skid plates. (alternatively).



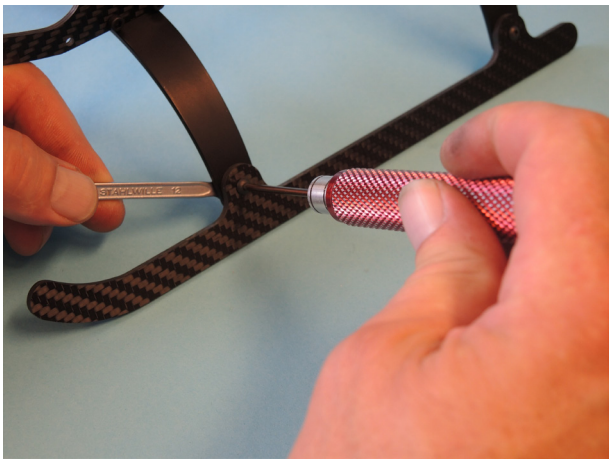
Parts overview of the landing gear with aluminum skids (alternatively).



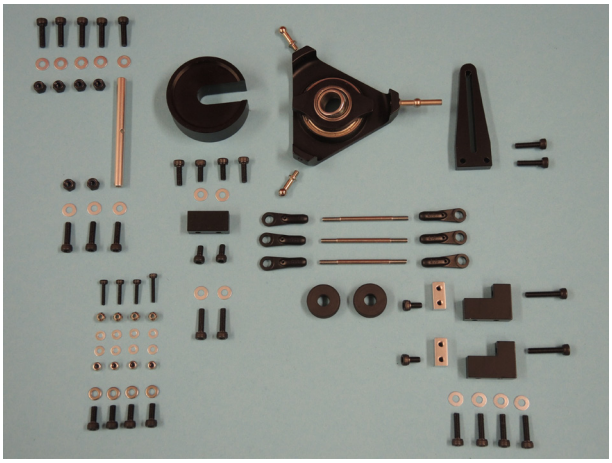
Two landing bows D549a/b are attached on the landing bow holders D627 with four hex bolts M3x8 VA D82 using Loctite. Note that the rear landing bow is higher than the front landing bow and that the front edge is straight (the rear edge is angled on a length of about 60mm).



Attach the skid plates D648 with four lense screws M3x8 024 and nuts M3 D547 using Loctite.

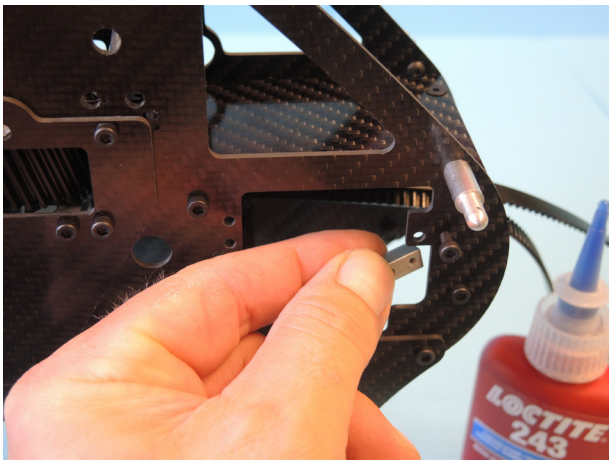


Bag 6: Swashplate and Linkage
Parts overview

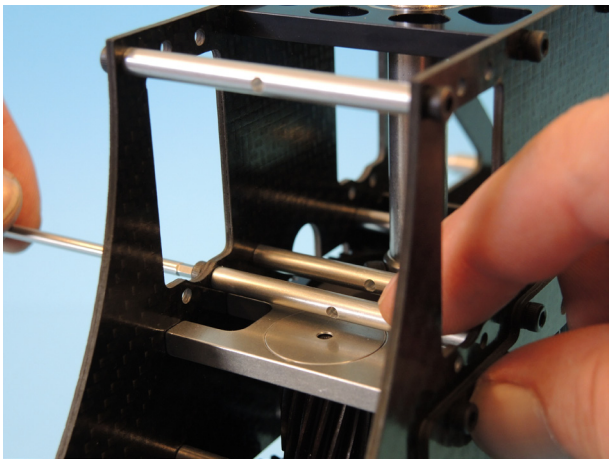


Attach two joint bolts M3x9 078 with rich Loctite on the two free arms of the swash plate D630. The swash plate guide D530 is already factory mounted with Loctite.

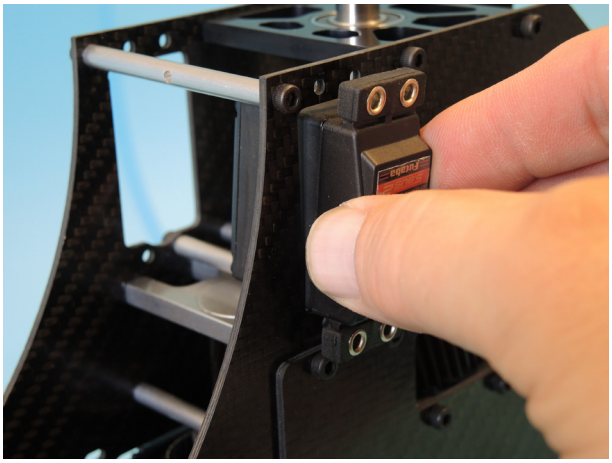
Attach two threaded blocks D23a with two hex bolts M3x8 using Loctite at the tail-servo cut-out of the upper left side frame D601. Add for perfect corresponding holes a second screw in the block before you tighten the first one. After tightening remove the second one.



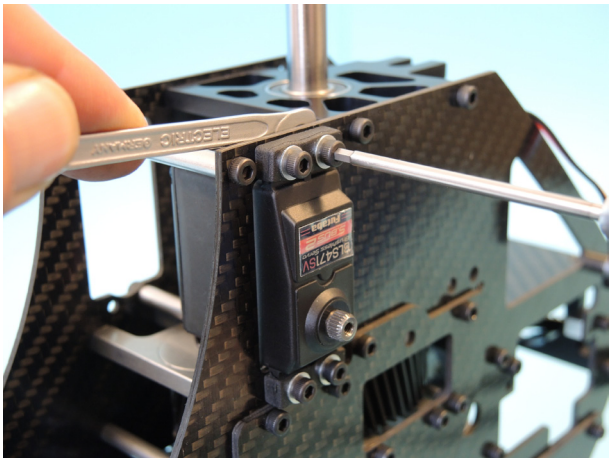
Place a frame connector D622 between the lower rear mounting holes of the roll servos and fix is provisorically on one side with a hex bolt (no Loctite).



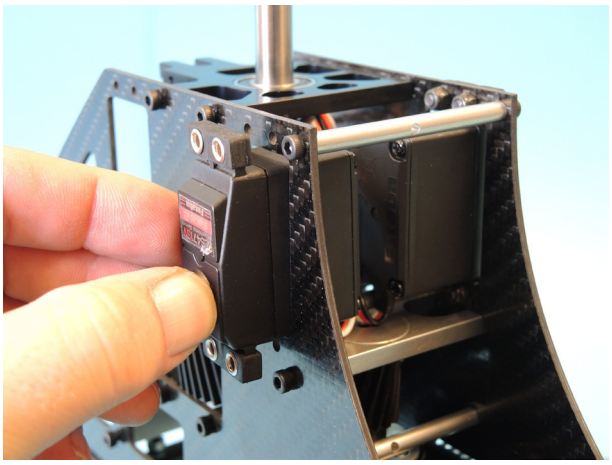
Place the left roll servo. The servos should have grommets with 3mm brass inserts. If not you can use optional inserts, f.e. D153.



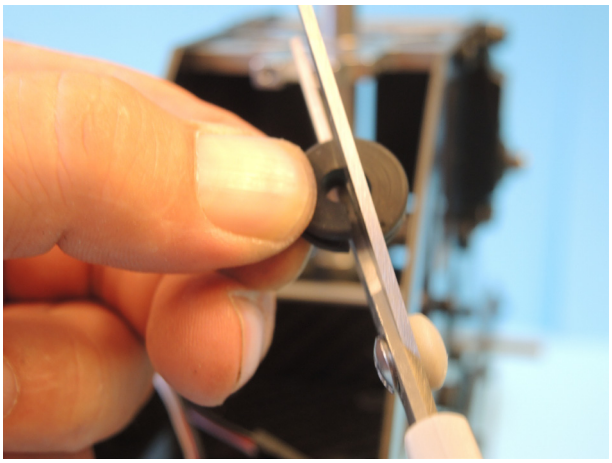
The roll servo is attached with four hex bolts M3x12 D119, washers M3 002 and lock nuts M3 008s. Therefore the open wrench #707 is a very good tool. The lower right screw will be applied with Loctite and turned then in the connector D622. After gently tightenimng of the bolts the provisorically mounted single bolt on the right side can be removed.



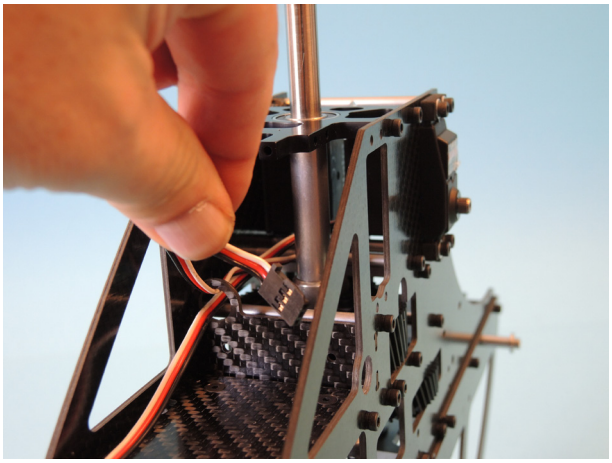
Place the right roll servo. Both servo cables should go in a big arc backwards. They can tough the cover plate on the upper first stage bearing block (this is intended). Tighten the screws as well as the left roll servo.



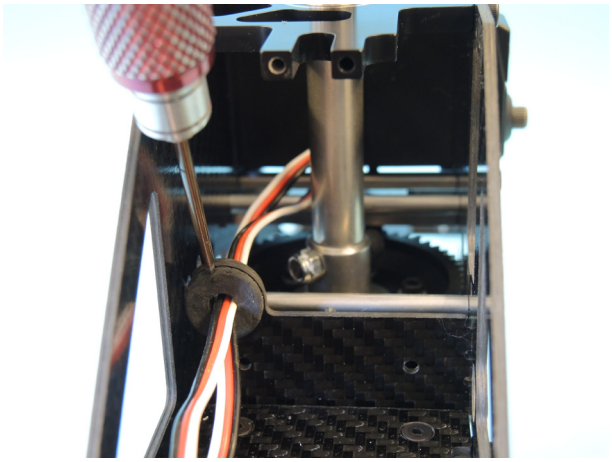
Cut a rubber grommet D80 on one side with a scissors. This is necessary to put it on the servo cable.



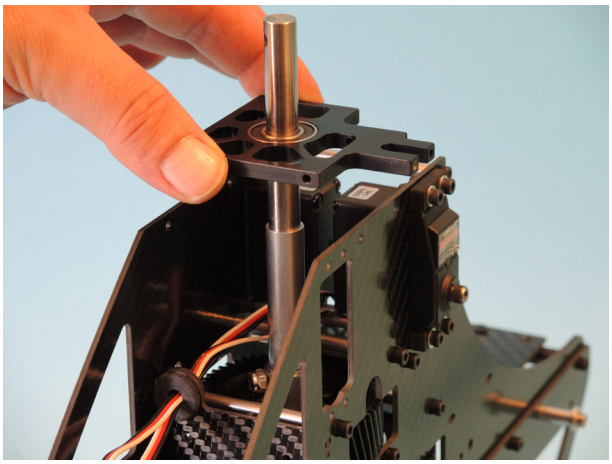
Put both roll servo cables thru the big hole of the vertical frame stiffener D623.



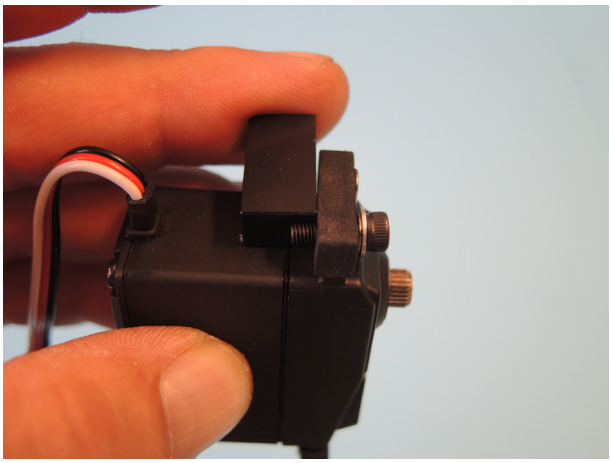
Now press the cutted rubber grommet into the hole as long as it snaps.If the grommet is going thru the hole during pressing then remove it from the servo cables, put it on them on the other side and try again.



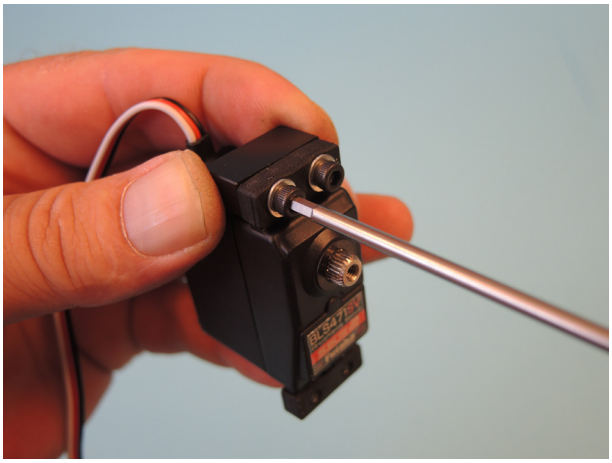
Remove the upper mainshaft bearing plate and turn it as shown 90 degree.



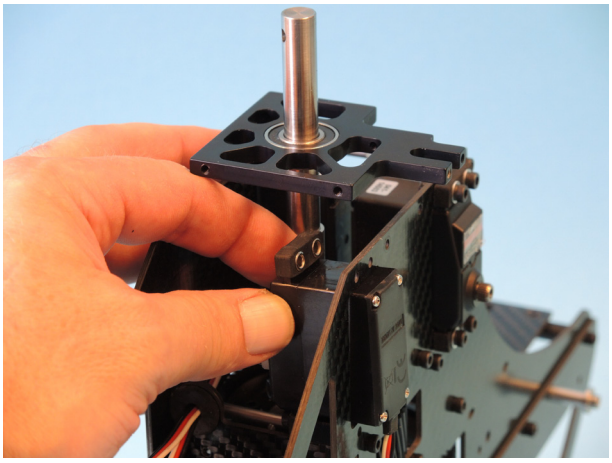
For the rubber grommets from the Futaba BLS471 servo use two hex bolts M3x10 D328 with washers M3 002 for connecting the servo with the spacer block D420. For thinner or thicker grommets use either bolts M3x8 D197 or M3x12 D119. It is important that there is a 5mm remaining length of the holes for screwing from the other side.



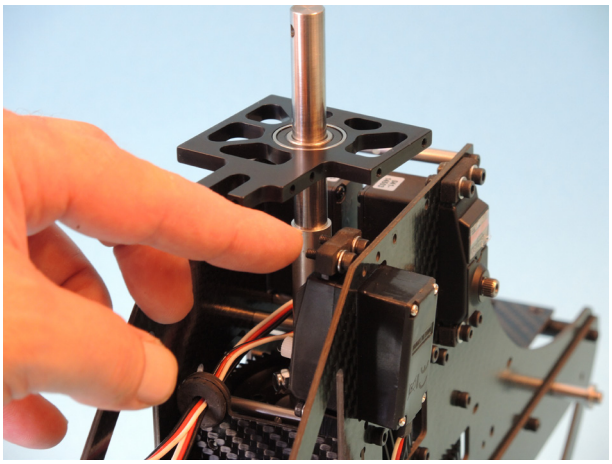
Mount the spacer block now gently on the servo cable side with the fitting screws. The screws should be not too loose and not too tight.



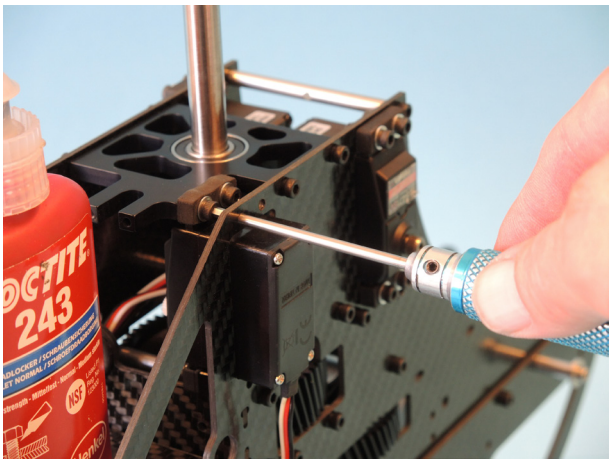
Attach the elevator servo from inside into the hole of the upper right side frame D602.



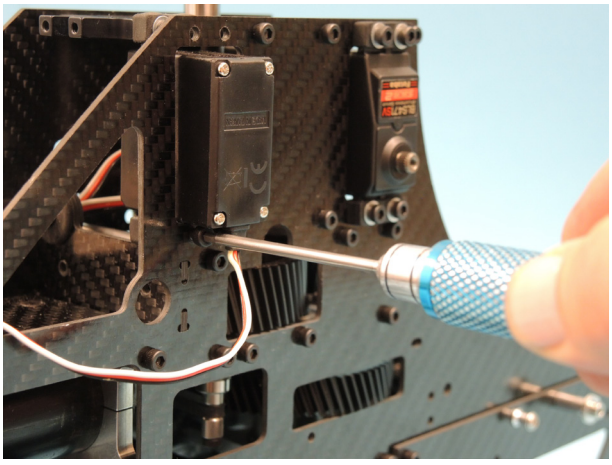
Put two hex bolts M3x12 D119 (Futaba-Servo) and washers M3 002 in the upper rubber grommets of the elevator servo.



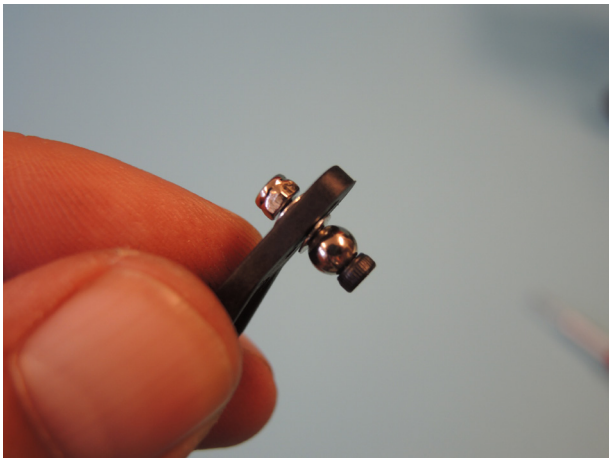
Position the upper manishaft bearing plate now finally and tighten it with the four M3x6 hex bolts D196 and Loctite. Then mount the upper screws of the elevator servo gently using Loctite.



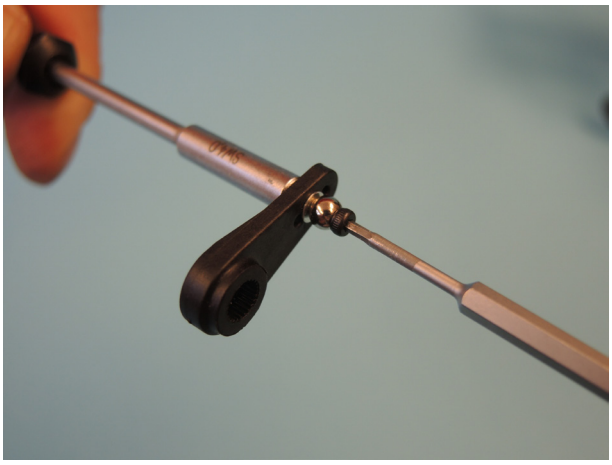
Mount the elevator servo holder D420 (attached on the elevator servo) with two hex bolts M3x6 D196.



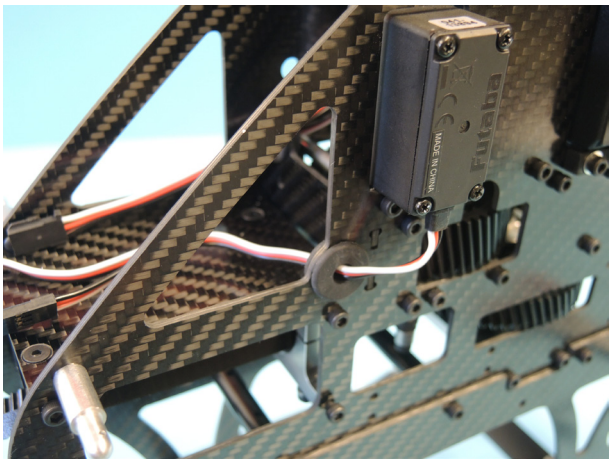
The arms of the swashplate servos should have an effective length of about 17mm. You can use f.e. the optional servo arms D154a. Attach a hex bolt M2x10 D296, a joint ball D117 and a washer M2 001 on three servo arms. The elevator servo arm gets these parts from the not toothed side. On the otherside of the arm put a washer M2 001 and a lock nut M2 007 on the bolt.



The roll servo arms get these parts from the toothed side. On the otherside of the arms put a washer M2 001 and a lock nut M2 007 on each bolt.

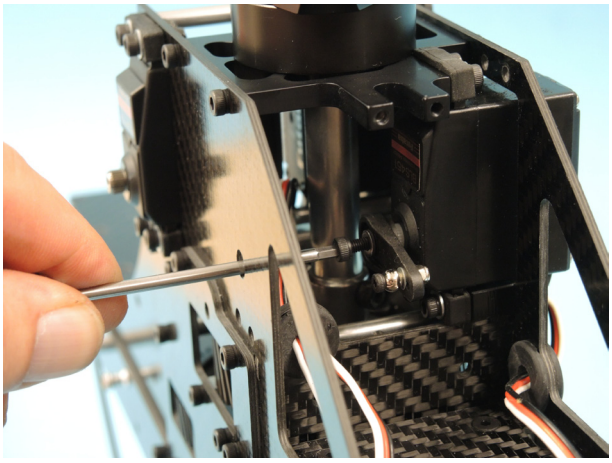


Push a rubber grommet D80 that is cutted from one side on the elevator servo cable, put the plug into the hole of the upper right frame D602 and press the grommet into the hole.

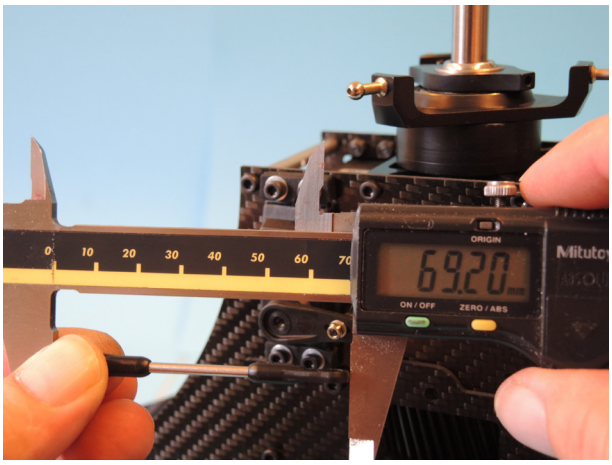


Put the swashplate justation ring D631 on the mainshaft, followed from the swash-place that must have contact to the justati-on ring.

The 4mm hole in the upper left side frame is thought for (later) mounting the servo arm on the elavator servo.

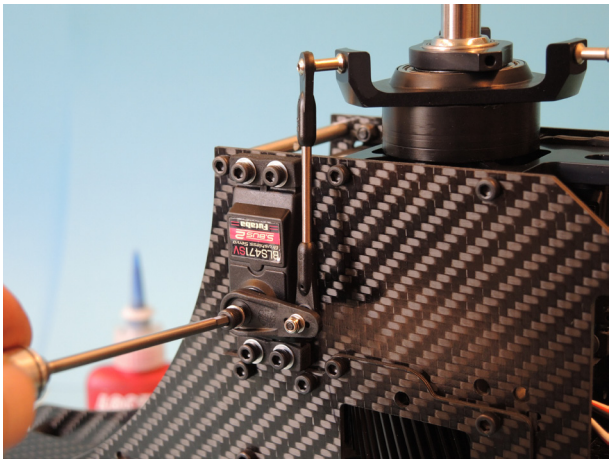


Rough length of the three linkages of the swashplates servos (Futaba BLS 471).

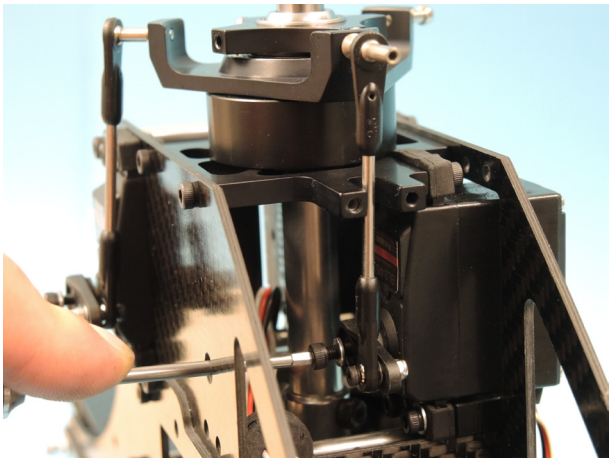


Push the ball joints for the roll servo linkages with the number outside on the servo arms and on the joint bolts of the swashplate. Check that the ball joints are moving free on the balls. If not press gently with an old pliers in mounted condition on the outside of the ball joints until they become a bit looser. This procedure is shown later for the tail pitch slider (bag 10).

The roll servo arms and the elevator servo arm are attached with a hex bolt M3x8 D197 and a washer shim 3x6x1 051 using Loctite. This step should be done later when electric current is on the servos and they have their real center position.

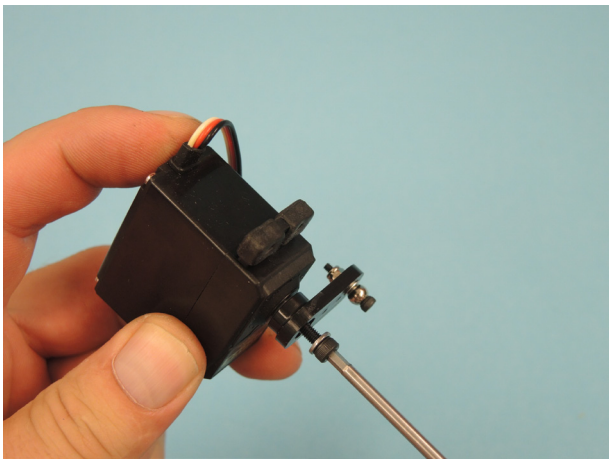


Attach the elevator servo linkage as shown. Mount the servo arm hex bolt M3x8 D197 and the washer shim 3x6x1 051 using Loctite also later when the servo is under electric current and has its defined center position.



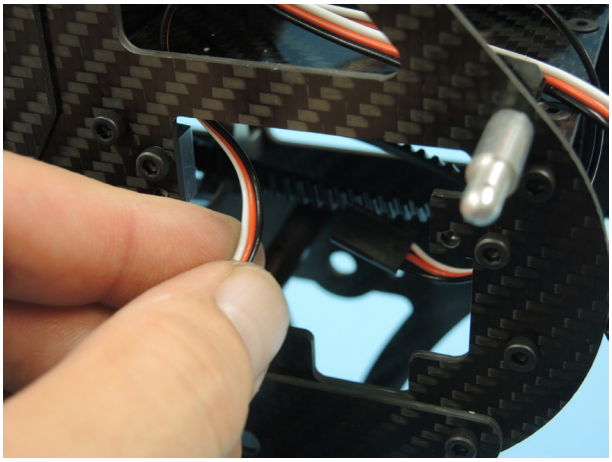
Attach the swash plate holder D532 with two hex bolts M3x12 D119 using Loctite.

Assemble the tail servo arm. Recomended arm length is 17-18.5mm. Attach a hex bolt M2x12 099, a ball D117 and a washer M2 001 on the not toothed side of the servo arm and add on the other side a washer M2 001 and a lock nut M2 007. A hex bolt M3x8 D197 and a washer 3x6x1 for locking the servo arm on the servo will be attached later when the servo is under current and has its center position.

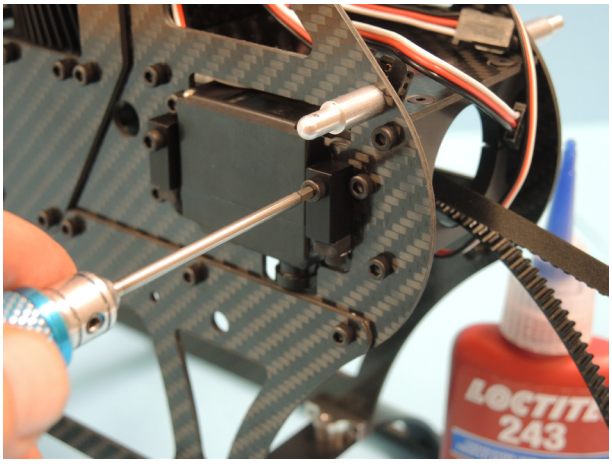


Two tail servo mounting blocks D629 are attached gently with four hex bolts M3x12 D119 and washers M3 002 using Loctite. The rubber grommets of the servo should be in straight position after tightening the screws.

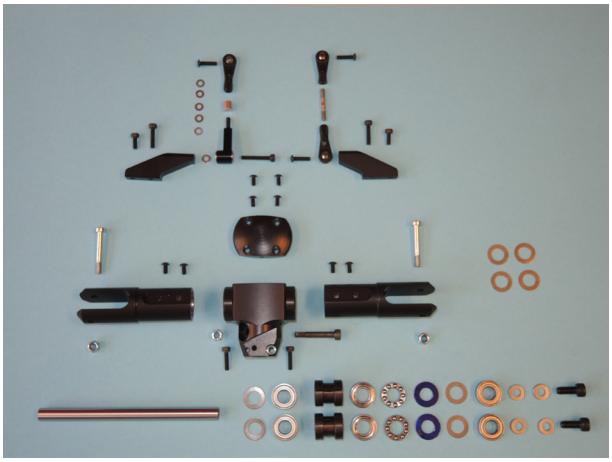
The cable of the tailservo is pushed into the left slot of the gyro plate D621. Therefore it is eventually necessary to remove the front threaded block D23a.



The tailservo is attached in the tailservo slot of the upper left frame D601 with two hex bolts M3x16 D329 using Loctite.



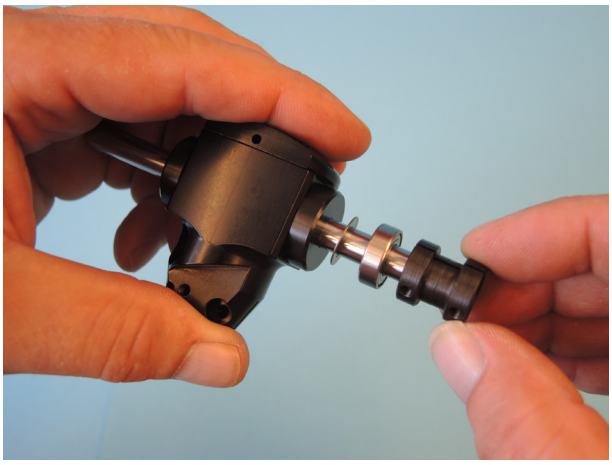
Bag 7: Rotorhead
Parts overview



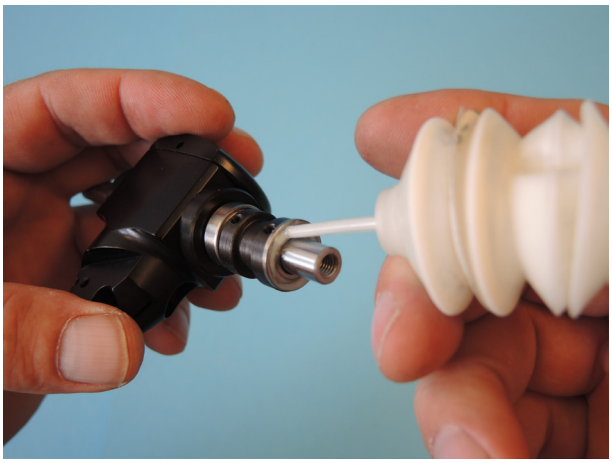
Thr mainrotor hub cap 580 ist attached on the mainrotor hub D452 with four lense screws M3x6 D199. The spindle bushes D453 are already factory attached.

Push the feather spindle 521 thru the spindle bushes D453 and place them about centered.

Add a washer shim 8x14x0.5 047, a ball bearing 8x16x5 071 and a threaded bush 509.



Add the thrust bearing 8x16x5 100. First add the non marked grooved shim with the inner diameter of 8.2mm (tilts on the spindle). Press a bit of lubrication in the groove.



Add the ball cage as shown and add a bit of lubrication on the balls.

Finally add the blue marked grooved shim with the inner diameter of 8.0mm (does not tilt on the spindle).

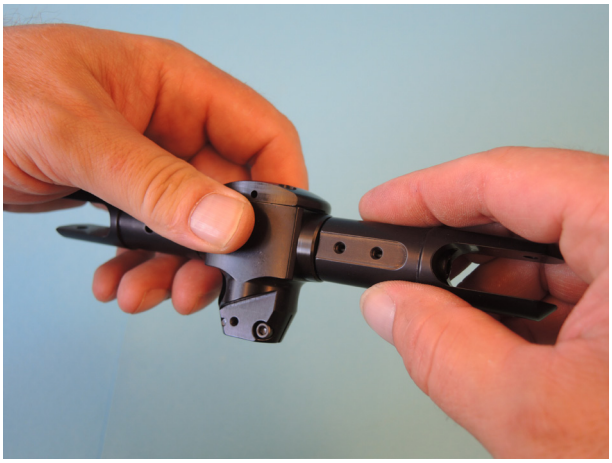
Add (a) washer shim(s) and a ball bearing 8x16x5 071. The necessary thickness of washer shims can vary a bit and must be checked by everyone for himself. Therefore both sides of maingrip units must be mounted and the M5x12 hex bolts 034 and washer shims 5x10x1 052 will be mounted from hand(!). If you feel end play then add 0.1mm on each side. If the bearings become notchy then remove 0.1mm each. You can also mount 0.1mm only on one side if necessary.

If the end play is correct then apply Loctite to the threads of both hex bolts M5x12 034 and tighten them from hand first.

Then tighten the screws with 8-10 Nm about (if you have a torque driver). If not then „tighten, but no too tightened“). Note that a too high tightened bolt reduces the total strengthness of the bolt that can cause a damage.

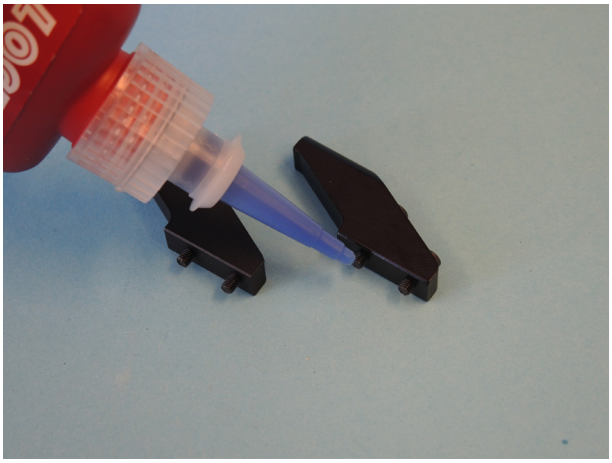
Attach two hex bolts M3x12 D119 in the rotorhub D452 using Loctite.

Push the bladegrips D635 on so that the cross holes in the grips are corresponding with the holes of the threaded bush 509. The fitting of the grips is quite narrow. A light warming up of the grips with a hair-dryer does help.



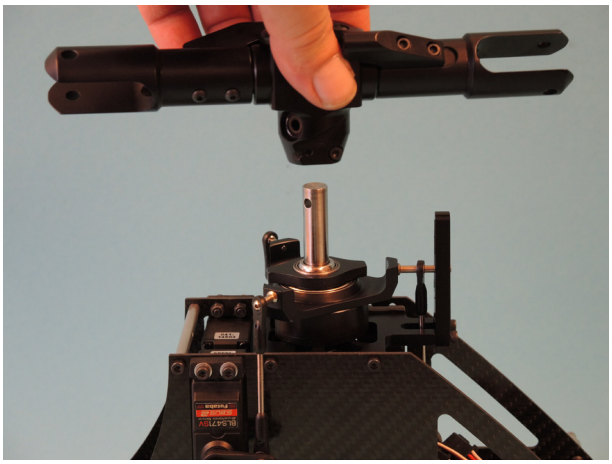
Add two lens screws M3x6 D199 using Loctite. Before tightening push both blade-grips in outside direction to eliminate play between screws and crossholes of the bladegrips.

Add on the blade grip arms a hex bolt M3x8 D197 and a hex bolt M3x14 D198 and apply Loctite on the threads.



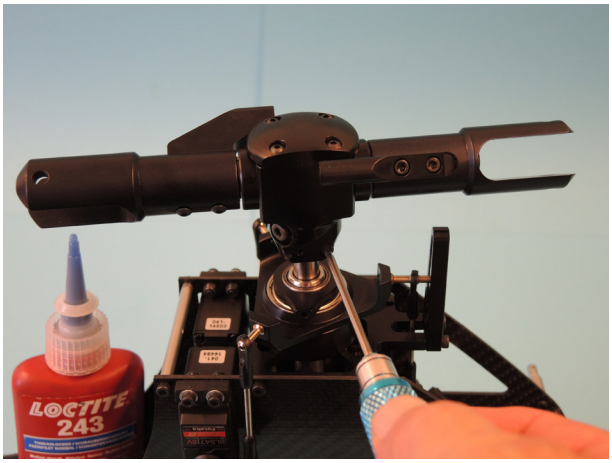
Attach the blade grip arms in the small grooves of the bladegrips. Check if both arms are flat on the grooves. If this is the case tighten the screws of both blade grip arms.

Attach the rotorhead on the mainshaft. The tolerance of the bore is narrow tolerated. During pushing on tilt the head slightly in both directions. Also a drop of oil is helpful. Do never turn the hub onto the shaft (risk of seizing)!

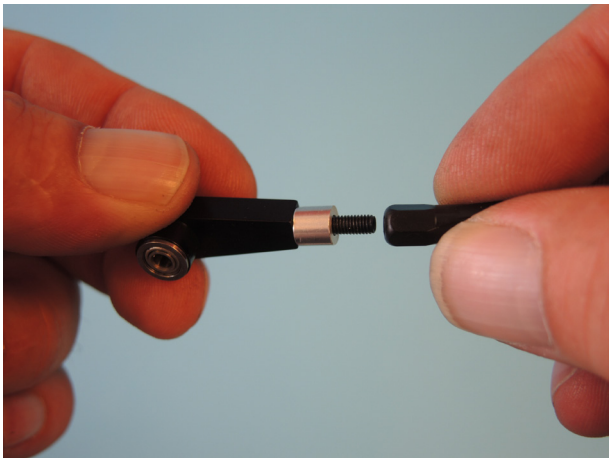


Push the jesus bolt D78 thru the corresponding holes of mainrotorhub and mainrotor shaft and tighten it with a lock nut M4 009. If the bolt cannot be easily mounted then turn the head 180 degree on the shaft and try again.

Tighten the two hex bolts M3x12 D119 in the mainrotor hub.



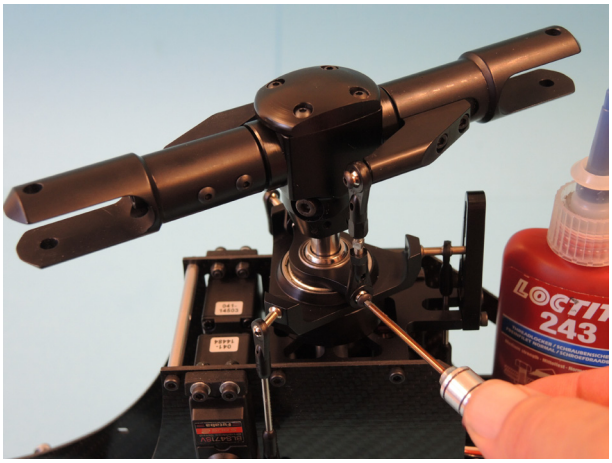
Push on the SRC arm D545 the spacer bush D637 and mount a ball joint M3 D72. If necessary add washer shims 3x6x0.1 475 between spacer bush and ball joint so that the ball joint has a tight contact and is to the same time positioned rectangular.



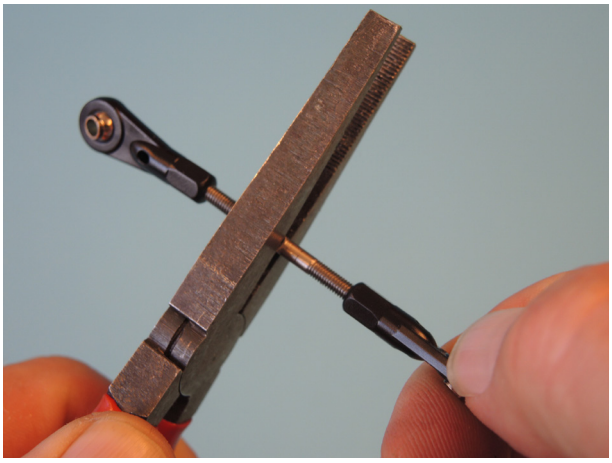
Add a hex bolt M3x20 D331 and a washer shim 3x6x0,5 D312.

Mount the SRC arm on the shorter blade grip arm D636 with enough Loctite. Be careful beneath a ball bearing using Loctite. Capillar forces can pull too much applied Loctite into the bearing.

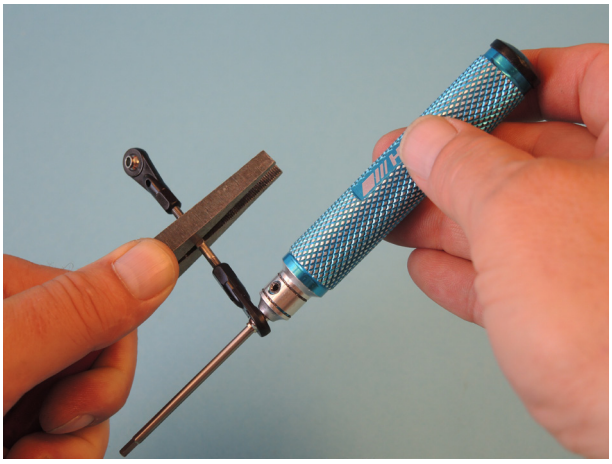
Attach the SRC arm with a lense screw M3x12 989 on the swashplate with enough Loctite.



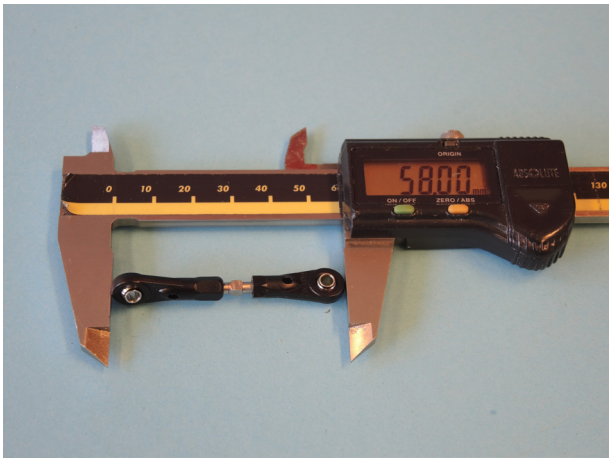
The right/left threaded linkage is made from the right/left threaded pushrod D541, a ball joint M3 D72 and a shortened ball joint M3 D578. The shortened ball joint is placed on the side with the rightturning thread (cw, no thin groove on this side).



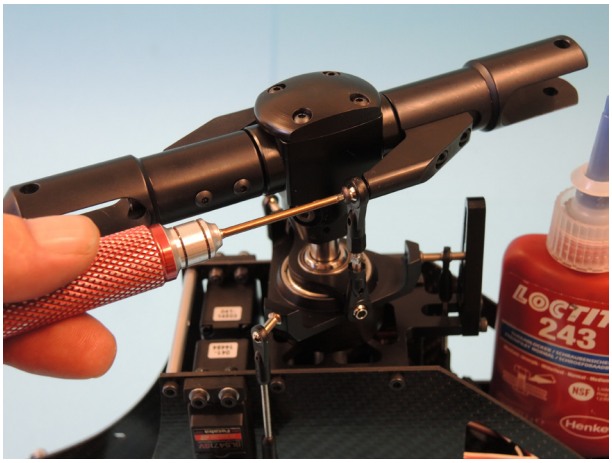
For turning the ball joint you can use a 3mm Ø hex wrench. But the first turnes should be made from hand.



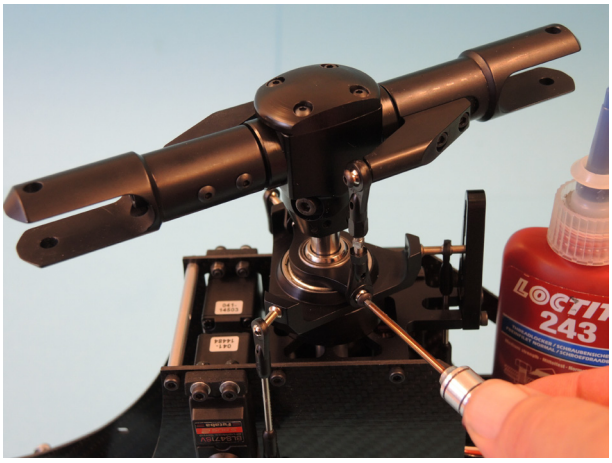
Rough length of the double ball joint R/L linkage.



Attach the double ball joint linkage with a lense screw M3x12 989 and enough Loctite on the long blade grip arm.

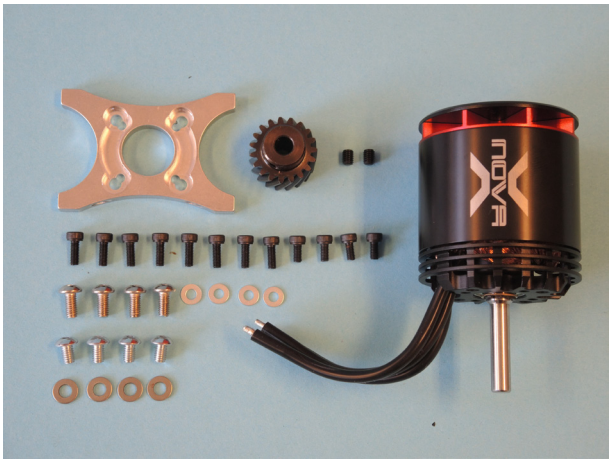


Attach the double ball joint linkage with a lense screw M3x12 989 and enough Loctite on the swashplate.



Bag 8: Motor mount
Parts overview

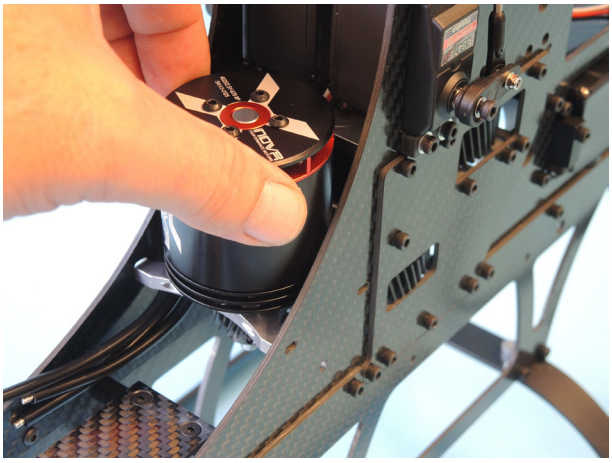
[Note: The motor is shown as sample and available as equipment]



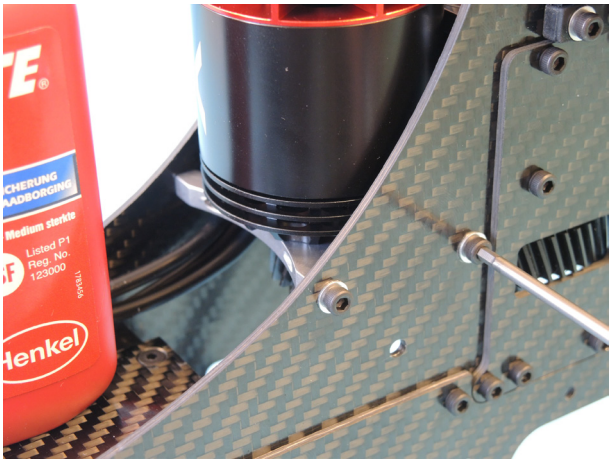
Attach the motor with for lense screws M4x8 D106 using Loctite on the motor-plate D633 so that the motor cables are placed besides. So there is more space to mount them later with the controller. For alternative motor types and bolt lengths there are M3x6 hex bolts D196, M3x8 D197, M4x6 D125 and for length reduction washer shims 3x6x1 051 and 4x8x1 043 in the bag.

Push the motor pinion D37 (18-22 teeth) on the shaft so that one threaded hole is corresponding with the flat spot on the motor shaft. Check for a clearance between pinion and motorplate of 0.5-1mm. Then tighten the pinion on the flat spot with a grub screw M4x5 035 using Loctite. Add then a second grub screw M4x5 035 using Loctite and tighten it.

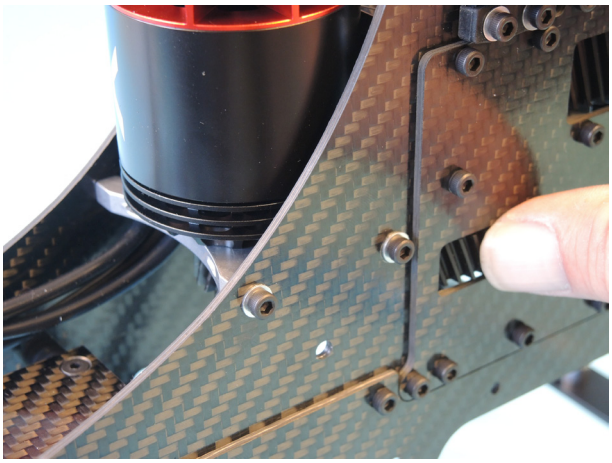
Push the motor unit between the frames so that the motor cables are placed on the right side (seen in flight direction).



Mount the motor carrier D633 with four hex bolts M3x8 D197 and washers M3 002 using Loctite.



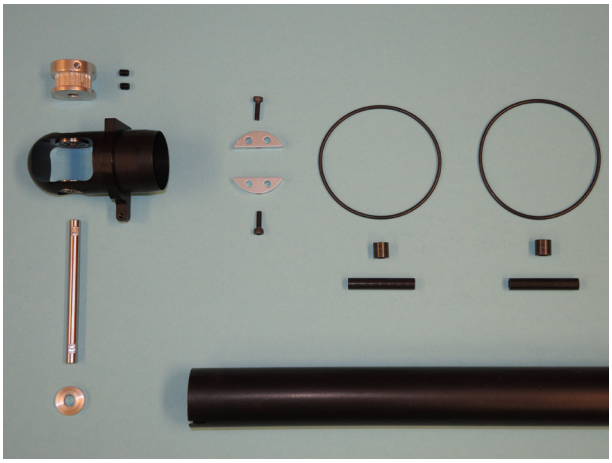
Check the gear mesh. If you move the delrin wheel slightly in both directions you must feel a small play between the gear wheels. If the mesh is too small or too large then open the motor plate mounting screws again and move the motor a little bit. Then tighten the screws again.



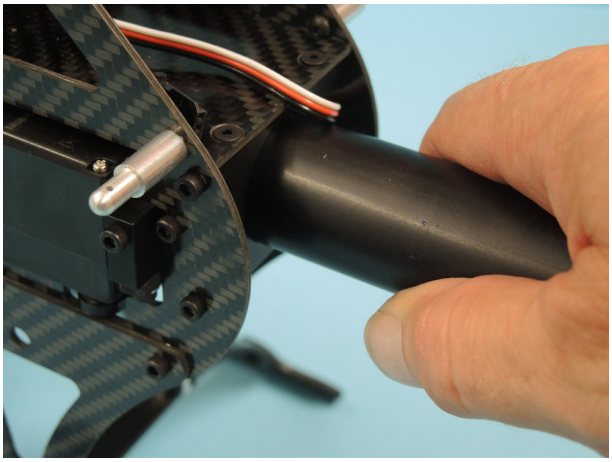
View of the motor area. Built in is a X-Nova 4025-670 for 10s use. Alternatively motor with diameters upto 55.5mm can be used. Note: A 4025 motor (or a 4030) is for the most applications of use absolutely enough.

View of the mounted mechanic

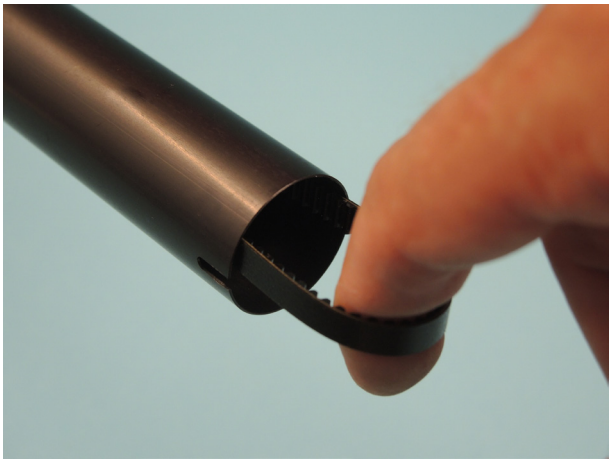
Bag 9: Tailboom
Parts overview



Remove some anodized black surface from the front end of the tailboom D639 (the side without slots) with a small flat file to get a good grounding between tail and mainframe. For this reason the front tailboom clamp is not anodized. Then push the tailboom careful in the clamps. Be cautious that you do not damage any servo cable.

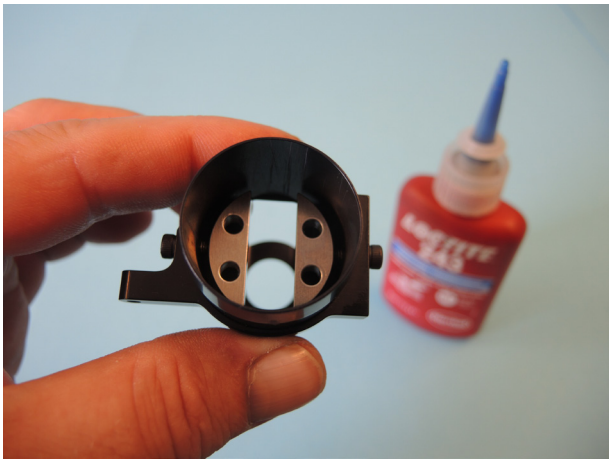


Pull the tailbelt 286 either with a long crankes wire thru the boom or use a thin rope with a weight at the end (f.e. a big nut). Check that the belt is not turned in anyway in the tailboom. Then put a finger from above in the belt end...



... and turn it 90 degree to the right.

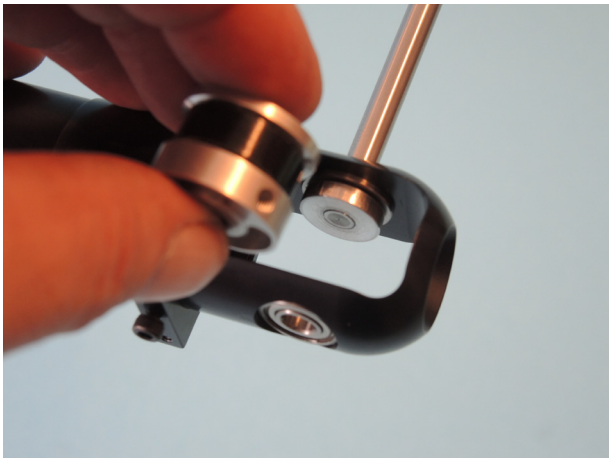
The tail gear housing D246 is attached with the rudder fin holder D44 and the two bracket mounts D43a with two hex bolts M3x10 D328 using Loctite. Check that the bolts are still as loose as possible to fit easily with the tailboom.



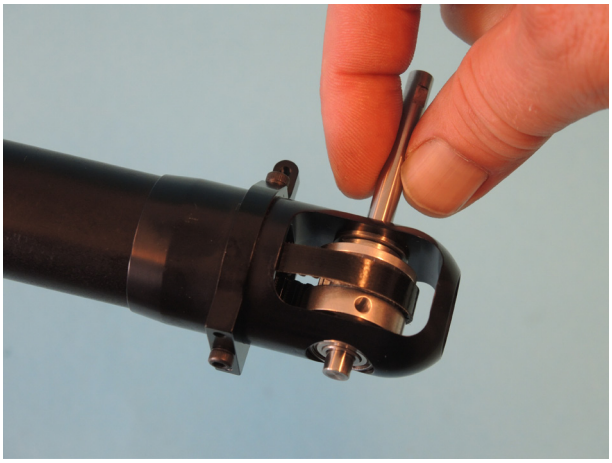
Push the tailrotor housing fully on the boom and check, looking inside, that the boom has really mechnical contact to the end of the housing. Check also that the brackets are vertical in the boom. Then tighten the bracket screws.

Push the tailboom as far as possible in the mechanics so that the tailbelt is as long as possible out of the tail housing. Then place the tail belt wheel 20T D643 in the belt end in that way that the mounting threads are on the left side (seen in flight direction).

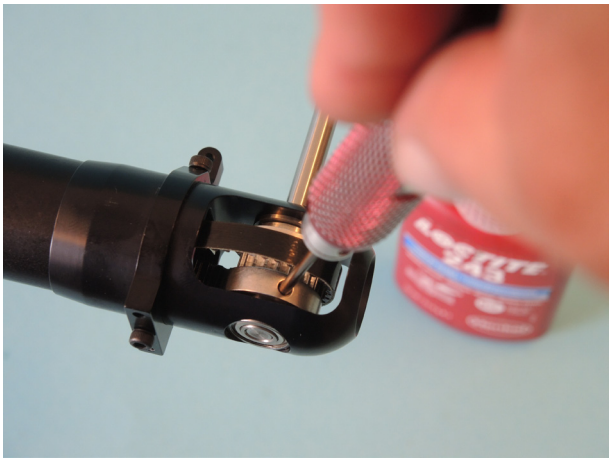
Push the tailrotor shaft D245 from the right side into the tailrotor housing as far that the distance washer D646 can be placed on the shaft end with the flanged side to the ball bearing. Push now the belt wheel into the tailrotor housing. Please note that each spacer shaft is made individually fitting to the tailrotor housing to get zero end play. So do not loose it.



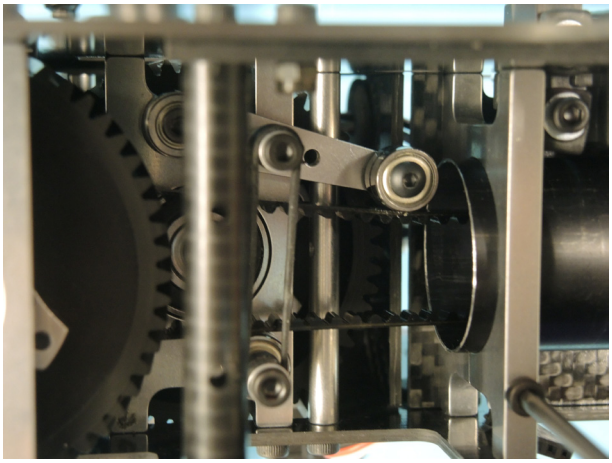
Push the tailrotor shaft thru the tailrotor housing. Note that the flat spot with the bigger distance to the end must be placed on the left side (where the grub screws of the belt wheel are).



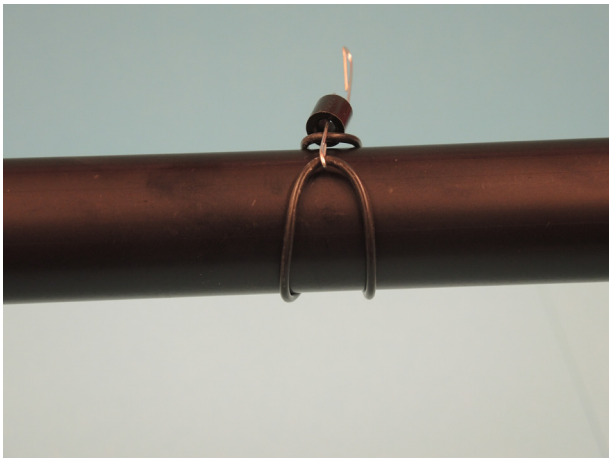
Add a grub screw M4x5 035 using Loctite in the belt wheel thread that is corresponding with the flat spot of the tailrotor shaft. Check that the left end of the shaft is corresponding with the outside end of the ball bearing. After tightening this screw add another screw M4x5 035 in the belt wheel using Loctite and tighten it.



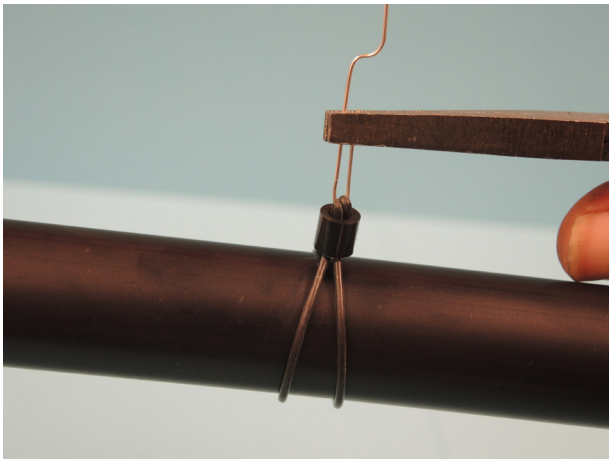
Now tighten the tailbelt. Push the tailboom out of the clamps as long as the belt tighening lever will get about the position shown in then picture. Then adjust the tailrotor shaft rectangular to the mainrotor shaft and tighten the two long hex bolts M3x35 D338 in the tailboom holder clamps using Loctite. Check that the 3mm thick spacers bushes D620a are under the bolt heads. After that tighten the two remaining lower right hex bolts M3x6 D196 of the tailboom clamps using also Loctite.



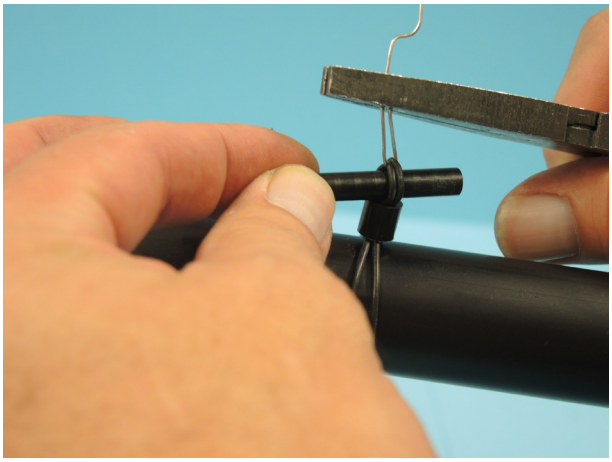
Bend the staple in that way that it can be used for pulling the rubber ring D66 thru the bush D60. Place the two ends of the rubber ring into the staple...



... and pull them with a pliers thru the bush.

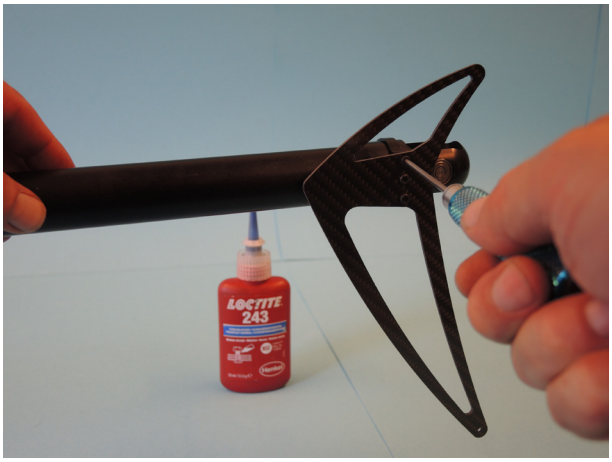


Then push the pushrod guide D59 in the ends of the rubber ring and remove the staple.

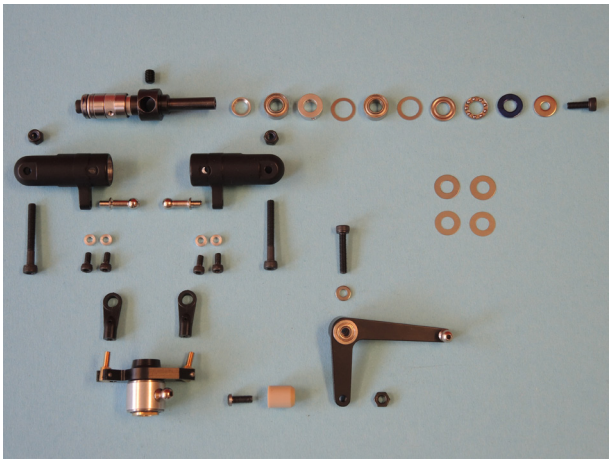


Position the pushrod guides in that way on the tailboom that each free distance is about the same (tailservoarm/guide/guide/ tail bellcrank).

Attach the rudder fin D640 on the rudder fin holder D44 with two hex bolts M3x8 D197 using Loctite.

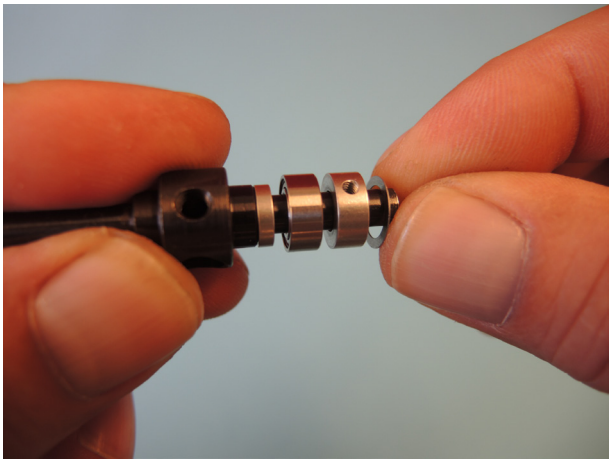


Bag 10: Tailrotor
Parts overbiew



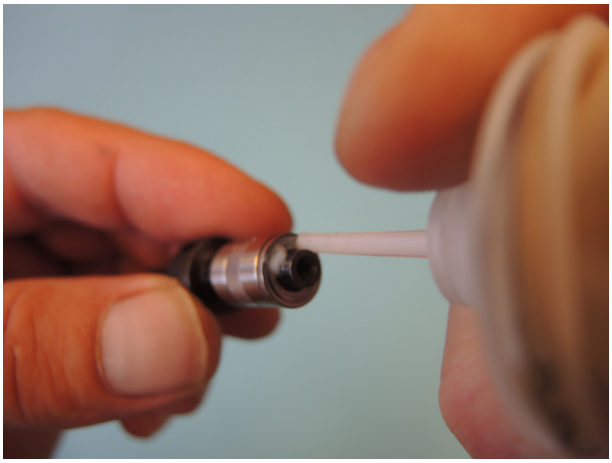
Push a conic spacer bush D256 on the tailrotor hub D255 (cone inside).

Now add a ball bearing 5x10x4 942, the blade grip holder ring 980, a washer shim 7x10x0,2 054...



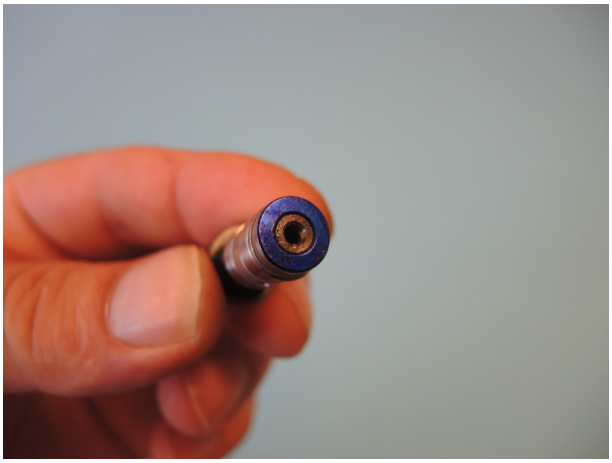
...and another ball bearing 5x10x4 942 followed from another washer shim 7x10x0,2 054.

Add the thrust bearing 5x10x4 112. Begin with the non marked grooved shim with the inner diameter 5.2mm (tilts) and add in the groove a bit of lubrication.



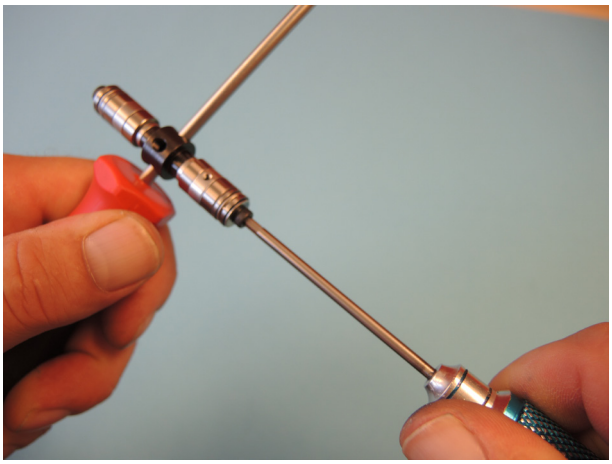
Now push the ball cage on as shown and add also a bit of lubrication on the balls.

Then add the blue marked grooved shim with the inner diameter 5.0mm (does not tilt). The outside should correspond with the end of the tailrotor hub D255.



The unit will be fixed thru a hex bolt M3x8 D197 with a large washer M3 004 and enough Loctite.

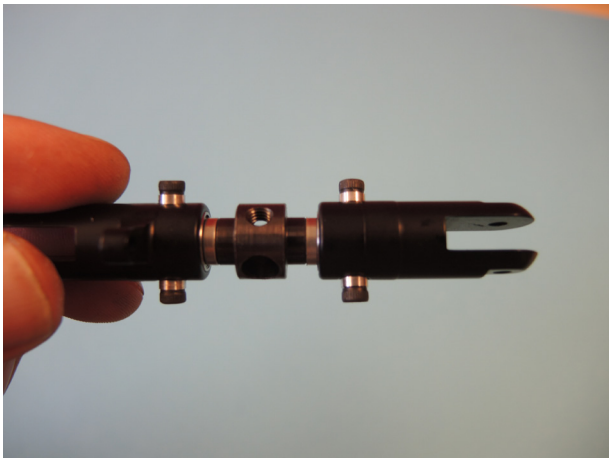
For tightening put in a wrench or a shaft into the center bore of the hub. Recommended torque is 1.5Nm.



Push the tailrotor blade grip 951 on the unit corresponding with the cross holes of the blade grip mount ring 980.

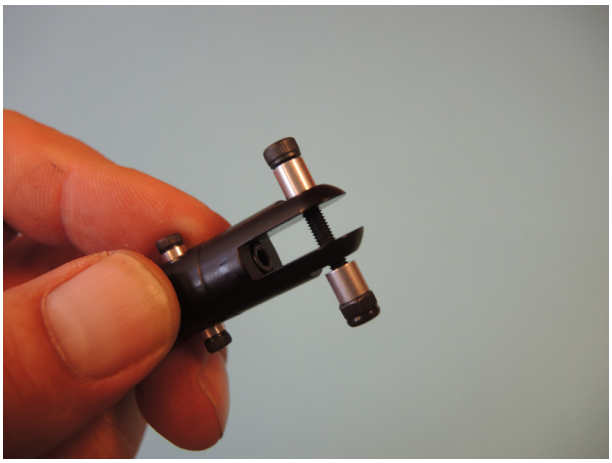
Each blade grip is now fixed with two hex bolts M2,5x5 and distance bushes 988 using Loctite. Before tightening them pull the blade grips outside so that both are corresponding with the screws.

View of the mounted unit. Both blade grips should turn easily and a small end play is recommended to keep both thrust bearing without any load. If this is not the case then disassemble the unit and shorten the conic bushes a bit using a file or sandpaper. If the endplay is too much then use a 0.1mm washer shim that you place between inner bearing and blade grip mount ring.

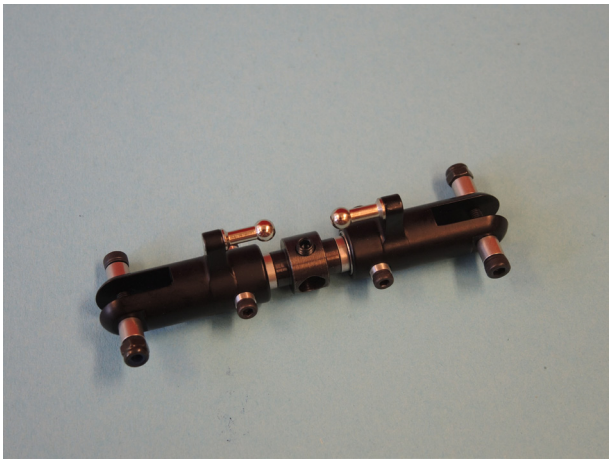


Attach a joint bolt M3x9 078 into each blade grip using Loctite. Recommended torque 1.1 Nm.

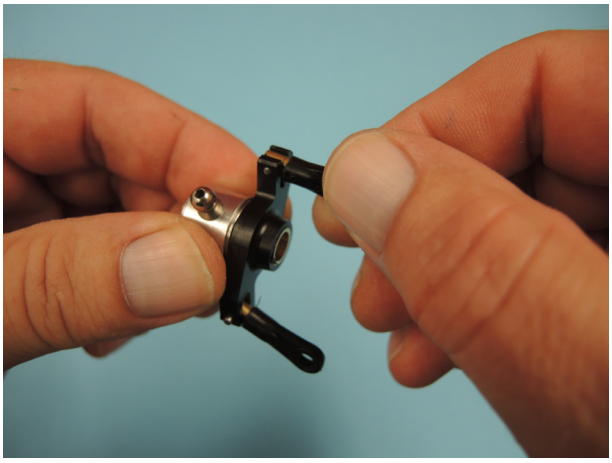
The tailrotor blades will be hold from a hex bolt M3x25 D336, two chinese weights 952 and a lock nut M3 008s.



View of the ready mounted tailrotor.



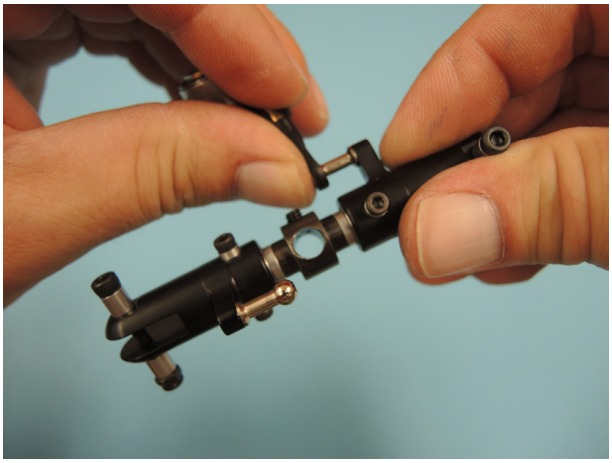
Fully attach two shortened ball joints 385 on the threads of the knuckle joints 382 of the tailslider 1475. They should be positioned so that the numbers on the ball joint should show like placed in the picture on the upper joint to the left side and on the lower to the right.



The bellcrank D49 is attached with a ball guide bush D288 and a special lense screw 092 using Loctite.

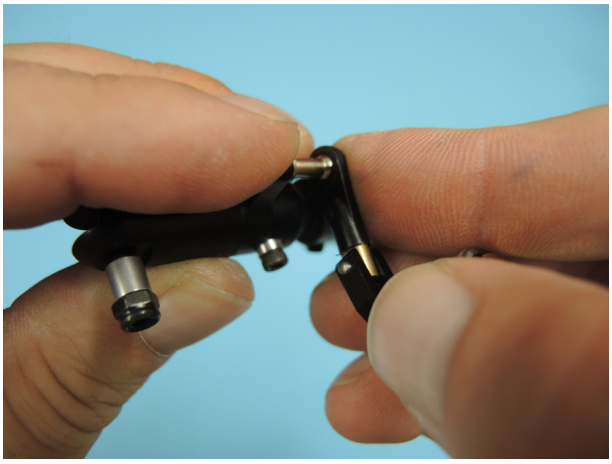
On the free end of the screw a nut D547 will be attached using Loctite.

Push the first ball joint on one joint bolt and check the clearance.

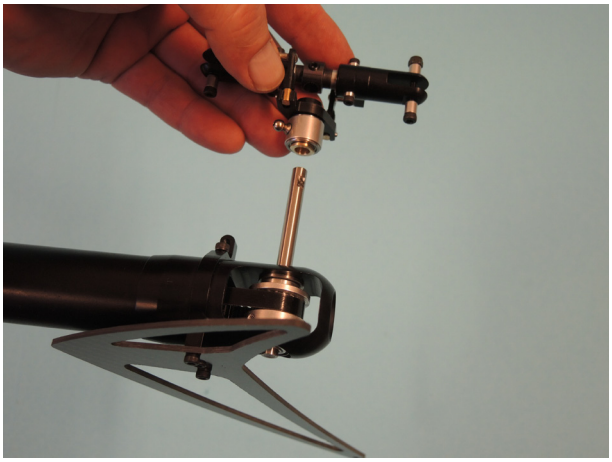


If the ball joint is too tight then press gently with a blunt pliers on the outside of the (mounted) ball joint as long as it is free enough. Do this step careful in small steps. If you press too much in one step you could get play on the joint that is not more to elimante.

Now add the second ball joint on the other (!) joint bolt and remove then (to avoid changing) the first ball joint from the ball. Do the same procedure again. It is important that both pairs must be kept as pairs and should not be changed.



Push now tailslider and tailrotor onto the shaft that the outer end of the tailrotor hub corresponds with the end of the tailrotorshaft. The tailslider should move free. If the tailrotor is difficult to push on the shaft then turn it 180 degree using the other side of the center bore.

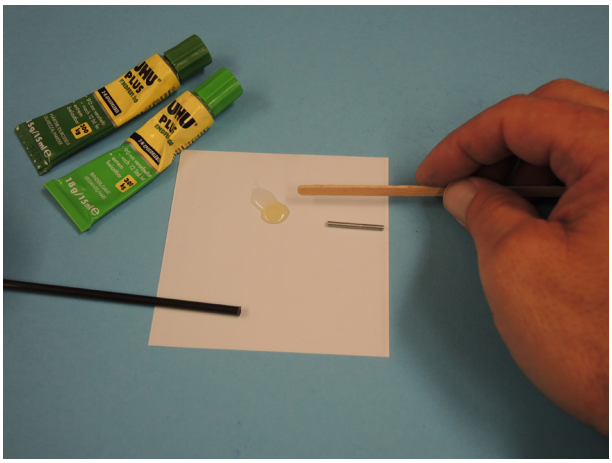


Adjust the tailrotor on the shaft in that way that the threaded M4 hole of the tailrotorhub is corresponding with the flat spot on the tailrotorshaft. Tighten now the unit with a grub screw M4x5 035 using enough Loctite.

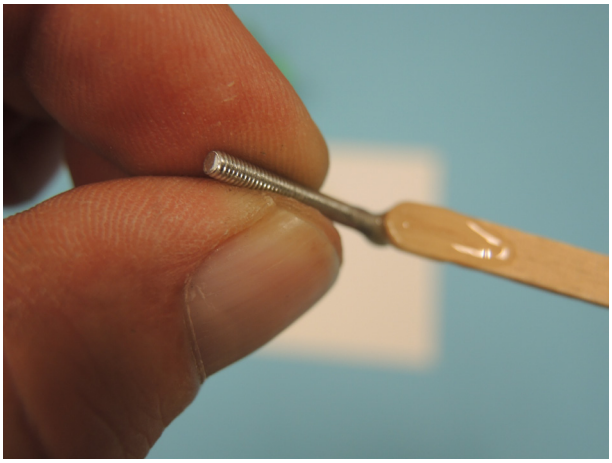
Push a hex bolt M3x16 D329 thru the bearings of the bell crank D49 and add a washer shim 3x6x1 051and apply some Loctite on the thread...

... and mount the bellcrank on the rudder fin holder D49. Note that the ball of the tailslider 1475 must be pushed into the ball guilde bush D288.

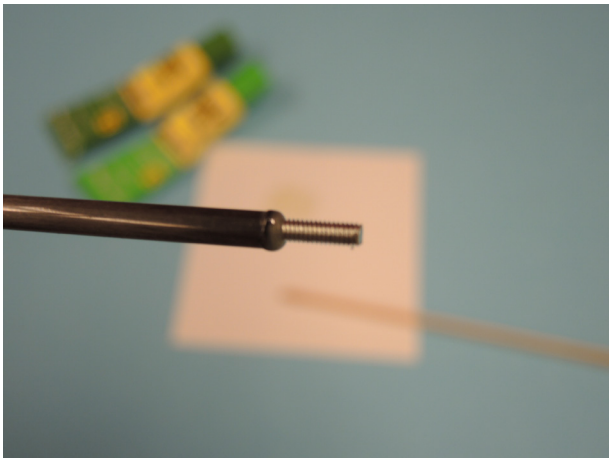
For mounting the threaded ends 087 on the tail pushrod 0350 mix some JB Weld.



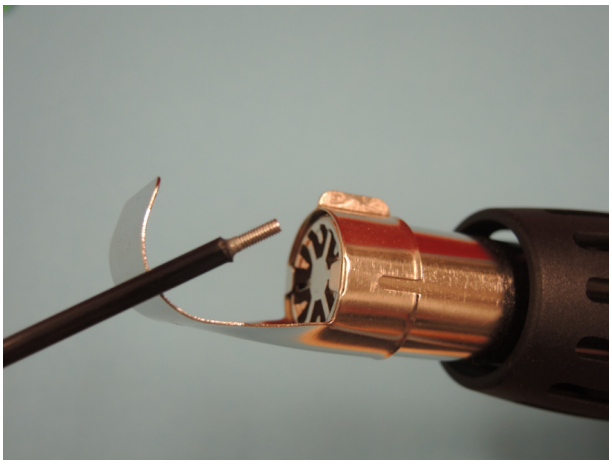
Apply the resin on the side of the first threaded end that was cutted with a saw. and put also a bit of resin into the hole of the tail pushrod.



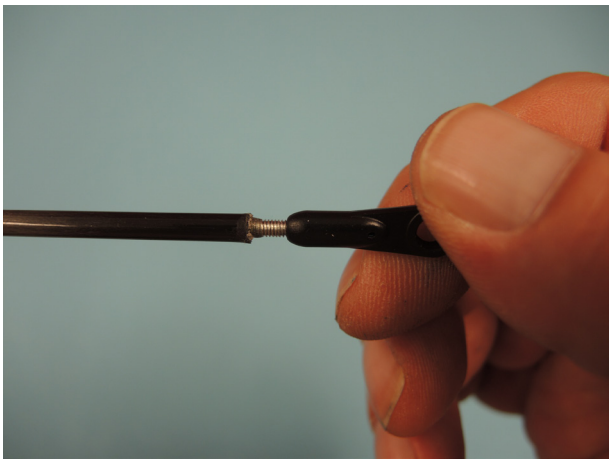
Push the threaded end into the pushrod so that about 7-8mm free end should be out. Remove the unnecessary resin careful.



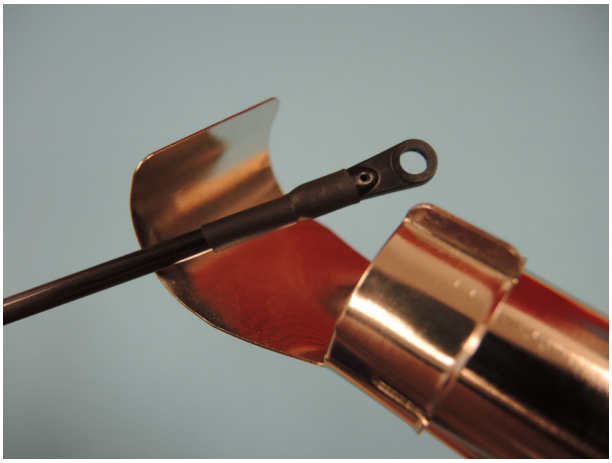
If you use long time hardening resin you can speed up the hardening using a heat gun or a hairdryer. Therefore only the threaded end should be heated, not the carbon rod. Check that the threaded end does not move during hardening because the resin will become very liquid for a short time.



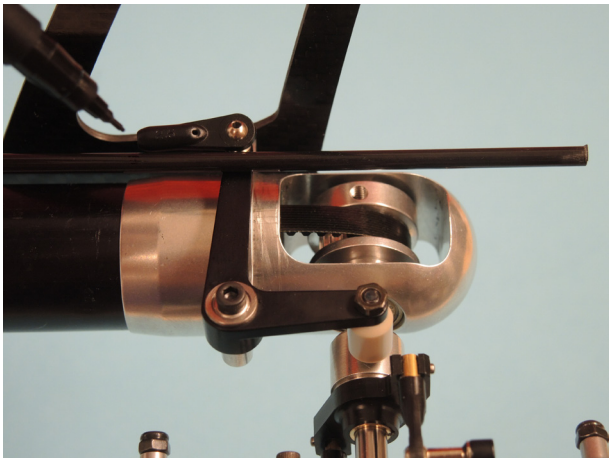
After the resin has hardened turn a ball joint 041 fully on the thread.



Add a pice of shrink tube on the ball joint and the carbon rod to enlarge stiffness. This side of the tail pushrod is later placed at the rear end (on the bell crank D49).



Push the tail pushrod into the pushrod holders D59, push the ball joint on the ball of the tailservo arm and adjust the arm rectangular. Attach a ball joint 041 on the bellcrank D49 and adjust the bellcrank also rectangular following the inner contour of the bellcrank.Now place a mark with a thin felt marker about 1mm before the end of the ball joint and remove the pushrod again.

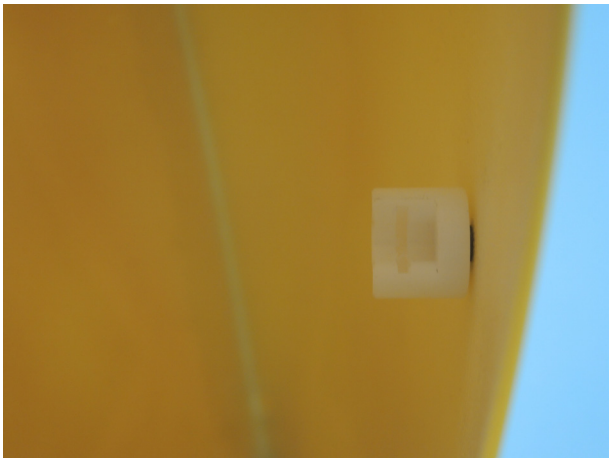


Cut the tail pushrod with a Dremel or a similar fast turning tool and attach now the second threaded end in the pushrod on the same way.

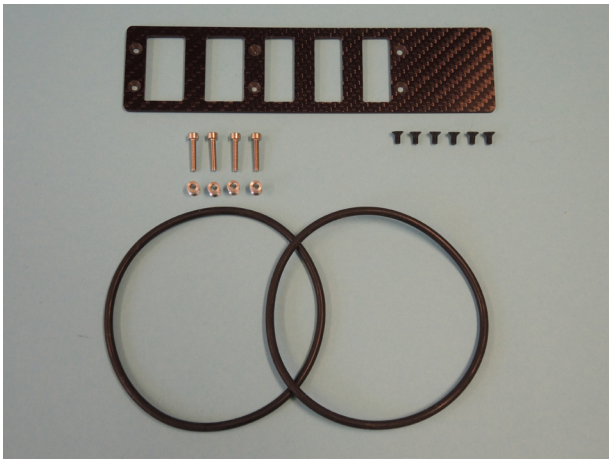
After hardening push the tail pushrod from behind in the pushrod holders D59 and turn a ball joint 041 at the front side on. The numbers on the ball joints must show away from the servoarm and the bellcrank.

Press in the front holes of the canopy on each side a lense screw D99 with large washers M3 004 and add inside a washer shim 3x6x1 051.

Then add a front canopy holder 168 from inside. In the rear canopy holes press two rubber grommets D74 in.



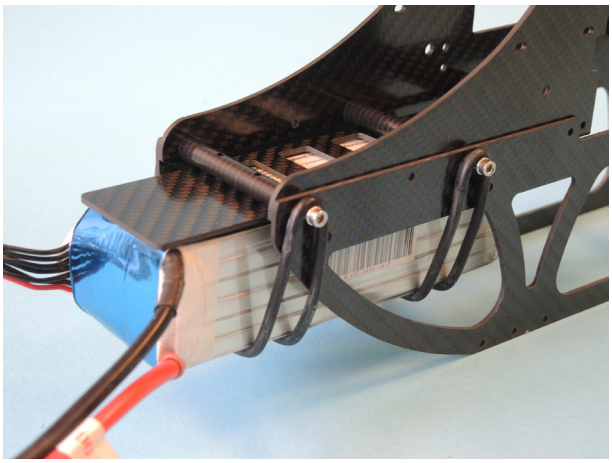
Battery mounting set „single battery with O-Rings“
alternatively, parts overview



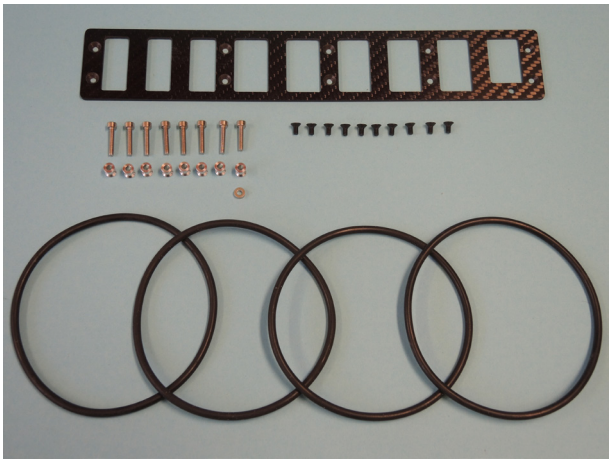
The mounting set „single battery with Velcro tapes“ contains a shorter battery plate that is mounted more to the front and only two Velcro tapes.

Typically a single battery is a 6-8s battery and a double battery is a 10-12s battery.

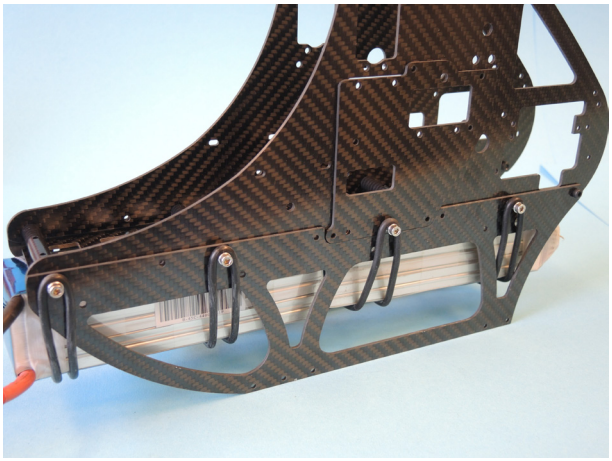
The battery plate D650 is attached with six countersunk screws M3x6 975 on the frame connectors D626. The two front frame connectors are attached outside with a O-Ring holder D57 and a hex bolt M3x16 D86. The battery, f.e. 6s/5000, will be mounted with two O-rings D127. For protecting the O-rings the lower front area of the lower frames should be rounded a bit.



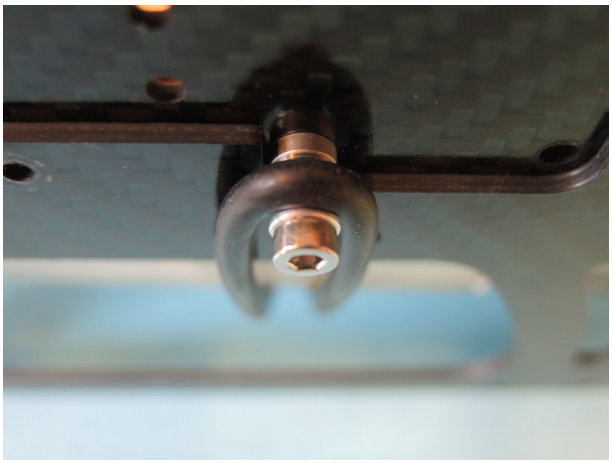
Battery mounting set „double battery with O-rings“
alternatively, parts overview



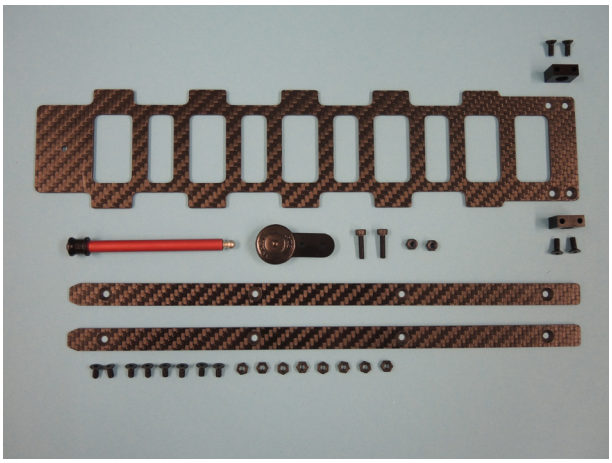
The battery plate D651 is attached with ten countersunk screws M3x6 975 on the frame connectors D626. The two front and the rear frame connector are attached outside with O-ring holders D57 and hex bolts M3x16 D86. The battery, f.e. 10s/4000, will be mounted with four O-rings D127. For protecting the O-rings the lower front area and the rear cutouts of the lower frames should be rounded a bit.



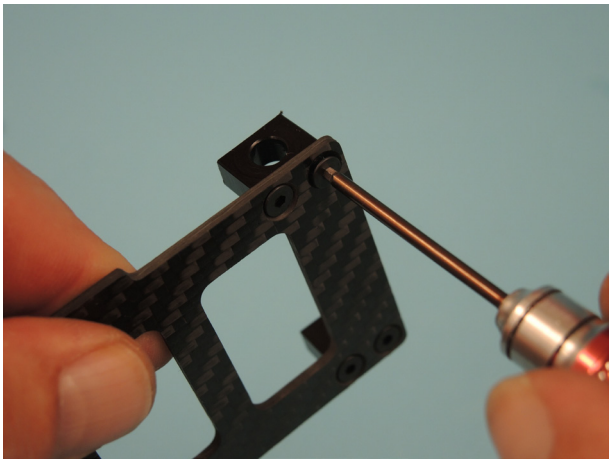
The third O-ring mounting point is attached on the left side with a O-ring holder D57 and a hex bolt M3x14 D85 using Loctite. For the connection on the right side as shown in the picture a hex bolt M3x16 D86, a O-ring holder D57 and a spacer bush 2mm D79 using Loctite are attached.



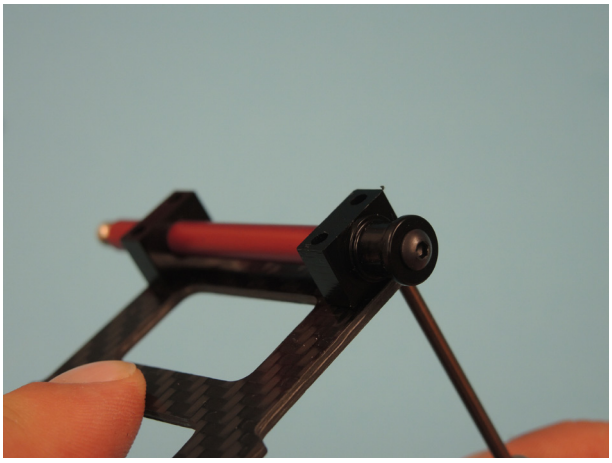
Battery mounting set „battery tray for 10-12s“
alternatively, parts overview



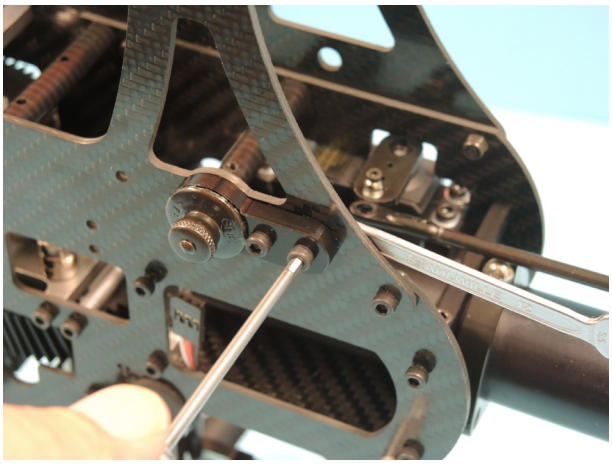
Attach on the battery plate D652 two holder eyelets D456 with four countersunk screws M3x8 025.



Push the holder pin D653 in and check for easy moving. Otherwise adjust the parallel position of the eyelets on the battery plate.

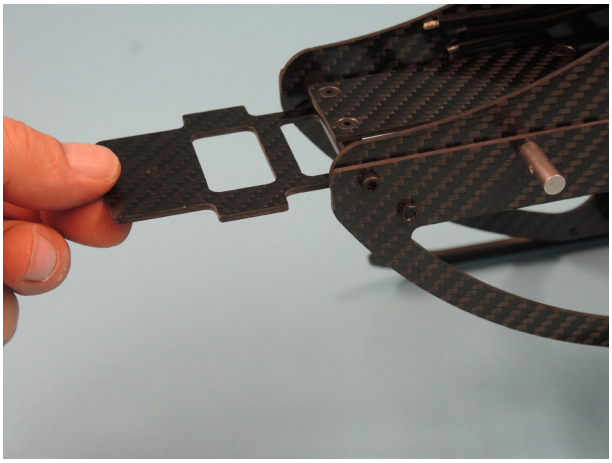


Attach the Tenax holder D460 with two hex bolts M3x12 D119 and lock nuts M3 008s on the lower right frame D625.

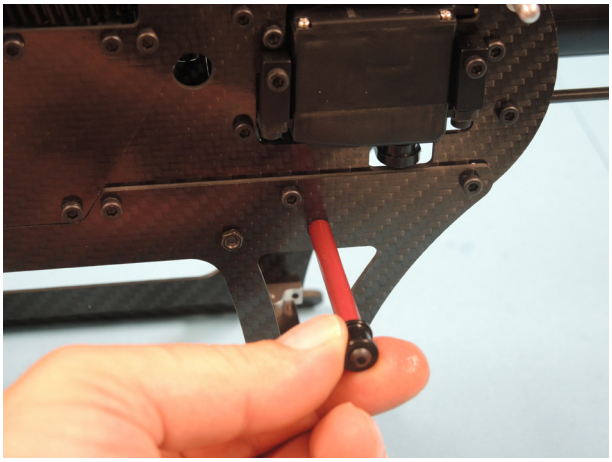


Mount two battery rails D437 with four countersunk screws M3x6 975 each and nuts D547on the lower frames using Locti-te, but still keep them loose.

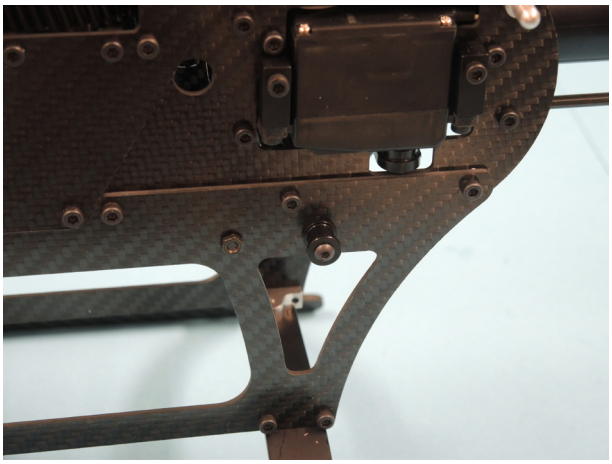
Push the battery plate D652 into the slot and check for clearance. After correcting the best position of the rails in the long holes of the lower frames tighten the screws.



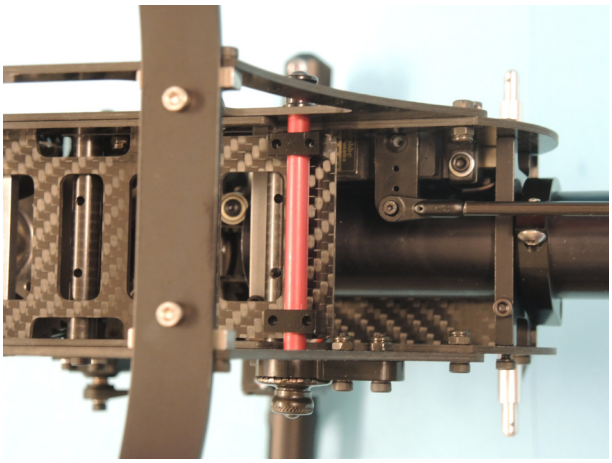
Push the battery pin in from the left side. Check the right position of the battery plate as long as the pin fits into the eyelets D456.



Then push the battery pin fully in as long as you hear a „clack“.



View of the mounted bolt.



View of the front area with the battery rails.