



Goblin 700 Manual

## **Goblin 700 Manual**

Release 2.0 - June 2012

SAB HELI DIVISION S.R.L.

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47030 San Mauro Pascoli (FC) - ITALY



# The Latest News For Goblin700



SAB HELI DIVISION

## New standard equipment for the Goblin 700

Life is an evolution, and as with life our helicopter changes. Not in a big way, but we feel these changes to the standard equipment included with the Goblin 700 will enhance your experience with the helicopter. The only mandatory upgrades for existing kit owners are the new 37T pulley (H0101-S), which has been available for some time, and the new shouldered M2.5x19 SHCS (HC033-S).

**01**

### New 21T Motor Pulley (H0015-21-S) (Note: Refer to page 13 of the manual for detailed assembly information.)

Originally, the Goblin was offered with a 21T motor pulley. After extensive testing we believe the gear ratio offered by using a 21 tooth motor pulley fits better with the most popular motor Kv choices being made. Of course, there are still many other pulley tooth counts offered as optional parts to allow you to optimize your power setup. Please refer to page 28 of the manual for updated gear ratio information.

**02**

### New 20T Drive Pinion (H0125-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

This new drive pinion is now made from steel, which affords much improved wear characteristics.

**03**

### New 60T Pulley (H0104-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

Extensive flight experience gained over the previous months has resulted in us making a small change to the 60T autorotation pulley. The changes made will help improve autorotation performance and ensure reliable operation of the one way bearing, even after extended use.

**04**

**04**

### New 37T Pulley (H0101-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

This new 37 tooth front tail drive pulley is now included in new kits in preference to the previous 36 tooth pulley. In addition to providing an increased tail drive ratio (which allows superb tail authority even at low head speeds), the pulley flanges are secured to the sprocket using SHCS. If you are still using the 36 tooth pulley with pressed on flanges, please contact the SAB Goblin distributor in your country for a replacement.

**05**

### New Main Shaft (H0122-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

This new main shaft has been modified to accept our new locking collar (H0020-S, included) which features a M4 securing bolt. The change from a M3 to M4 securing bolt for this collar ensures locking collar integrity even during the harshest of conditions.

**06**

### New M4 Locking Collar (H0121-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

Available separately, this is the new main shaft locking collar utilizing a M4 size attachment bolt, which is included.

**07**

### New Heavy Duty 27T Tail Pulley (H0102-S) (Note: Refer to page 19 of the manual for detailed assembly information.)

This new tail pulley features a series of socket head cap screws which securely fasten the flanges to the pulley sprocket. While the original design was more than adequate, we realize that the permanent security offered by this new system will be appreciated by all.

**08**

### New Socket Head Cap Screw Shouldered M2.5x19 (HC033-S) (Note: Refer to page 11 of the manual for detailed assembly information.)

These new shouldered SHCS offer a large increase in strength compared to the original fully threaded bolts. If you are still using the original fully threaded bolts, please contact the SAB Goblin distributor in your country for replacements.

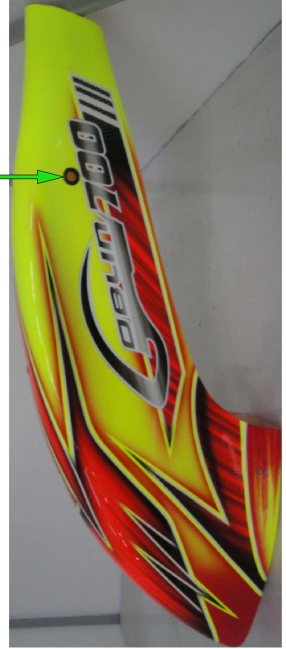
**09**

### New Yellow Landing Gear (H0105-S) (Note: Refer to page 8 of the manual for detailed assembly information.)

Our new yellow landing gear is both aesthetically pleasing and functional. It will give your Goblin even more of a sports car look and feel. Manufactured from high quality carbon fiber, the color matches the stock canopy paint scheme. These will look great on your model.



New Canopy Grommet (HA111-S)



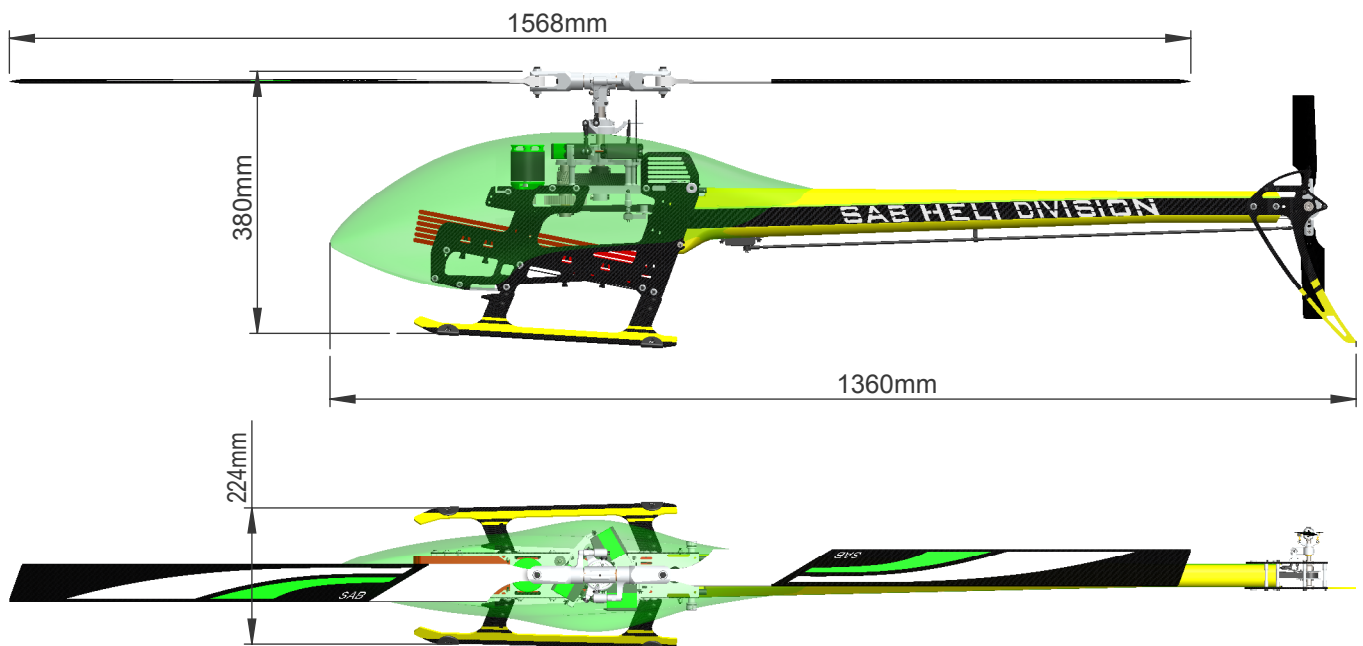
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## INDEX

- |                              |   |                               |
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| 3 – Components and Box       | 9 – Installation of swashplate servos       | <b>15 – In flight</b> ⚠       |
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| 6 – Main rotor               | 12 – Installation of the motor              | 18 – Spare parts              |

## SPECIFICATIONS



Main rotor diameter: 1568mm (with 690mm blades)  
 Main blade length: 690 to 710mm  
 Tail rotor diameter: 296mm  
 Tail blade length: 115mm  
 Main shaft diameter: 12mm  
 Tail shaft diameter: 6mm  
 Spindle diameter: 10mm

Weight including standard electronics: 3290g (excluding batteries).  
 Motor size: Maximum 64mm diameter, maximum height 64mm  
 Battery compartment: 60x58x350mm (adaptable to 64x58x350mm)

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**The Goblin** is a high performance radio controlled helicopter.  
 The design is original, moving away from traditional schemes, searching rationality for simplicity.  
 Our goal was to create a simple, high performance helicopter, with a minimum of mechanical components, and simple maintenance.  
 Please read this user manual carefully, it contains instructions for the correct assembly of the model.  
**Please refer to the web site [www.goblin-helicopter.com](http://www.goblin-helicopter.com) for updates and other important information.**  
 Thank you for your purchase, and have a great time with your Goblin!

SAB Heli Division.

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## IMPORTANT NOTES

- \*This radio controlled helicopter is not a toy.
- \*This radio controlled helicopter can be very dangerous.
- \*This radio controlled helicopter is a technically complex device which has to be built and handled very carefully.
- \*This radio controlled helicopter must be built following these instructions. This manual provides the necessary information to correctly assemble the model. It is necessary to carefully follow all the instructions.
- \*Inexperienced pilots must be monitored by expert pilots.
- \*All operators must wear safety glasses and take appropriate safety precautions.
- \*A radio controlled helicopter must only be used in open spaces without obstacles, and far enough from people to minimize the possibility of accidents or of injury to property or persons.
- \*A radio controlled helicopter can behave in an unexpected manner, causing loss of control of the model, making it very dangerous.
- \*Lack of care with assembly or maintenance can result in an unreliable and dangerous model.

**Neither SAB Heli Division nor its agents have any control over the assembly, maintenance and use of this product. Therefore, no responsibility can be traced back to the manufacturer. You hereby agree to release SAB Heli Division from any responsibility or liability arising from the use of this product.**

## SAFETY GUIDELINES

- \*Fly only in areas dedicated to the use of model helicopters.
- \*Follow all control procedures for the radio frequency system.
- \*It is necessary that you know your radio system well. Check all functions of the transmitter before every flight.
- \*The blades of the model rotate at a very high speed; be aware of the danger they pose and the damage they may cause.
- \*Never fly in the vicinity of other people.

## NOTES FOR ASSEMBLY

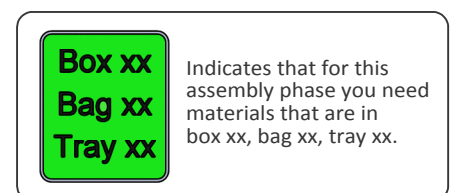
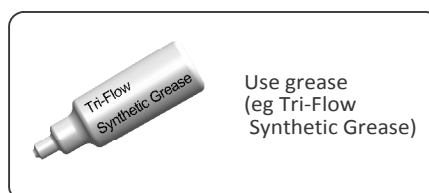
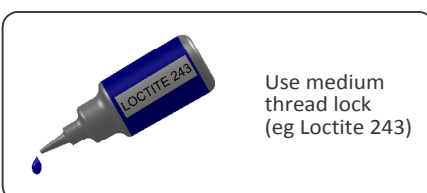
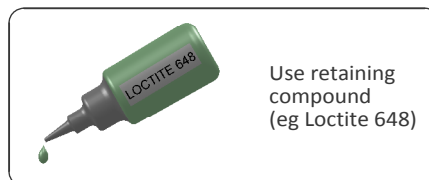
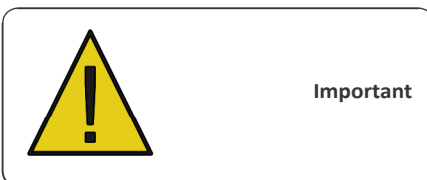
Please refer to this manual for assembly instructions for this model.

Follow the order of assembly indicated. The instructions are divided into chapters, which are structured in a way that each step is based on the work done in the previous step. Changing the order of assembly may result in additional or unnecessary steps.

Use thread lockers and retaining compounds as indicated. In general, each bolt or screw that engages with a metal part requires thread lock.

Factory pre-assembled components have been assembled with all the required thread lock and lubricants, and have passed quality control. It is not necessary to disassemble and re-assemble them.

It is necessary to pay attention to the symbols listed below:







### ADDITIONAL COMPONENTS REQUIRED

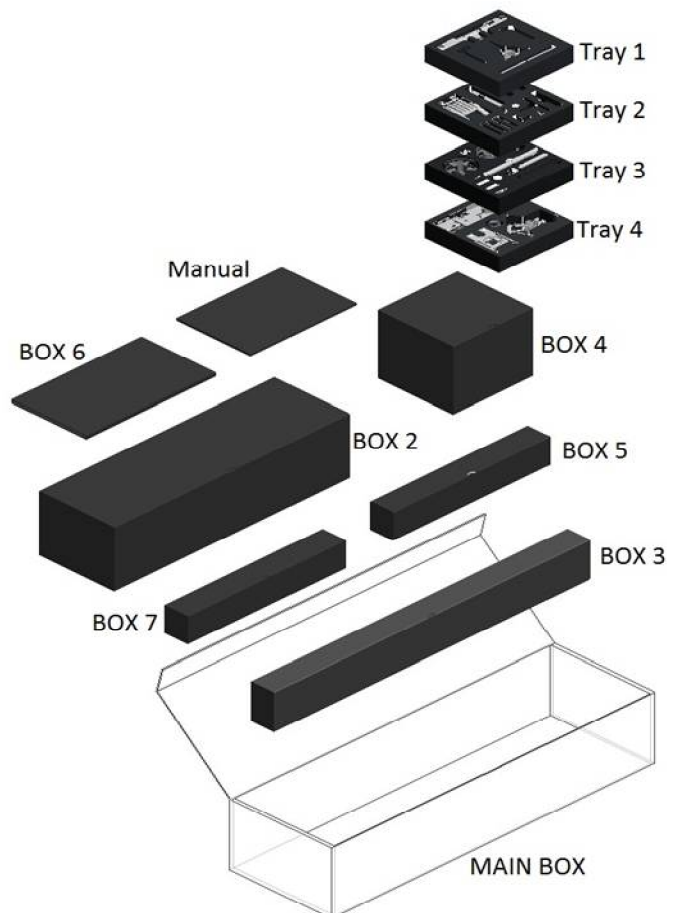
- \*Electric Motor:  
10S-12S – 400-600Kv  
Maximum diameter 64mm,  
Maximum height 64mm, pinion shaft diameter 6mm
- \*Speed controller:  
minimum 120A to be safe
- \*Batteries: 10-12S 4000-5000mAh
- \*1 flybarless 3 axis control unit
- \*Radio power system, if not integrated with the ESC
- \*3 cyclic servos
- \*1 tail rotor servo
- \*6 channel radio control system on 2.4 GHz

(See configuration examples on page 28)

### TOOLS, LUBRICANTS, ADHESIVES

- \*Generic pliers
- \*Hexagonal driver, size 1.5,2,2.5,3,4mm
- \*4mm T-Wrench
- \*5.5mm Socket wrench (for M3 nuts)
- \*8mm Hex fork wrench (for M5 nuts)
- \*Medium threadlocker (eg. Loctite 243)
- \*Strong retaining compound (eg. Loctite 648)
- \*Spray lubricant (eg. Try-Flow Oil)
- \*Synthetic grease (eg. Tri-Flow Synthetic Grease)
- \*Cyanoacrylate adhesive
- \*Pitch Gauge (for set-up)
- \*Soldering equipment (for motor wiring)

### Inside the main box there are:



#### Inside the main box:

- Box 2: Canopy, Blade Holder.
- Box 3: Boom, Blades, Tail blades, Carbon rod.
- Box 4: Mechanical parts in 4 trays:  
Tray 1: Main rotor  
Tray 2: Carbon frame and tail rotor  
Tray 3: Transmission  
Tray 4: Main structure
- Box 5: Bags
- Box 6: Carbon parts
- Box 7: Combo Kit (optional)

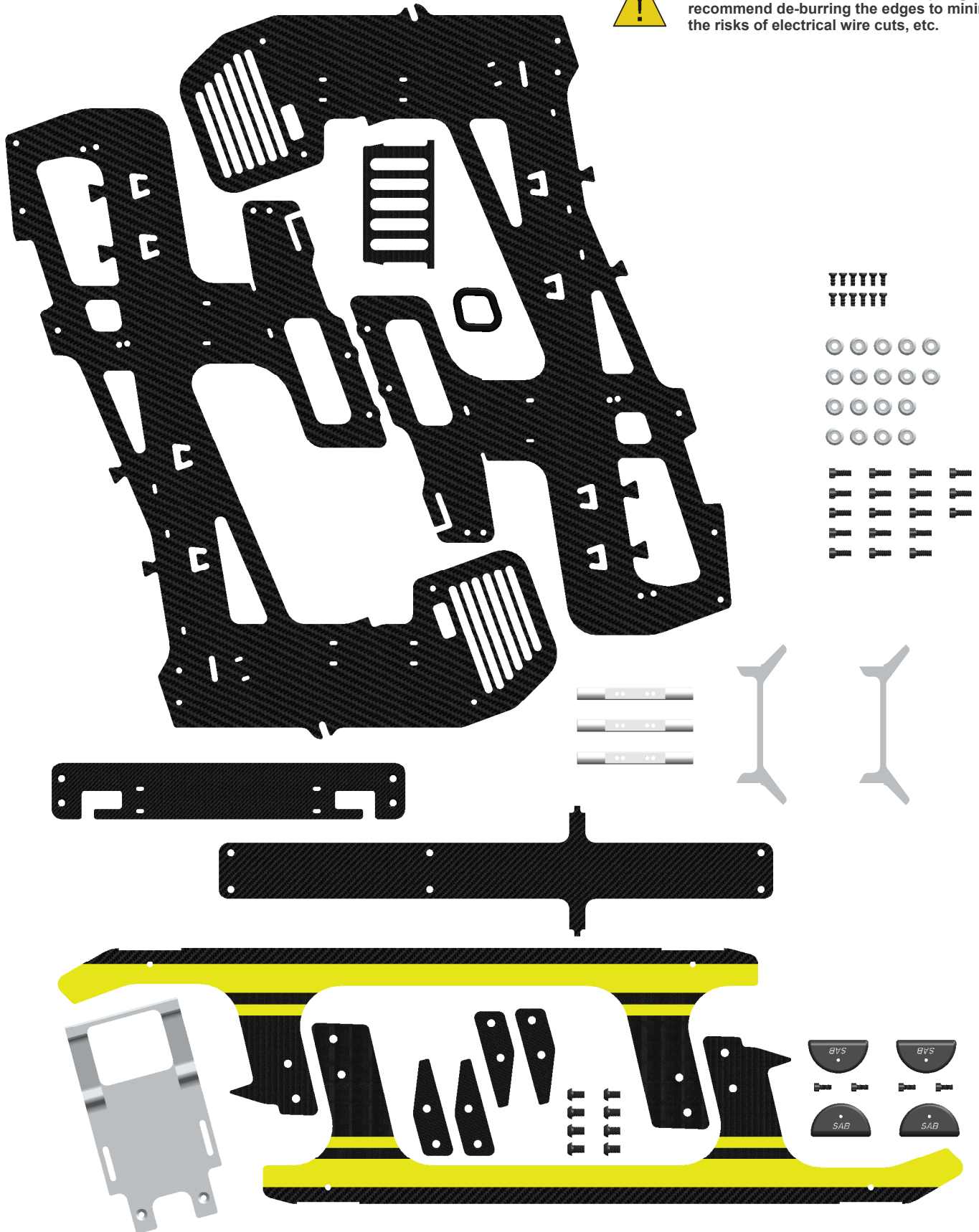
The assembly process is described in the following chapters of this manual. Each phase begins with a green frame which gives the box, the bag with screws (and miscellaneous items), and the foam tray with the components required for the phase.



# 4-Carbon Frame



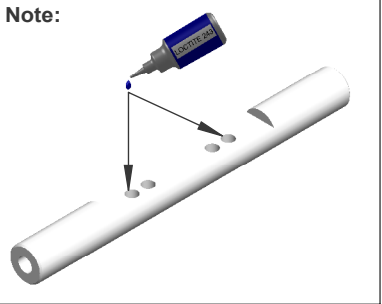
The manufacturing process of the carbon parts often leaves micro-burrs and sharp edges. We recommend de-burring the edges to minimize the risks of electrical wire cuts, etc.





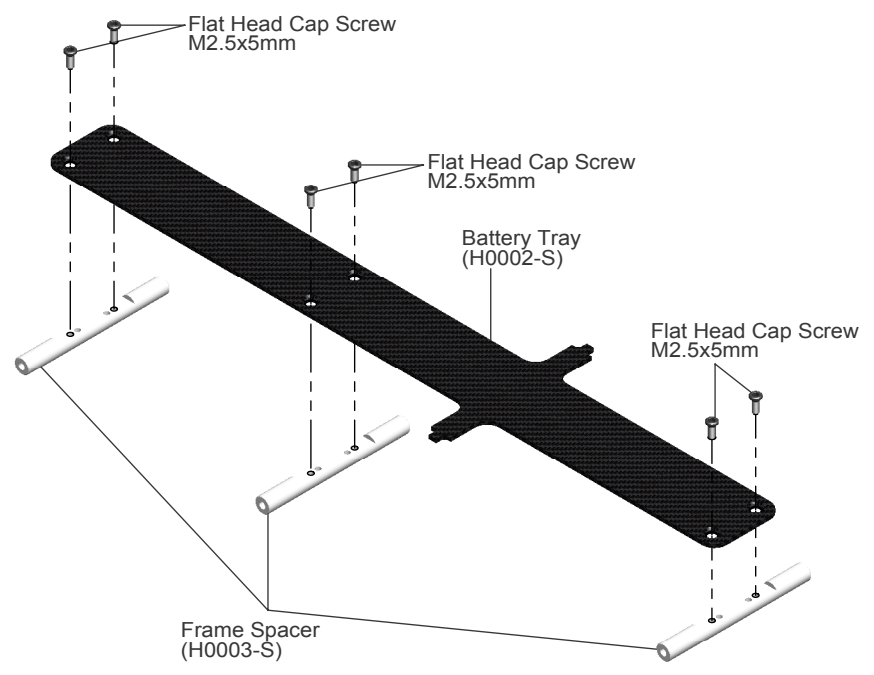
**Box 6**  
**Bag 1**  
**Tray 2**

Frame Spacer x 3

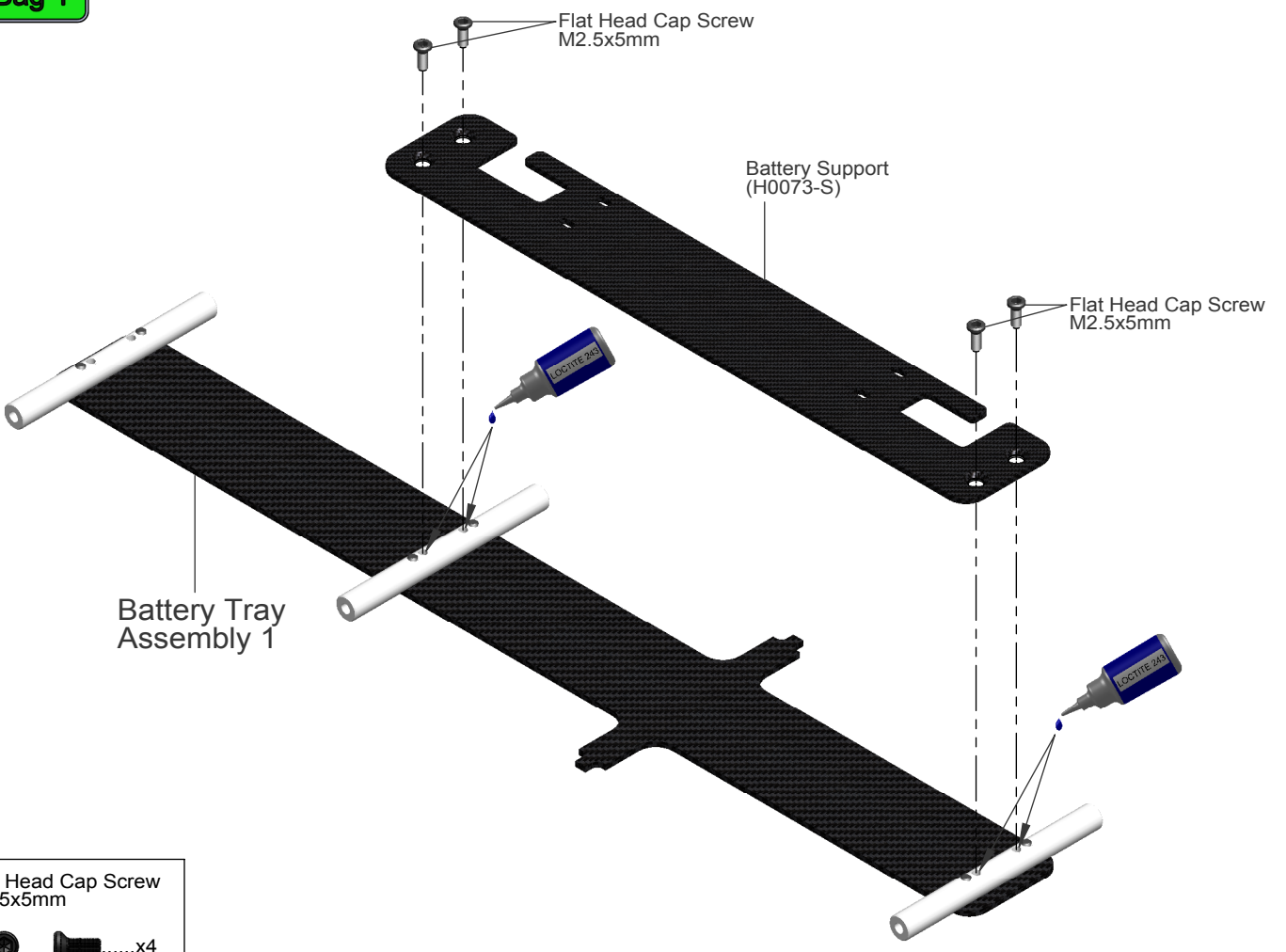


Flat Head Cap Screw  
M2.5x5mm

.....x6



**Box 6**  
**Bag 1**



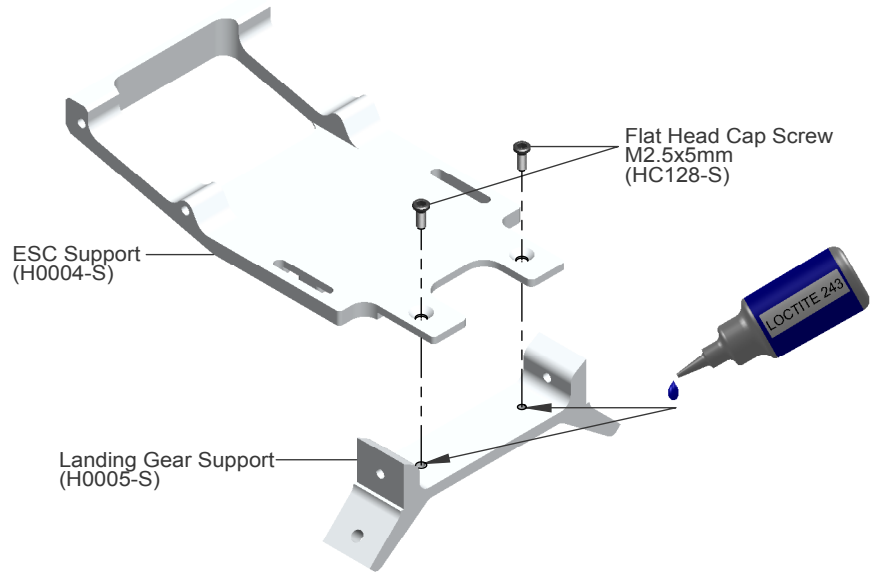
Flat Head Cap Screw  
M2.5x5mm

.....x4





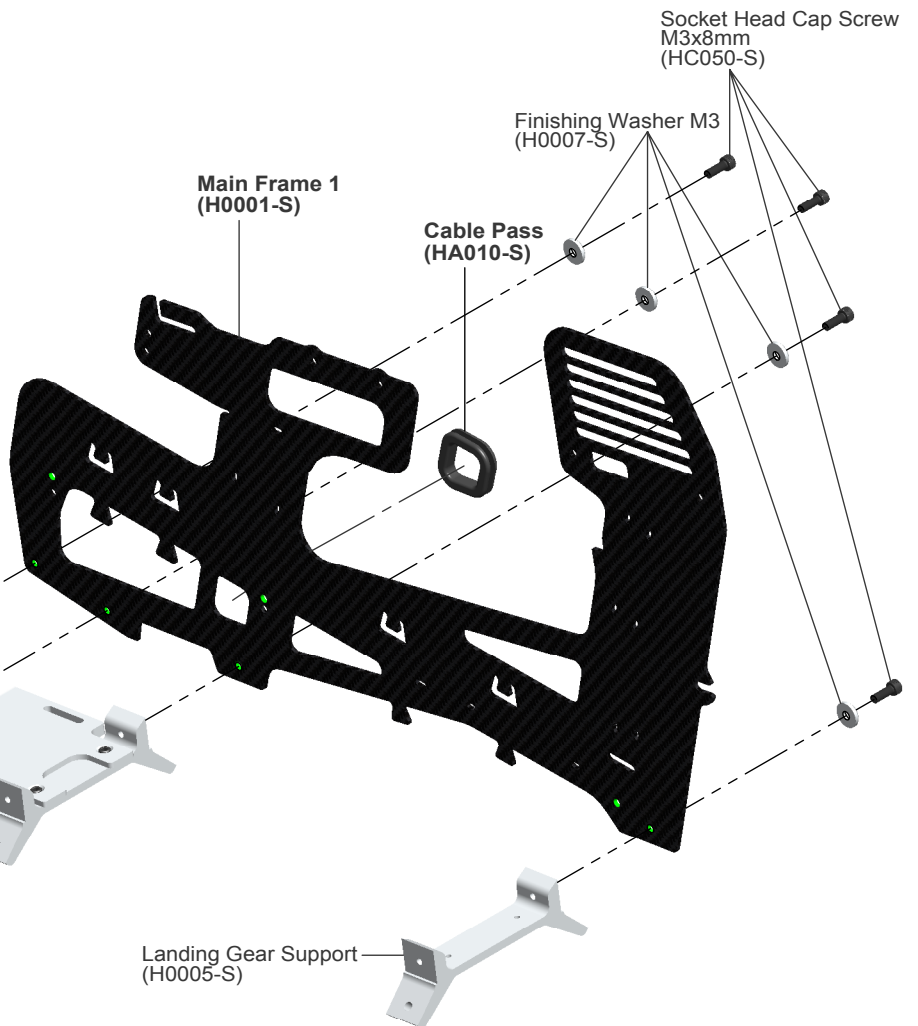
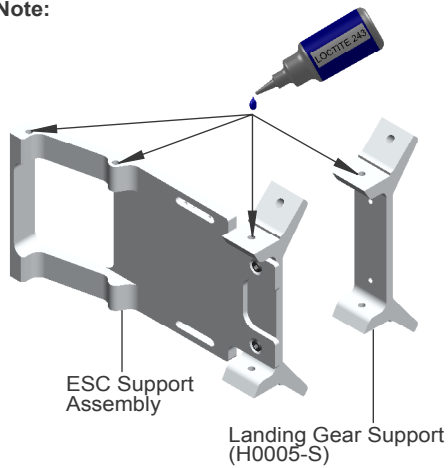
**Bag 1  
Tray 2**



Flat Head Cap Screw  
M2.5x5mm  
 .....x2

**Box 6  
Bag 1  
Tray 2**

Note:

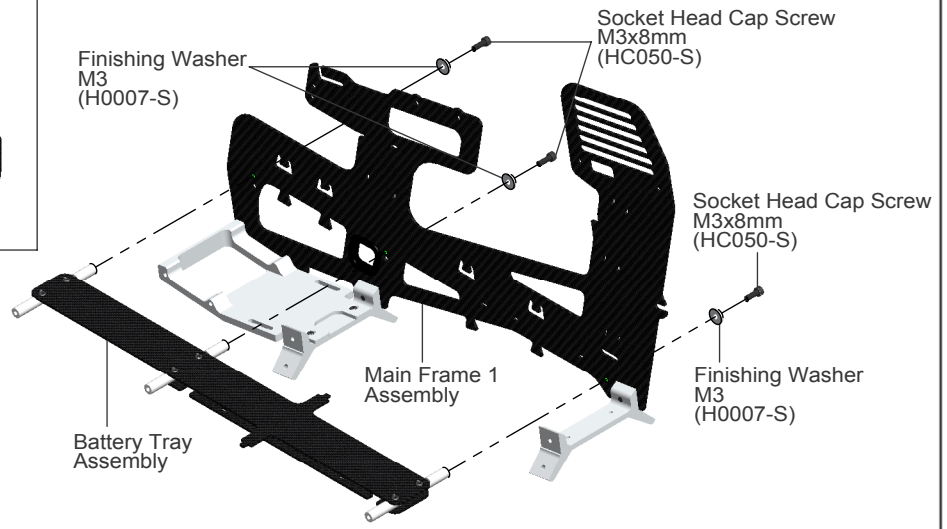
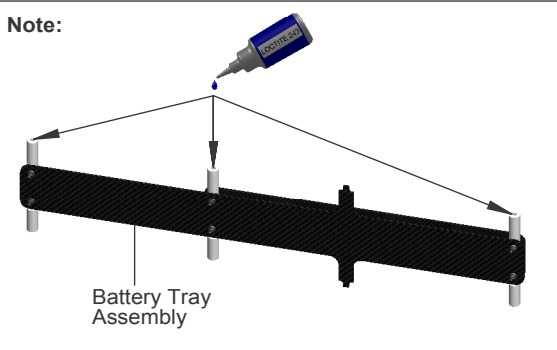
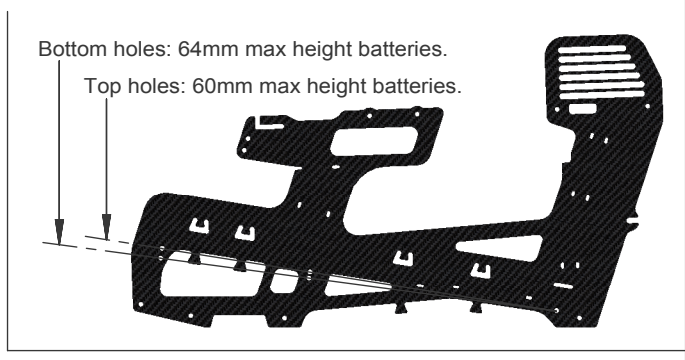


Socket Head Cap Screw  
M3x8mm  
 .....x4

Finishing Washer M3  
 .....x4

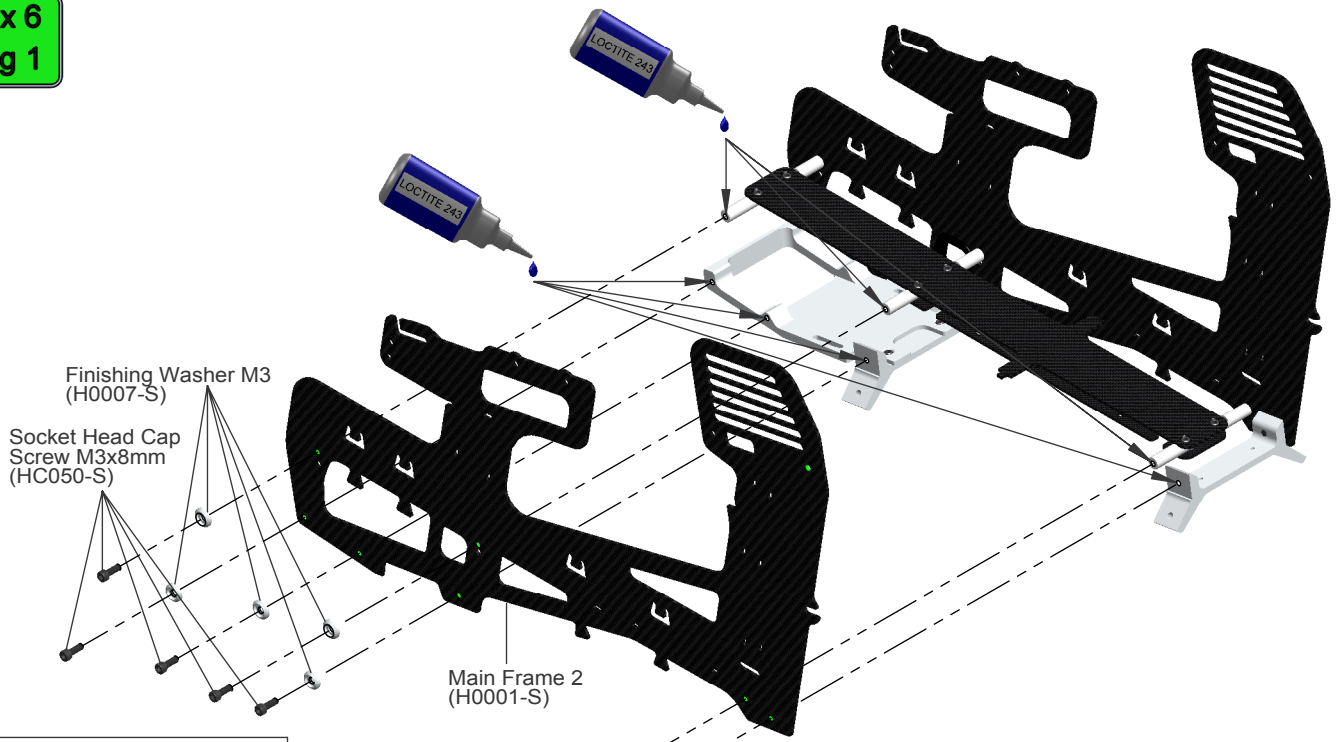


**Bag 1**



- Socket Head Cap Screw M3x8mm
- ..... x3
- Finishing Washer M3
- ..... x3

**Box 6  
Bag 1**



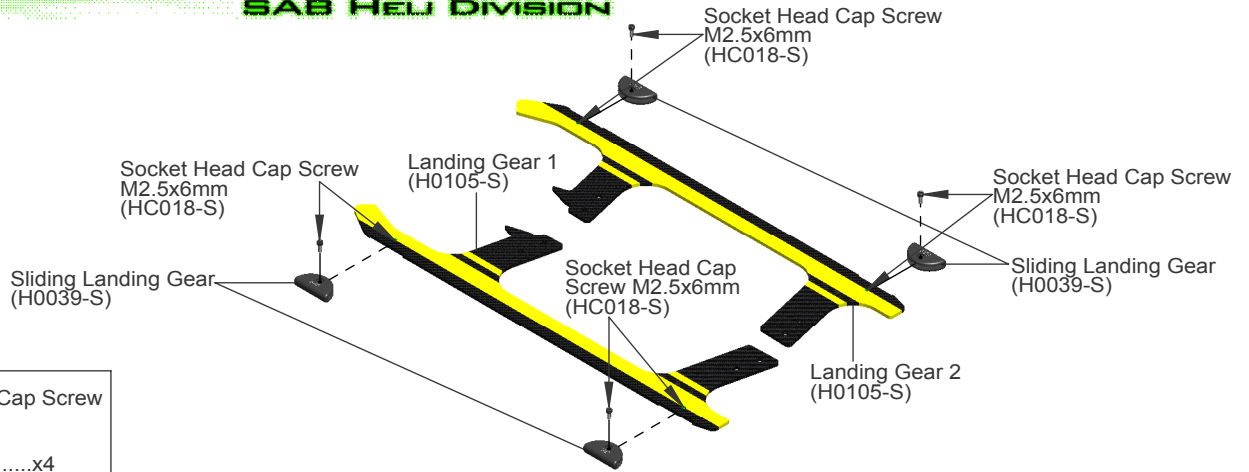
- Socket Head Cap Screw M3x8mm
- ..... x7
- Finishing Washer M3
- ..... x7





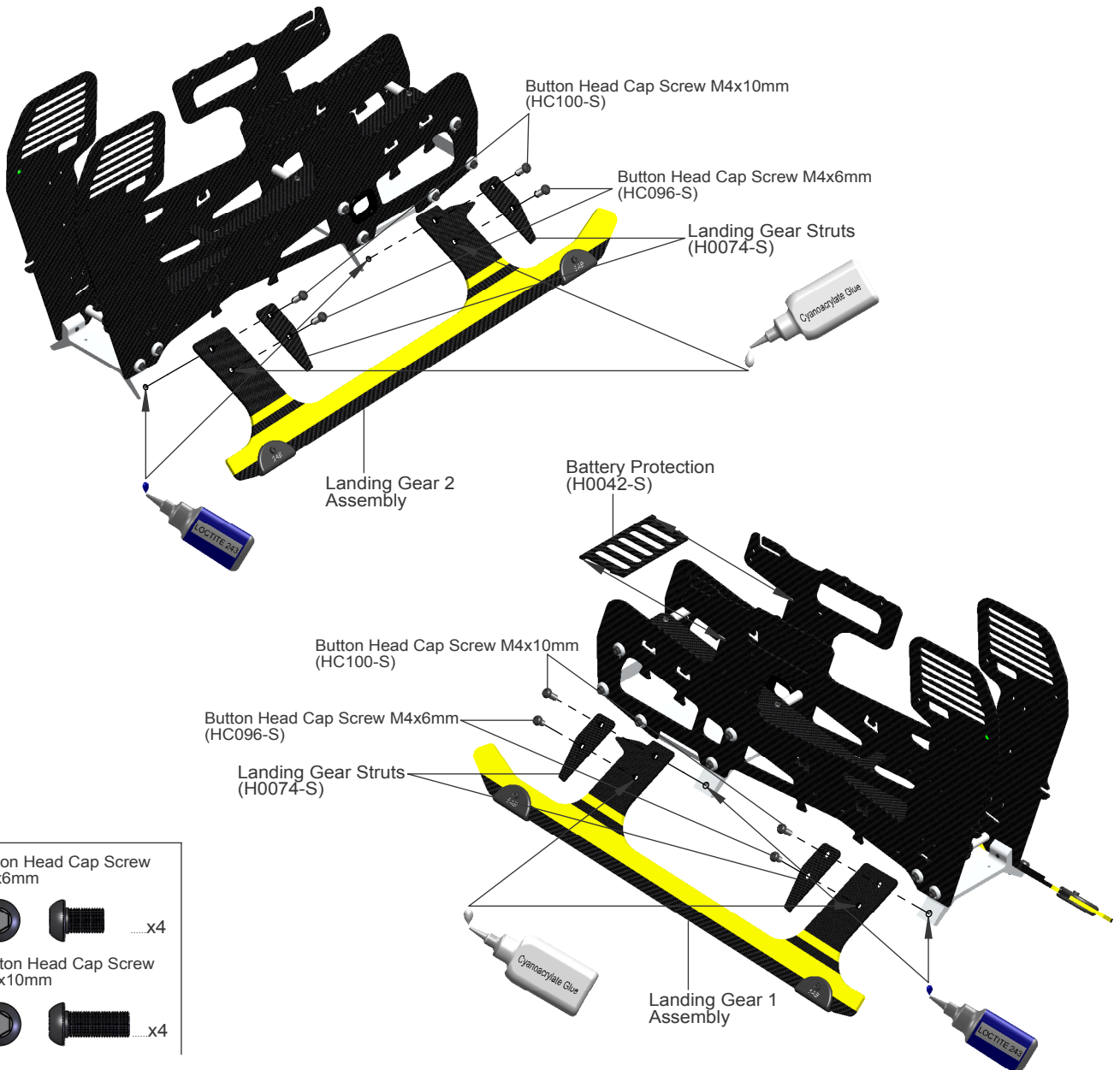


**Box 6**  
**Bag 2**



- Socket Head Cap Screw M2.5x6mm
- 
- .....x4

**Bag 2**



- Button Head Cap Screw M4x6mm
- 
- .....x4
- Button Head Cap Screw M4x10mm
- 
- .....x4



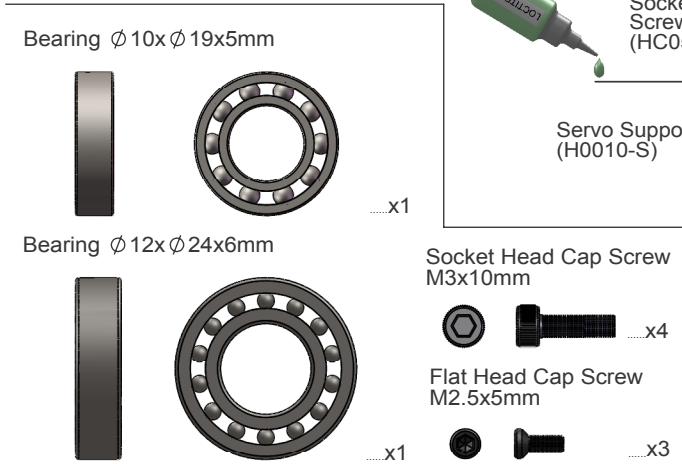
5 - Transmission Assembly





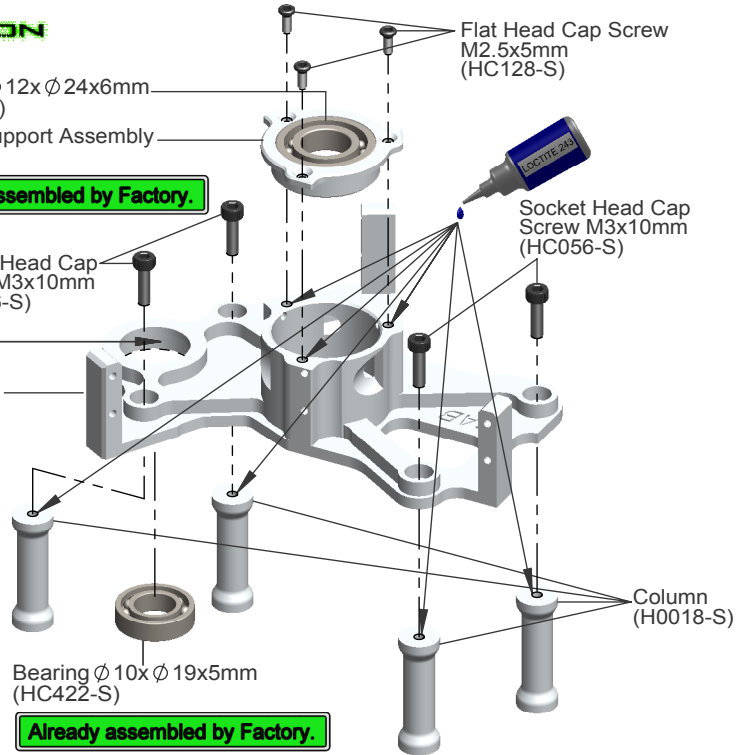
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**Bag 3**  
**Tray 3-4**



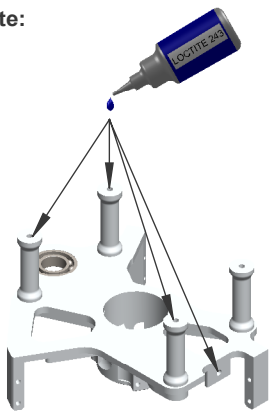
Bearing  $\varnothing 12x\varnothing 24x6mm$  (HC426-S)  
Bearing Support Assembly (H0024-S)  
**Already assembled by Factory.**

Servo Support (H0010-S)



**Box 6**  
**Bag 3**  
**Tray 4**

Note:



**Already assembled by Factory.**

Bearing  $\varnothing 10x\varnothing 19x5mm$  (HC422-S)

Main Structure (H0009-S)

Socket Head Cap Screw M3x10mm (HC056-S)

Socket Head Cap Screw M3x10mm ...x3

Socket Head Cap Screw M3x8mm ...x1

Button Head Cap Screw M3x4mm ...x2

Bearing  $\varnothing 12x\varnothing 24x6mm$  ...x1

Bearing  $\varnothing 10x\varnothing 19x5mm$  ...x1

Finishing Washer M3 (H0007-S)

Socket Head Cap Screw M3x8mm (HC050-S)

Swash plate Anti-Rotation Guide (H0017-S)

Bearing  $\varnothing 12x\varnothing 24x6mm$  (HC426-S)  
**Already assembled by Factory.**

Antenna Guide (H0050-S)

Button Head Cap Screw M3x4mm (HC038-S)

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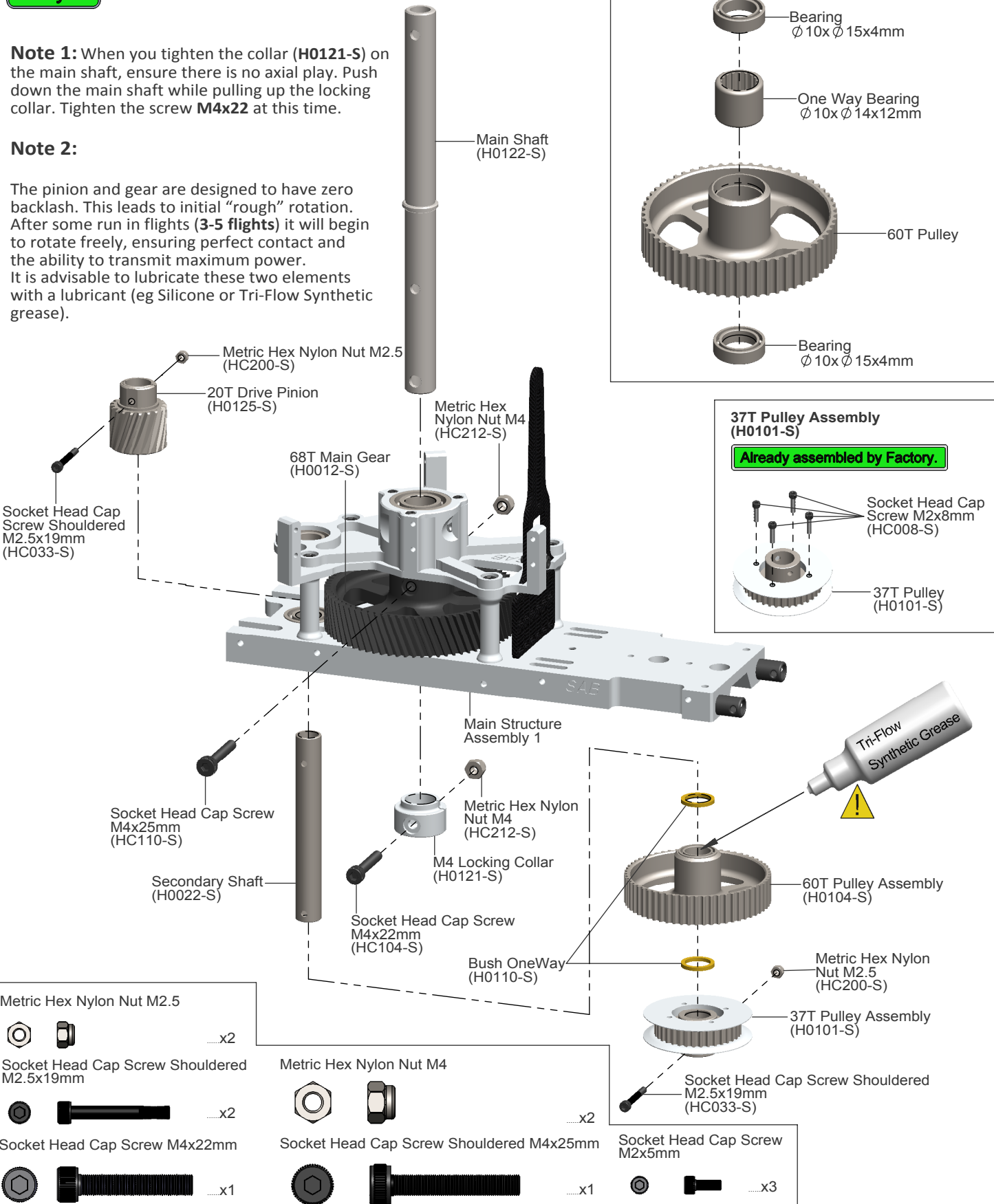


**Bag 4  
Tray 1**

**Note 1:** When you tighten the collar (H0121-S) on the main shaft, ensure there is no axial play. Push down the main shaft while pulling up the locking collar. Tighten the screw M4x22 at this time.

**Note 2:**

The pinion and gear are designed to have zero backlash. This leads to initial "rough" rotation. After some run in flights (3-5 flights) it will begin to rotate freely, ensuring perfect contact and the ability to transmit maximum power. It is advisable to lubricate these two elements with a lubricant (eg Silicone or Tri-Flow Synthetic grease).



Metric Hex Nylon Nut M2.5



Socket Head Cap Screw Shouldered M2.5x19mm



Socket Head Cap Screw M4x22mm



Metric Hex Nylon Nut M4



Socket Head Cap Screw Shouldered M4x25mm



Socket Head Cap Screw M2x5mm



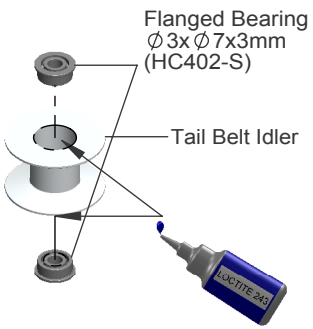




**Bag 5  
Tray 4**

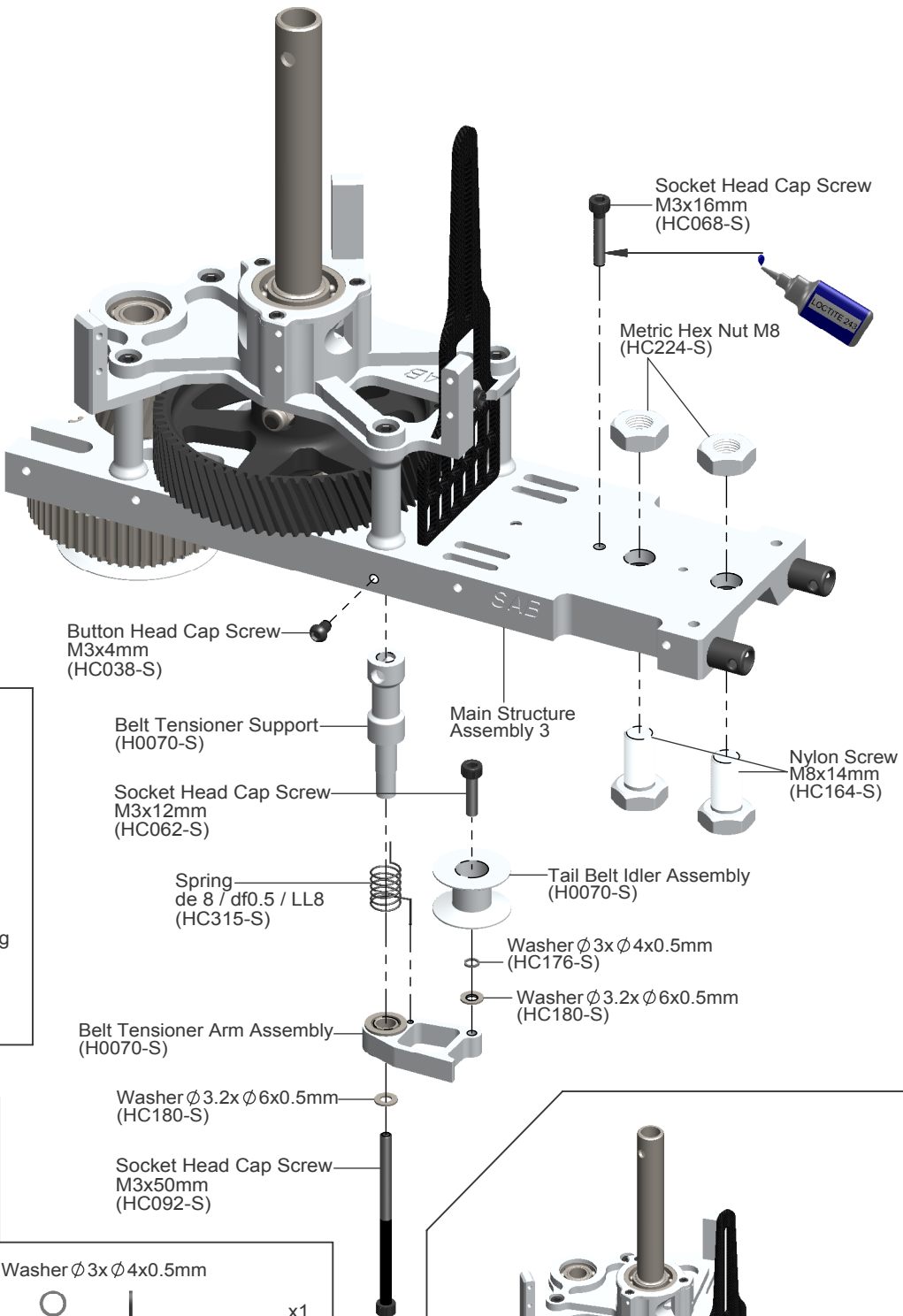
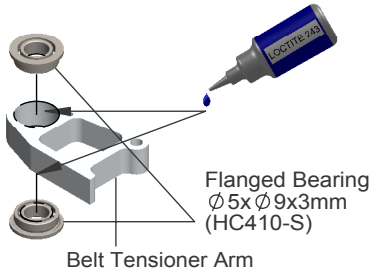
Tail Belt Idler Assembly (H0070-S)

**Already assembled by Factory.**



Belt Tensioner Arm Assembly (H0070-S)

**Already assembled by Factory.**



Button Head Cap Screw M3x4mm



Socket Head Cap Screw M3x12mm



Socket Head Cap Screw M3x50mm



Flanged Bearing  $\phi 5x \phi 9x 3mm$



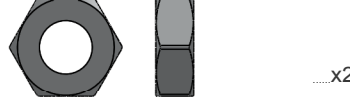
Flanged Bearing  $\phi 3x \phi 7x 3mm$



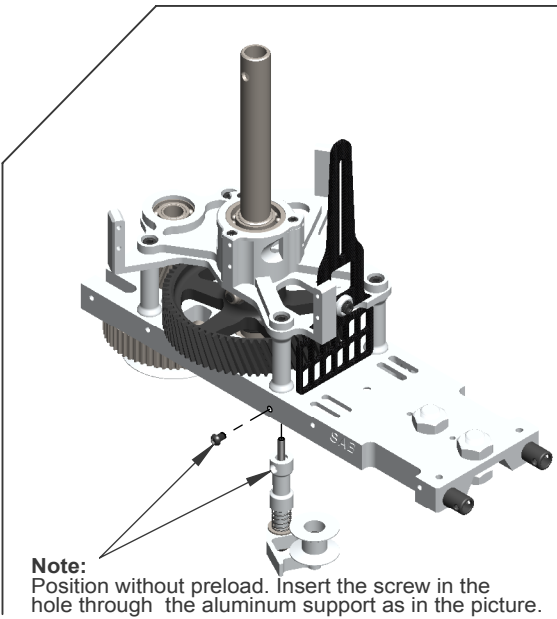
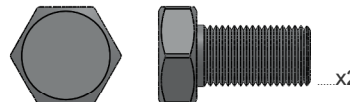
Washer  $\phi 3x \phi 4x 0.5mm$



Metric Hex Nut M8

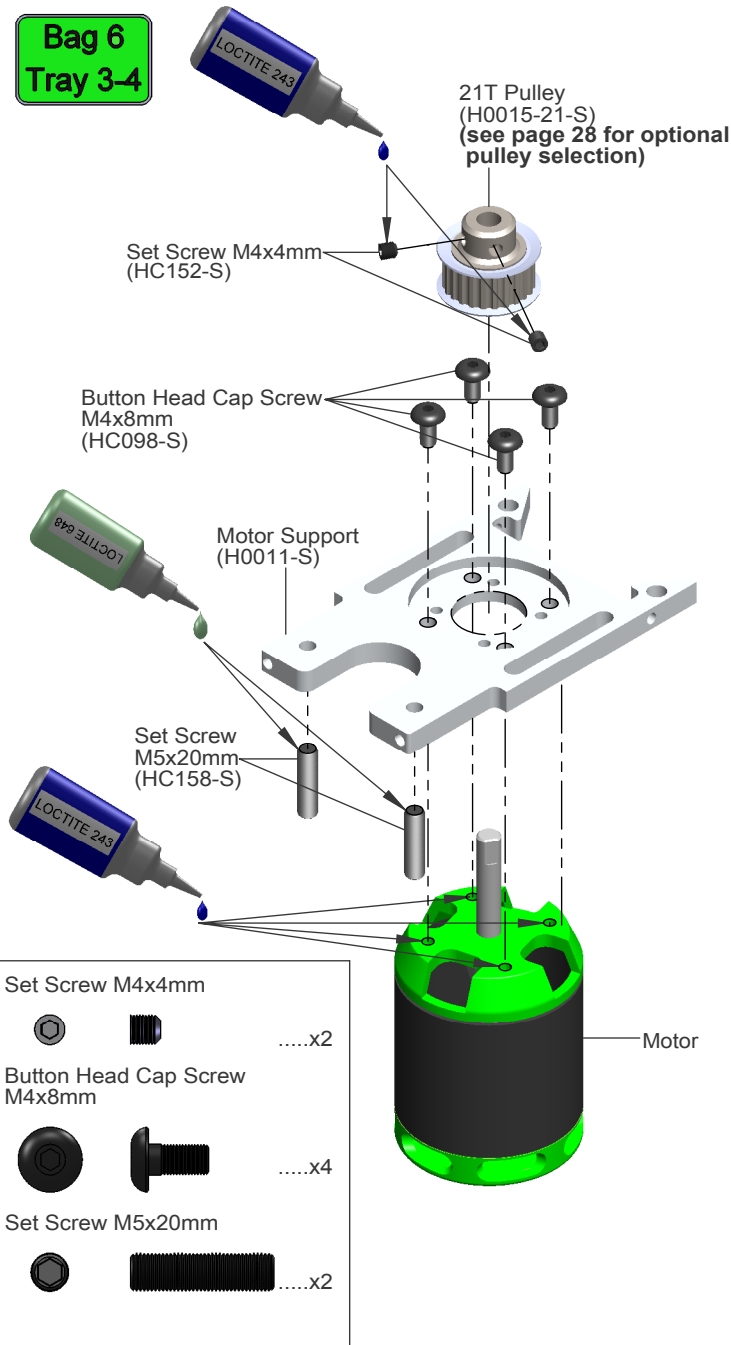


Nylon Screw M8x14mm

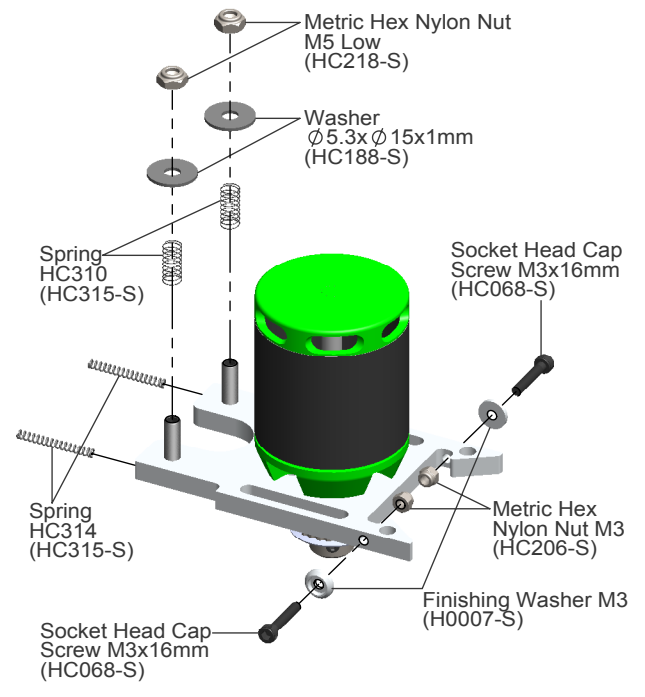




**Bag 6**  
**Tray 3-4**



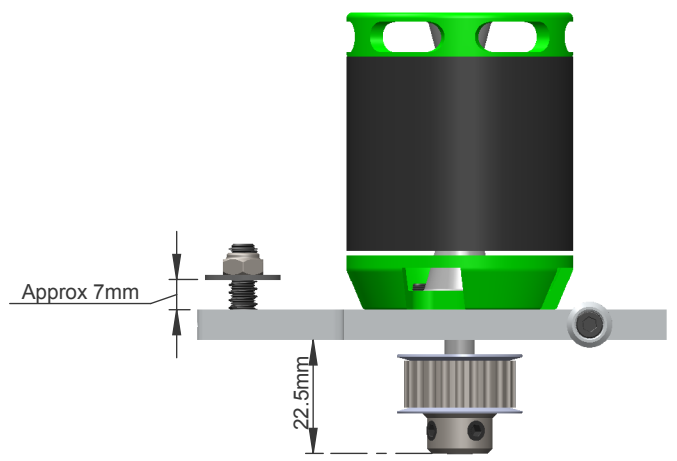
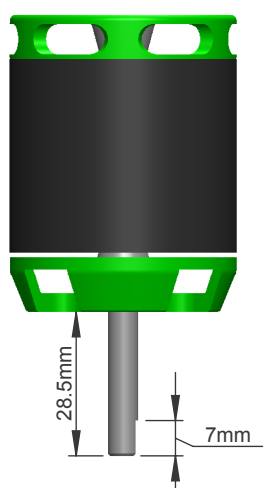
- Set Screw M4x4mm  
 .....x2
- Button Head Cap Screw M4x8mm  
 .....x4
- Set Screw M5x20mm  
 .....x2



- Metric Hex Nylon Nut M3  
 .....x2
- Finishing Washer M3  
 .....x2
- Socket Head Cap Screw M3x16mm  
 .....x2
- Washer Ø5.3xØ15x1mm  
 .....x2

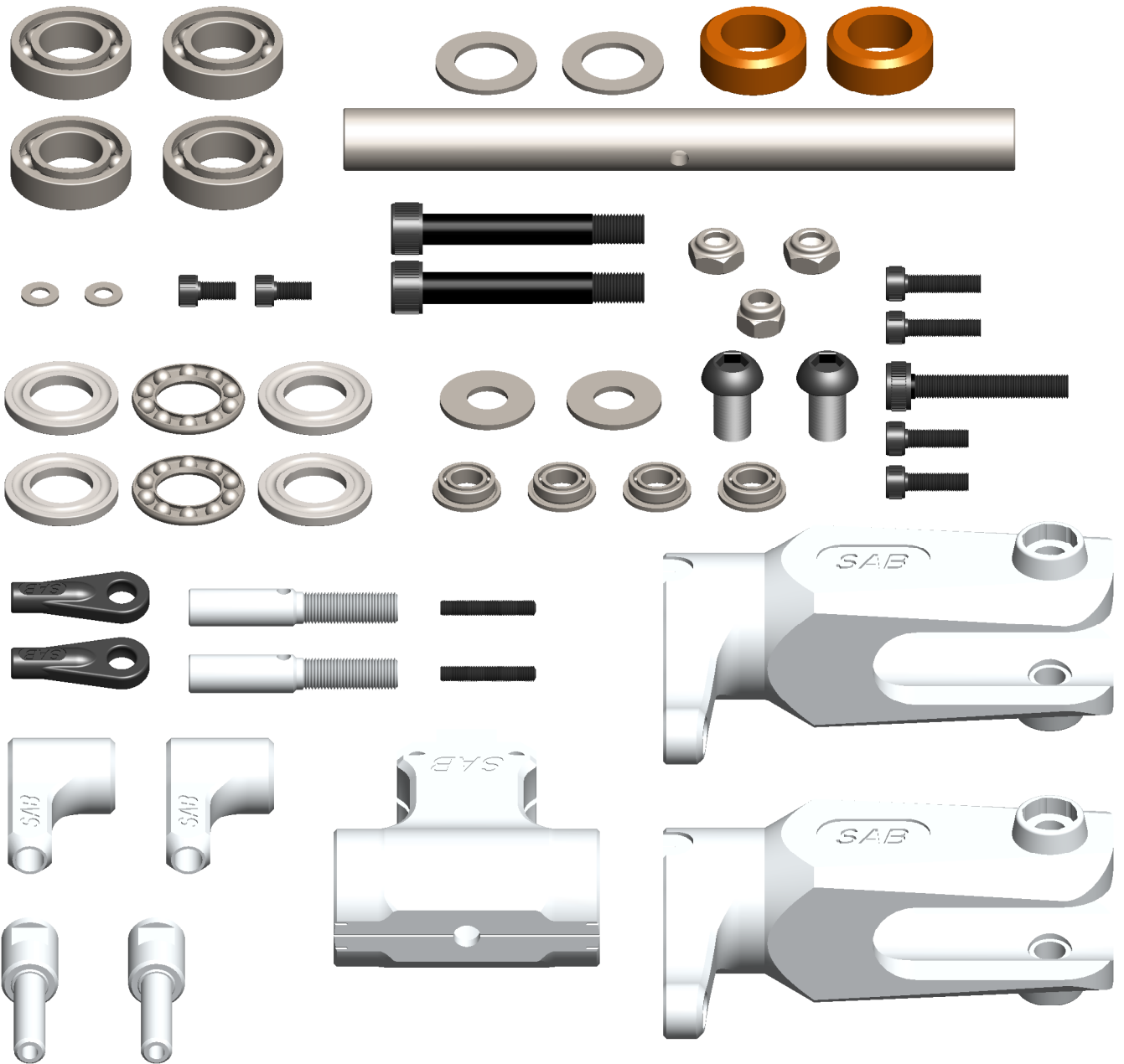
**Note:**

To maximize space for the batteries, it is advisable to shorten the motor shaft. Follow the dimensions given in this drawing. For the cut, you can use an electric tool like a "Dremel" with a cut-off disc. Additionally, ensure the motor shaft has an appropriate 'flat' for one of the set screws.





# 6 - Main Rotor



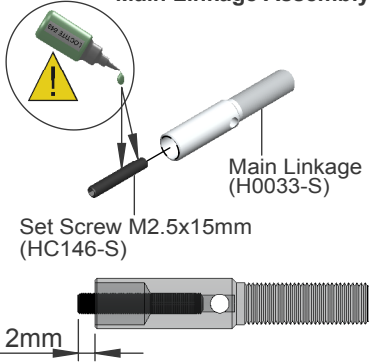


**Tray 1**

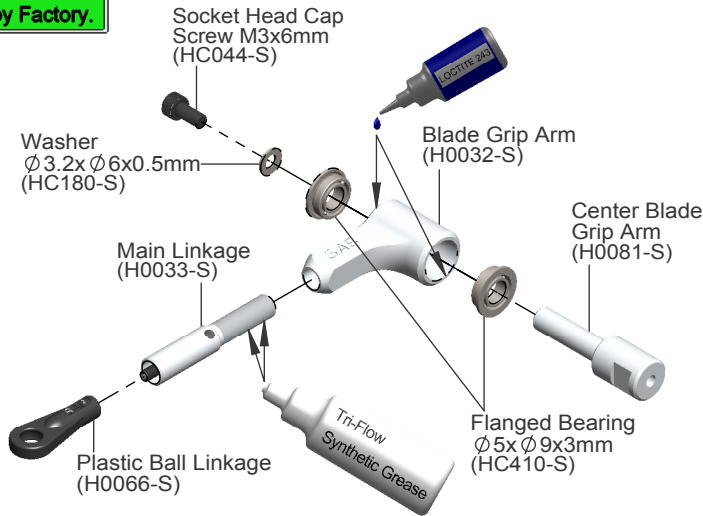
**Blade Grip Arm Assembly ..... x 2**

**Already assembled by Factory.**

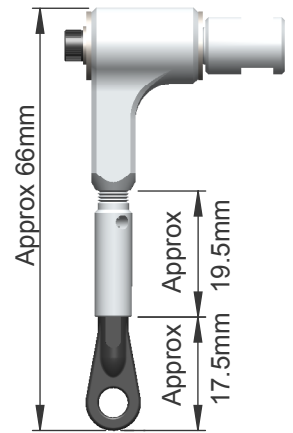
**Main Linkage Assembly**



**Note:** HC146 must be strongly blocked with HC0033.

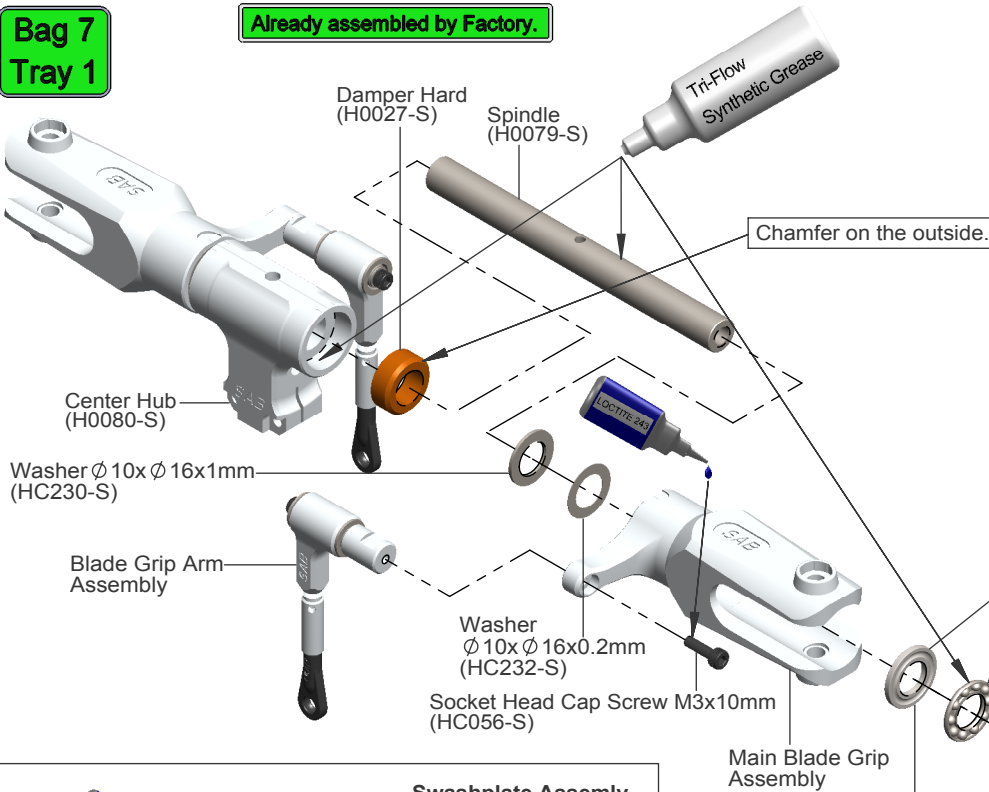


**Note:**

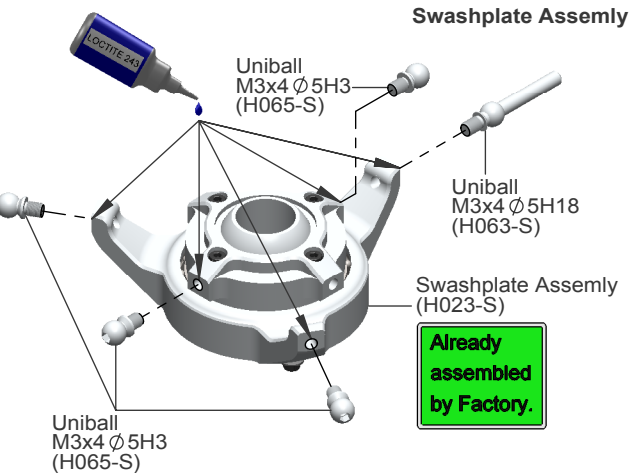


**Bag 7  
Tray 1**

**Already assembled by Factory.**



**Main Blade Grip Assembly .....x2**



**Already assembled by Factory.**

**Note: Larger ID**

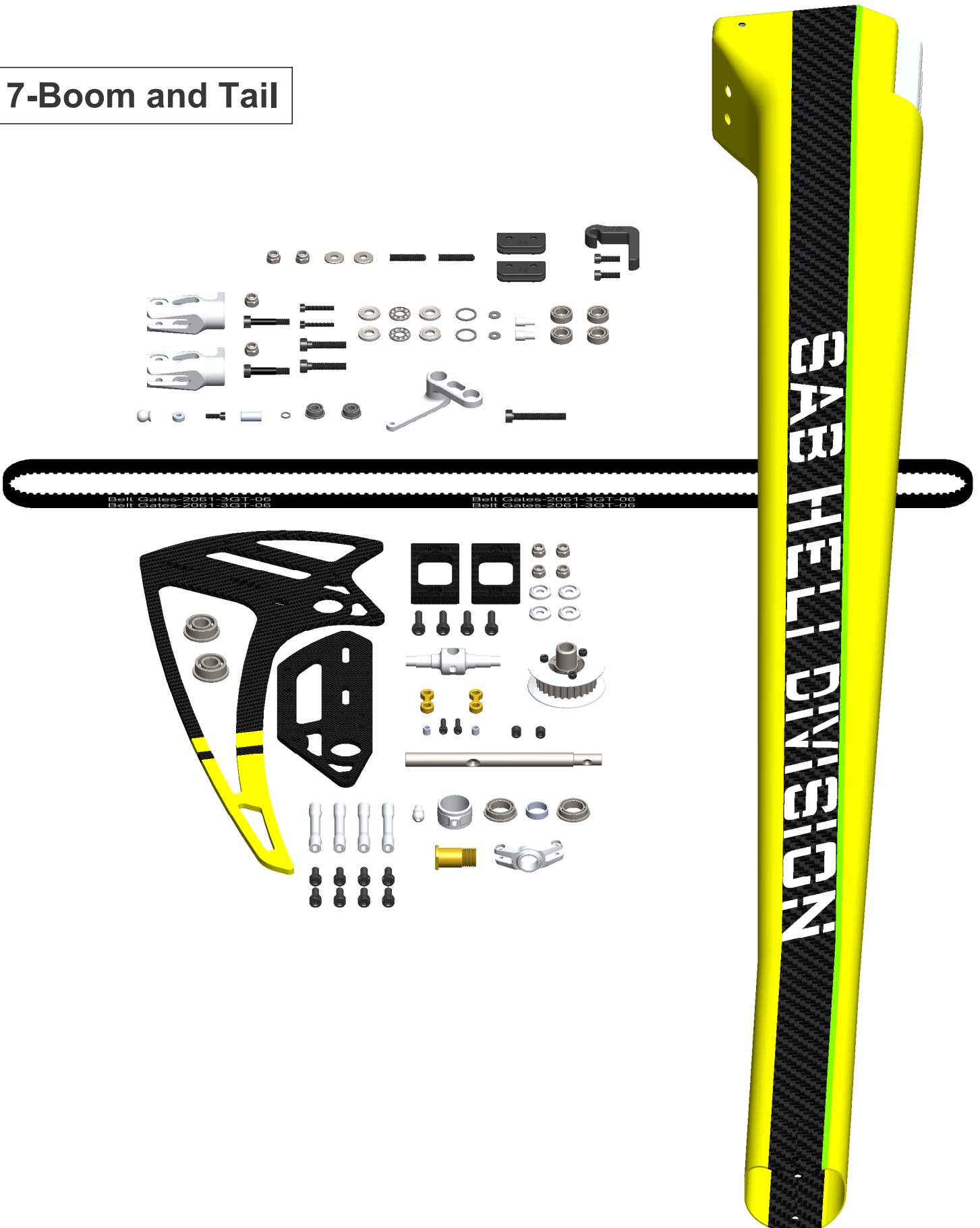
**Note: Smaller ID**







7-Boom and Tail





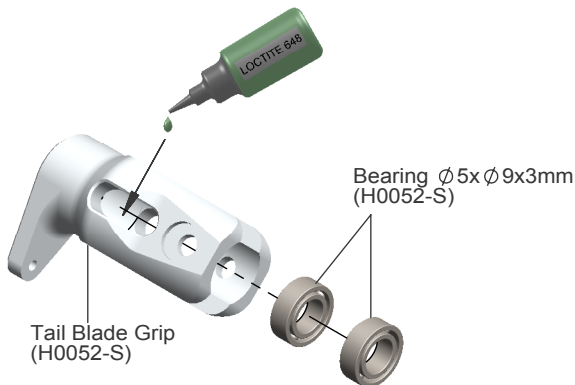
**Tail Blade Grip Assembly .... x 2**  
(H0052-S)

**Already assembled by Factory.**

Bearing  $\varnothing 5 \times \varnothing 9 \times 3 \text{mm}$



...x4



**Bag 8**  
**Tray 2**

Washer  $\varnothing 3 \times \varnothing 4 \times 0.5 \text{mm}$



...x1

Socket Head Cap Screw  
M2x8mm



...x1

Socket Head Cap Screw  
M3x22mm

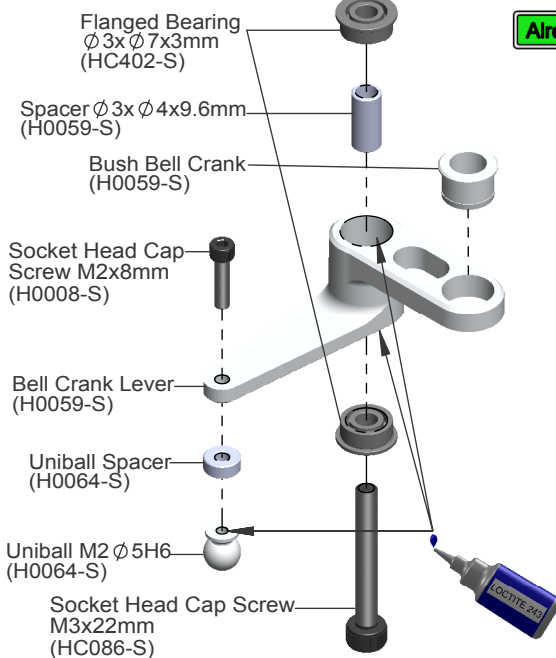


...x1

Flanged Bearing  $\varnothing 3 \times \varnothing 7 \times 3 \text{mm}$



...x2

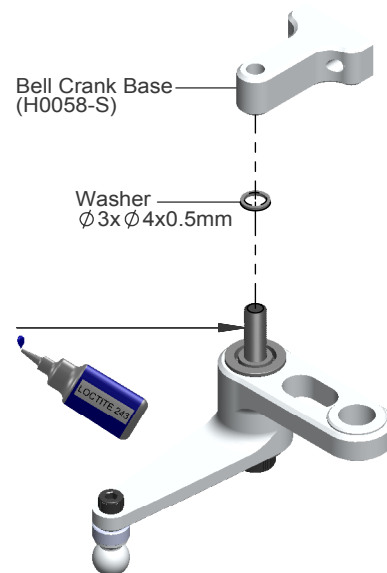


**Bell Crank Lever Assembly**

**Already assembled by Factory.**

Bell Crank Base  
(H0058-S)

Washer  
 $\varnothing 3 \times \varnothing 4 \times 0.5 \text{mm}$

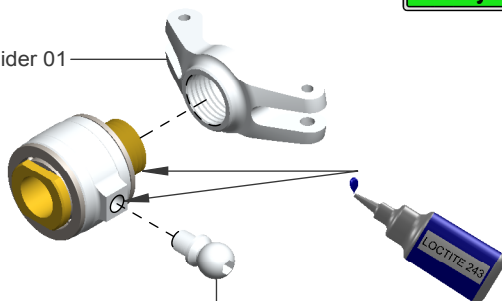


**Tray 2**

**Tail Pitch Slider Assembly**

**Already assembled by Factory.**

Tail Pitch Slider 01  
(H0053-S)



Uniball M3x3.5  $\varnothing 5 \text{H3}$   
(H0065-S)

Flanged Bearing  $\varnothing 8 \times \varnothing 12 \times 3.5 \text{mm}$

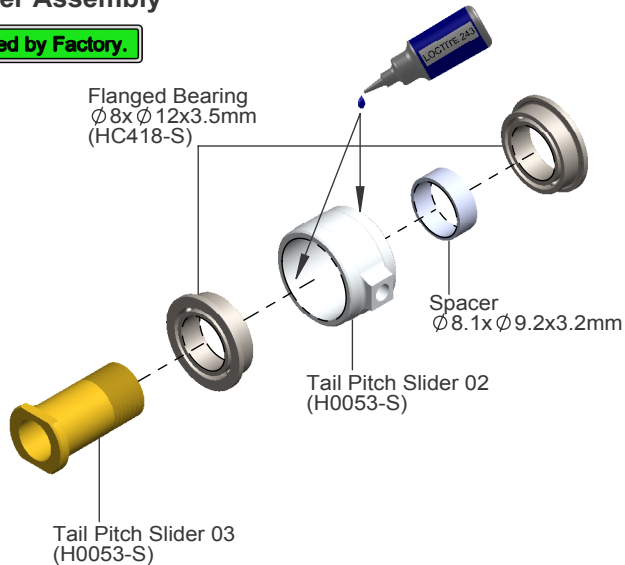


...x2

Flanged Bearing  
 $\varnothing 8 \times \varnothing 12 \times 3.5 \text{mm}$   
(HC418-S)

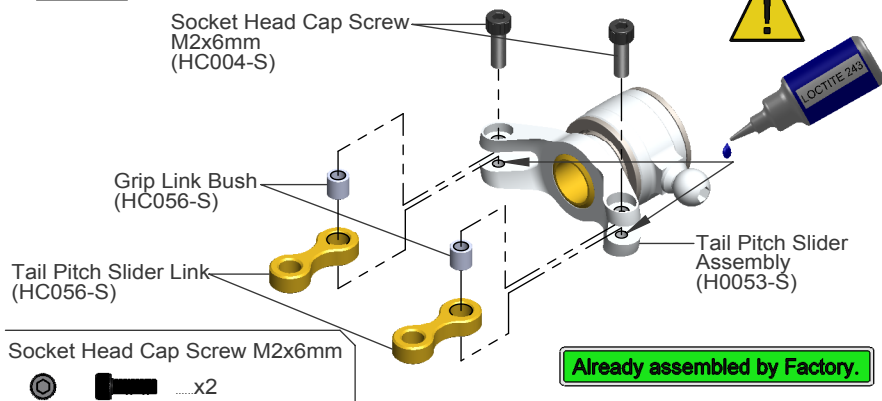
Spacer  
 $\varnothing 8.1 \times \varnothing 9.2 \times 3.2 \text{mm}$

Tail Pitch Slider 02  
(H0053-S)

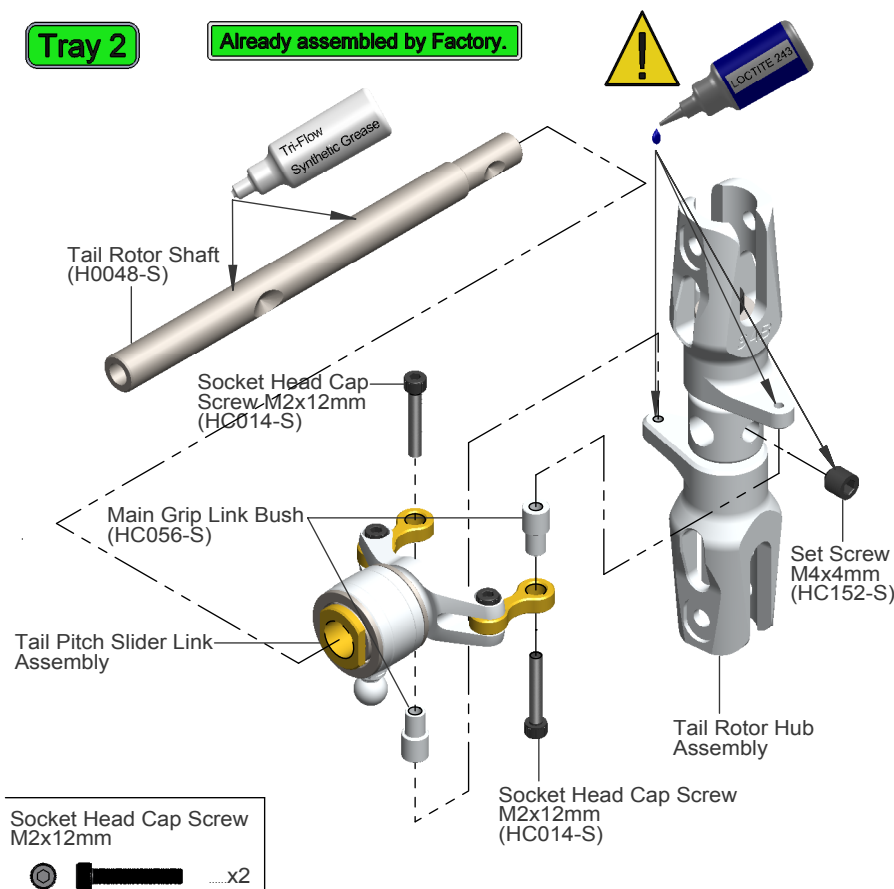




**Tray 2** Tail Pitch Slider Link Assembly



**Tray 2** **Already assembled by Factory.**



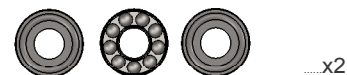
Socket Head Cap Screw M3x16mm



Spacer  $\varnothing 7 \times \varnothing 9 \times 5 \text{mm}$

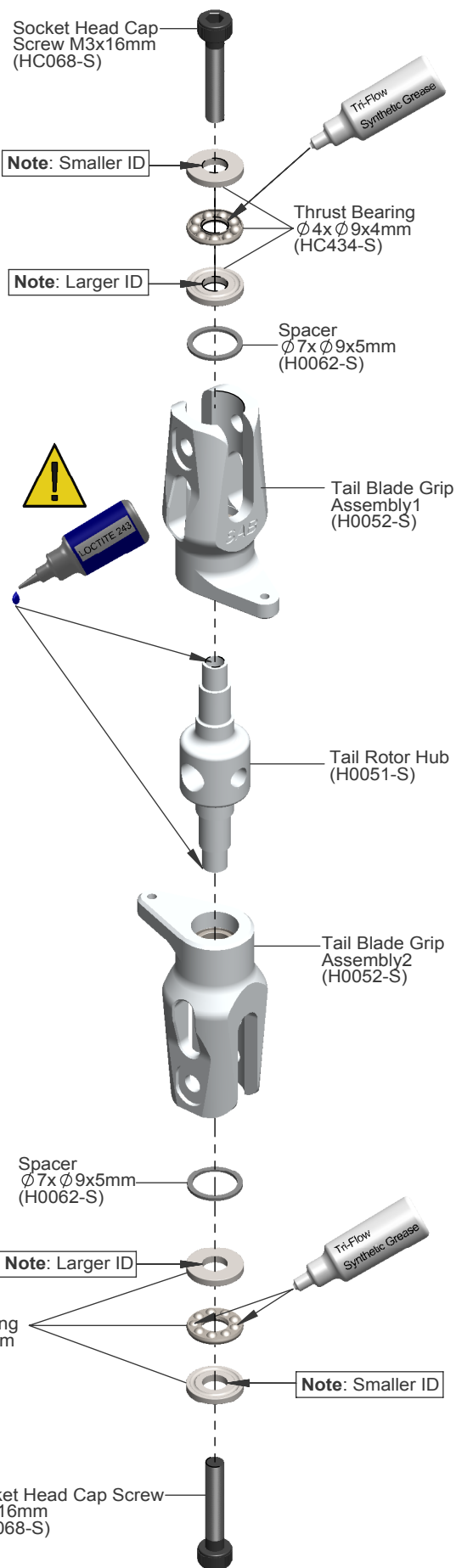


Thrust Bearing  $\varnothing 4 \times \varnothing 9 \times 4 \text{mm}$



**Tray 2** Tail Rotor Hub Assembly

**Already assembled by Factory.**

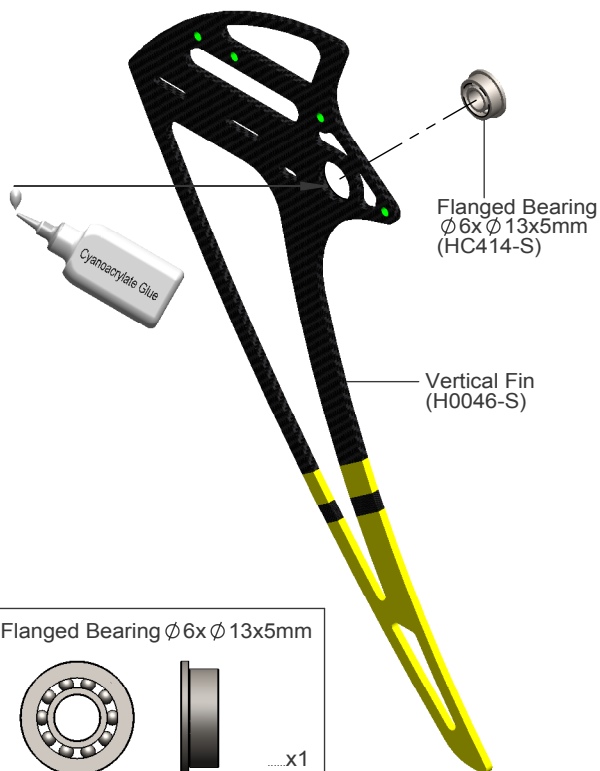




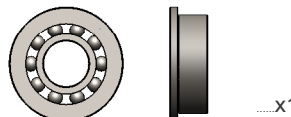
**Bag 6**

**Vertical Fin Assembly**

**Already assembled by Factory.**

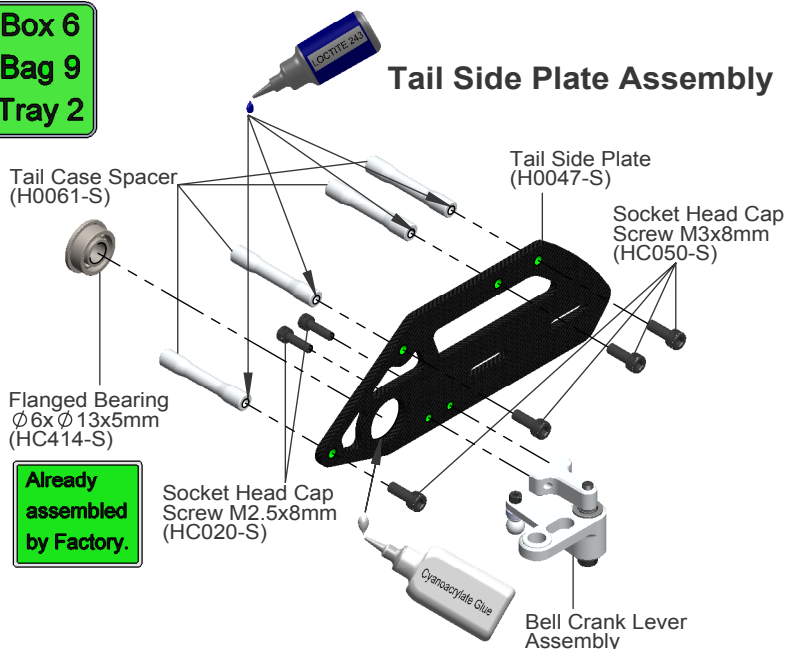


Flanged Bearing  $\varnothing 6 \times \varnothing 13 \times 5 \text{mm}$



**Box 6**  
**Bag 9**  
**Tray 2**

**Tail Side Plate Assembly**



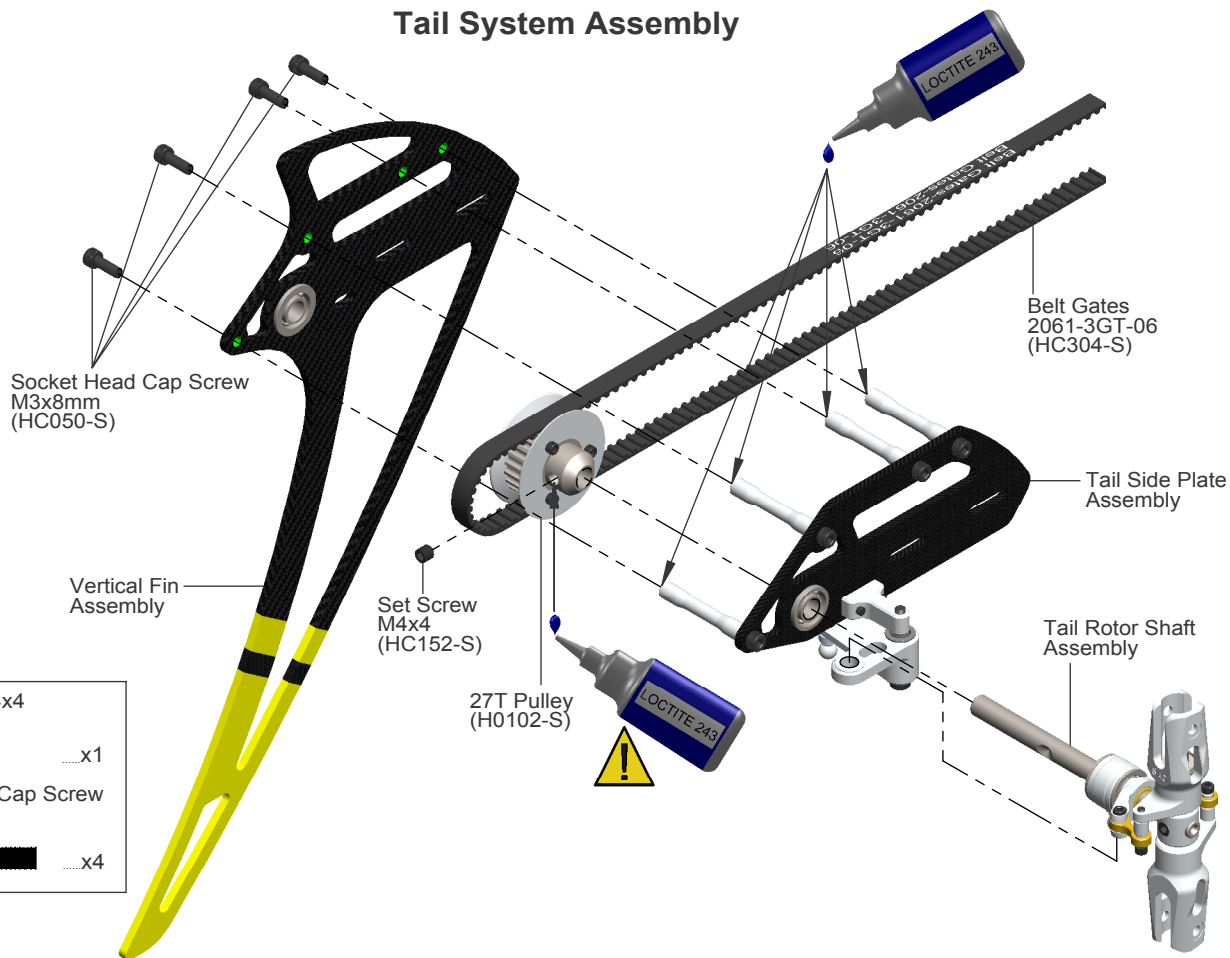
**Already assembled by Factory.**

Flanged Bearing  $\varnothing 6 \times \varnothing 13 \times 5 \text{mm}$     Socket Head Cap Screw M2.5x8mm



**Bag 9**  
**Tray 2**

**Tail System Assembly**



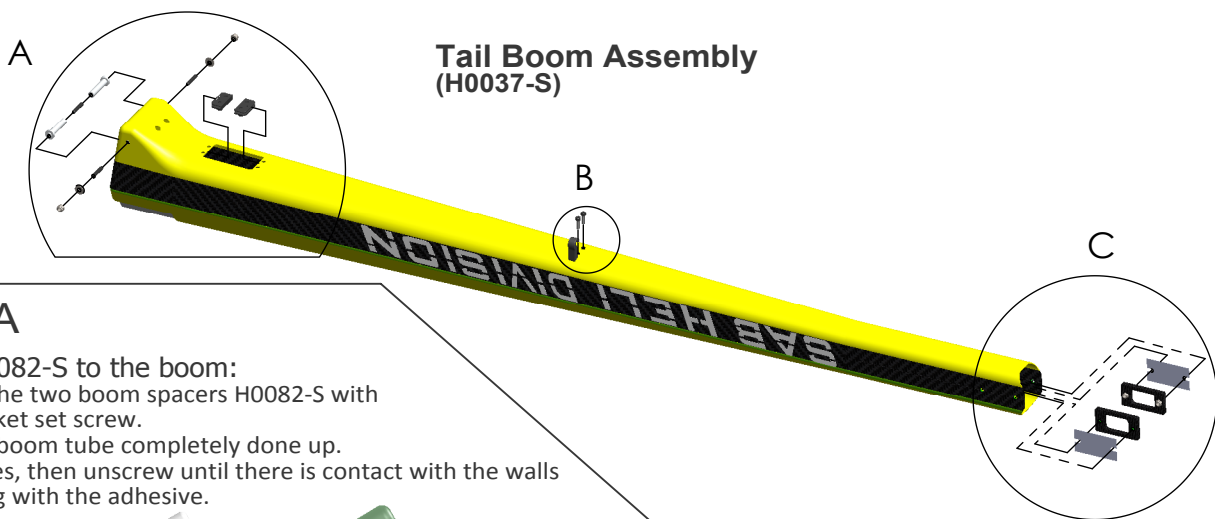
Set Screw M4x4 .....x1  
Socket Head Cap Screw M3x8mm .....x4





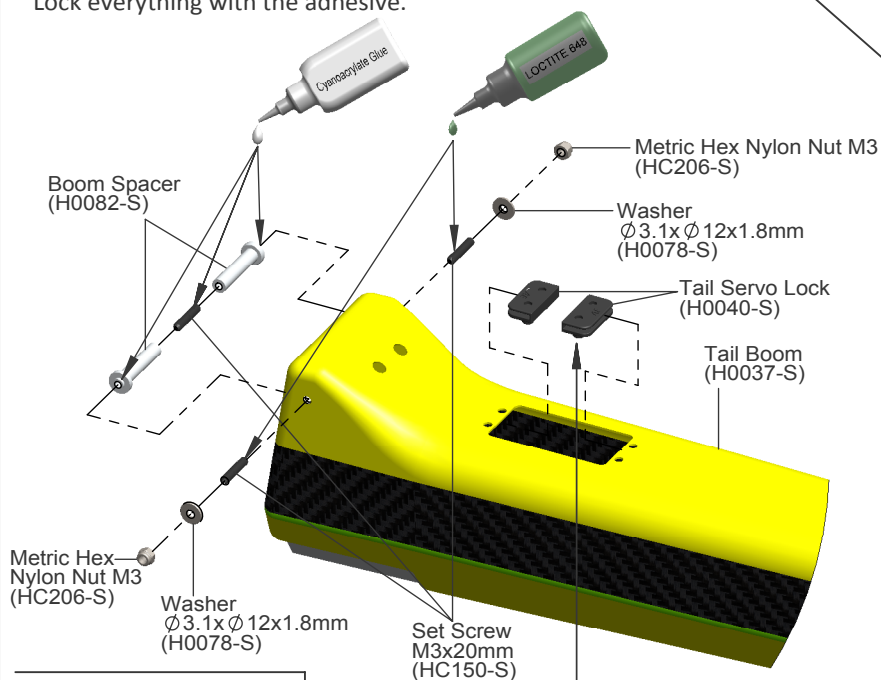
If you want to see a video of this operation, consult the SAB Heli Division YouTube channel.

**Box 3**  
**Bag 10**



### DETAIL A

**Attaching H0082-S to the boom:**  
Pre-assemble the two boom spacers H0082-S with the M3x20 socket set screw. Insert into the boom tube completely done up. Center the holes, then unscrew until there is contact with the walls. Lock everything with the adhesive.

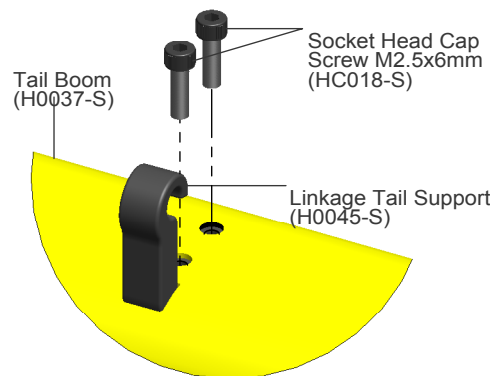


- Set Screw M3x20mm ...x3
- Metric Hex Nylon Nut M3 ...x2

**Assemble H0040-S in the boom**  
Before assembling the two parts in the boom we suggest tightening the M2.5 screws into the two plastic parts to pre-thread them. In this way when you will assemble the tail servo it will be easier to tighten the screws into the plastic parts. Check the tail servo can fit, if necessary carefully sand the hole.

### DETAIL B

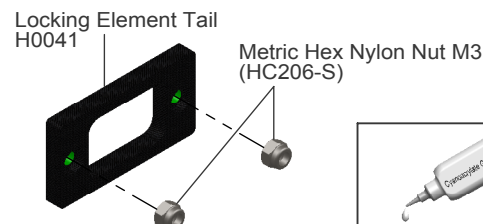
**Assemble H0045-S in the boom**  
Before mounting H0045 on the boom we suggest to first tighten the M2.5 screws into the holes to thread them. In this way when you assemble the part it will be easier to tighten the screws.



- Socket Head Cap Screw M2.5x6mm ...x2

Locking Element Tail Assembly .... X 2

**Already assembled by Factory.**

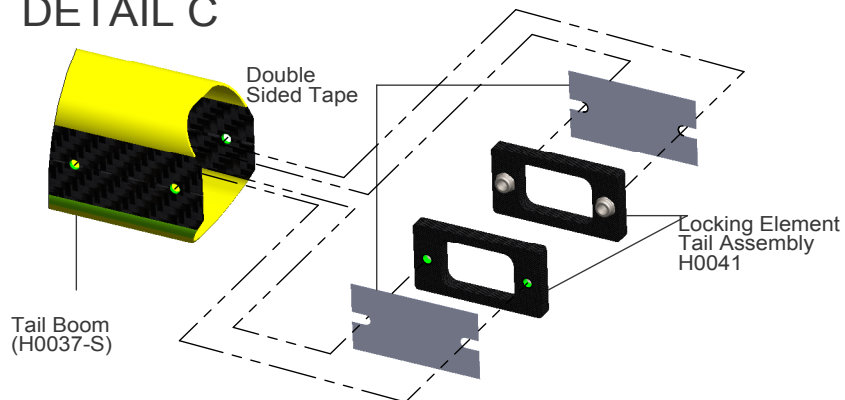


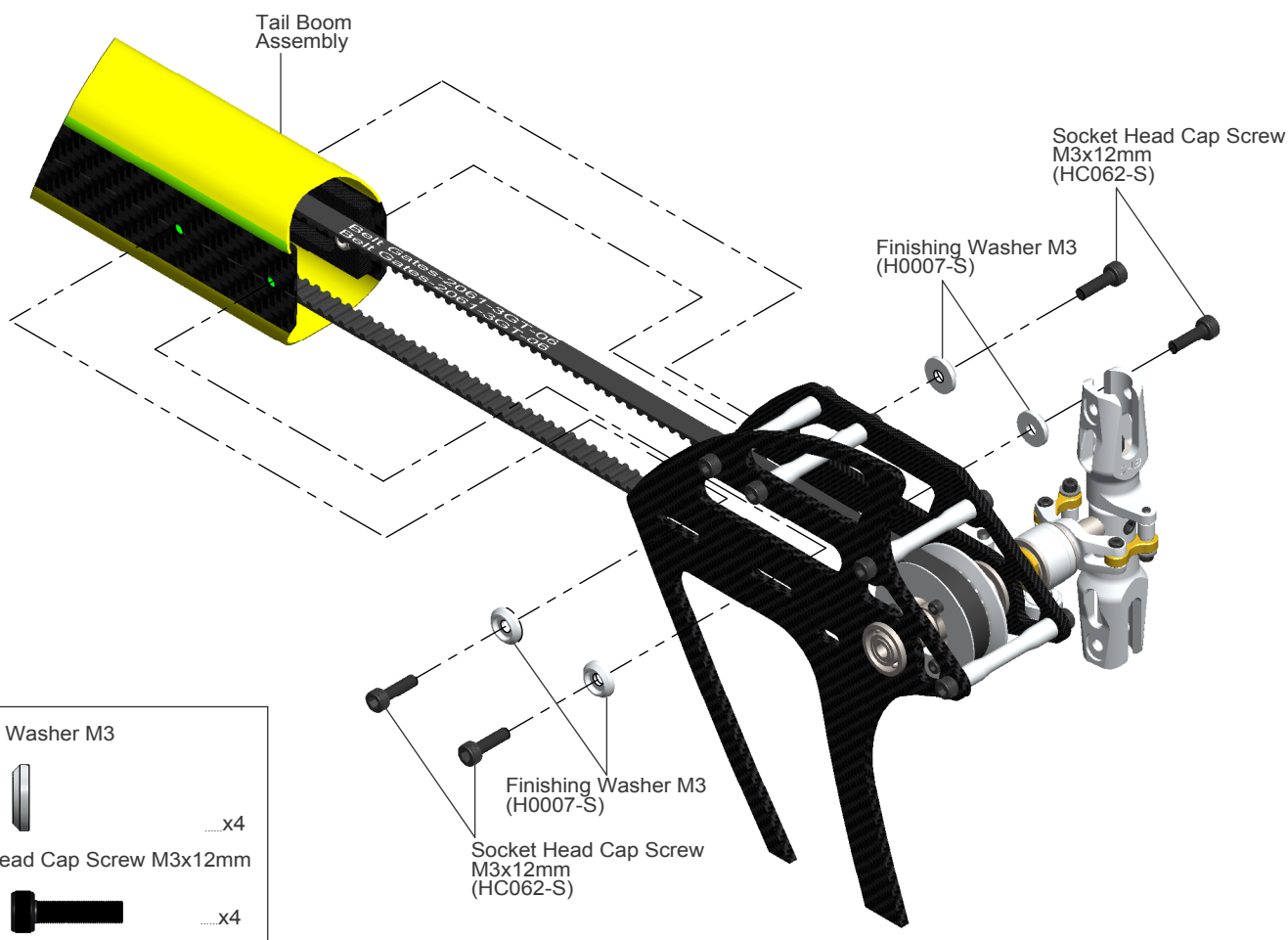
- Metric Hex Nylon Nut M3 ...x4

**Note:**



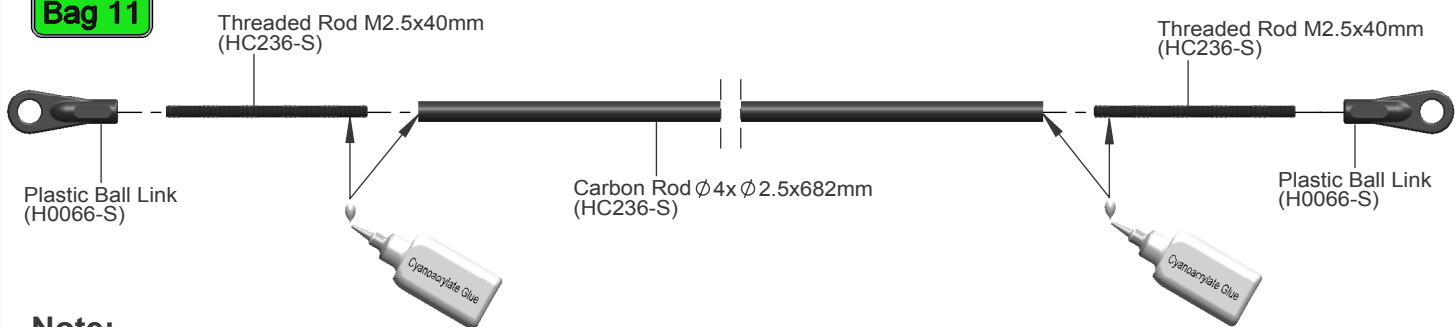
### DETAIL C



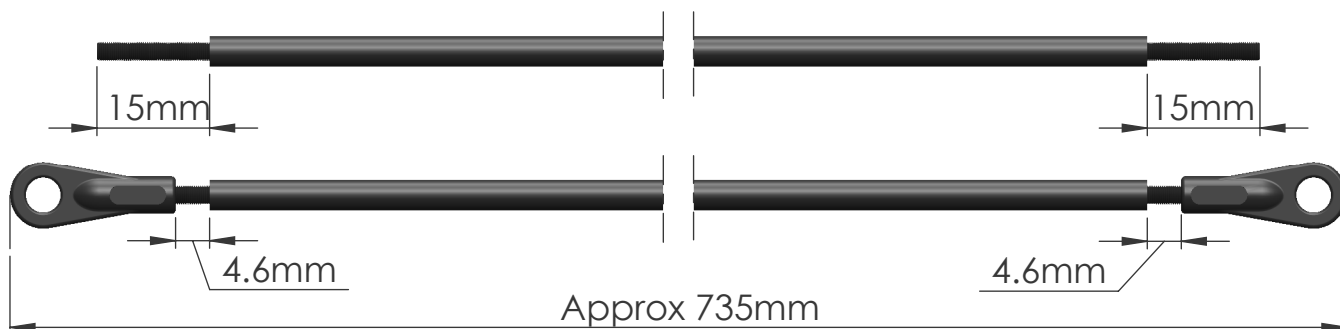


- Finishing Washer M3
- .....x4
- Socket Head Cap Screw M3x12mm
- .....x4

**Box 3**  
**Bag 11**



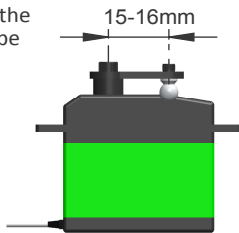
**Note:**



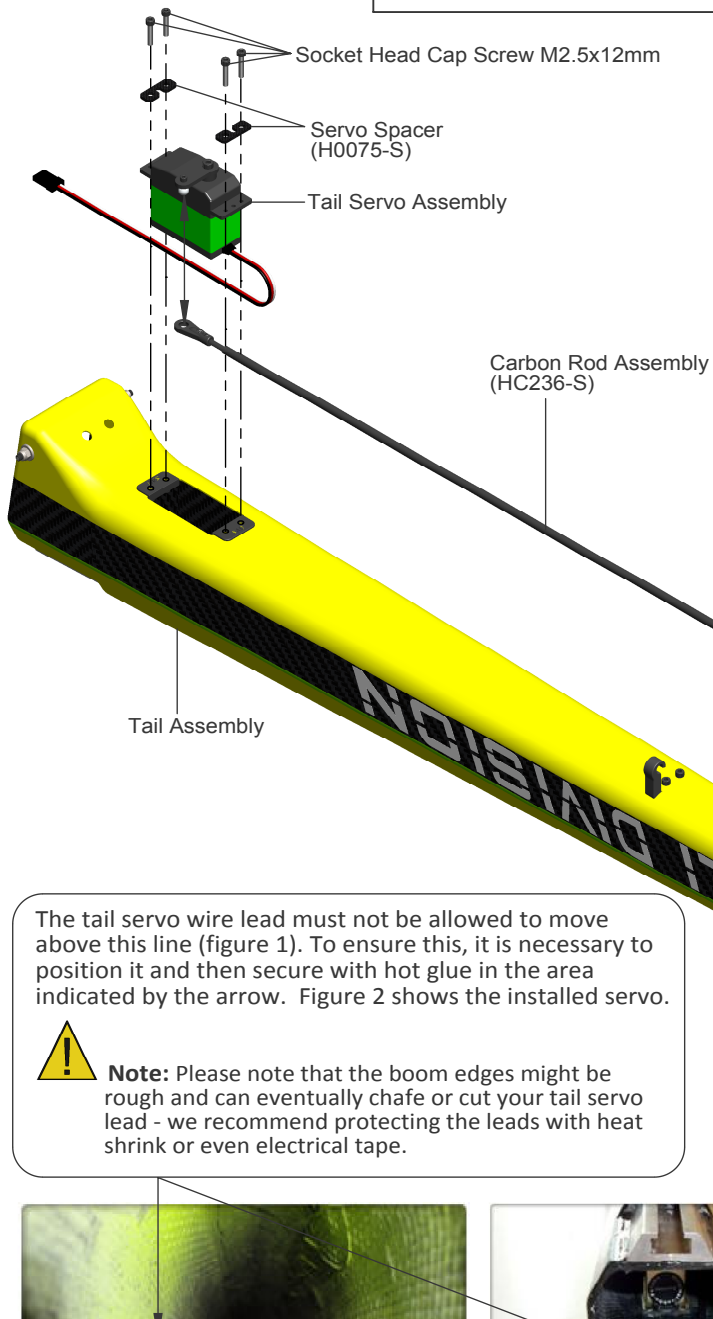
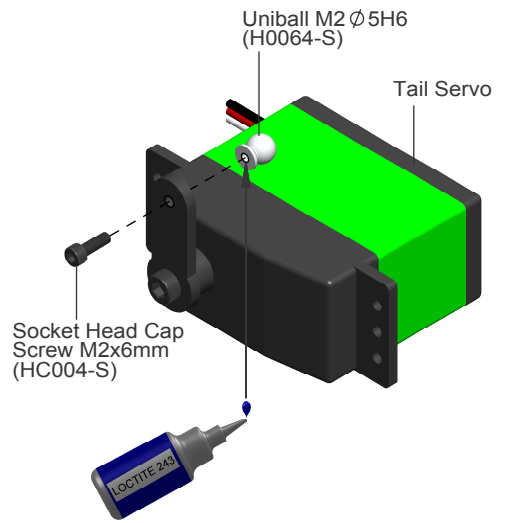


**Bag 13**

The distance between the axis and the ball must be between 15-16 mm



**Tail Servo Assembly**

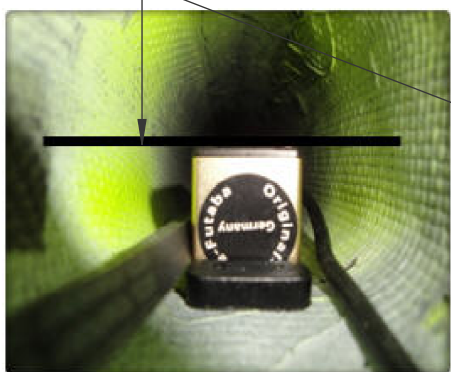


- Uniball M2 Ø5H6
  - ...x1
- Socket Head Cap Screw M2x6mm
  - ...x1
- Socket Head Cap Screw M2.5x12mm
  - ...x4

The tail servo wire lead must not be allowed to move above this line (figure 1). To ensure this, it is necessary to position it and then secure with hot glue in the area indicated by the arrow. Figure 2 shows the installed servo.



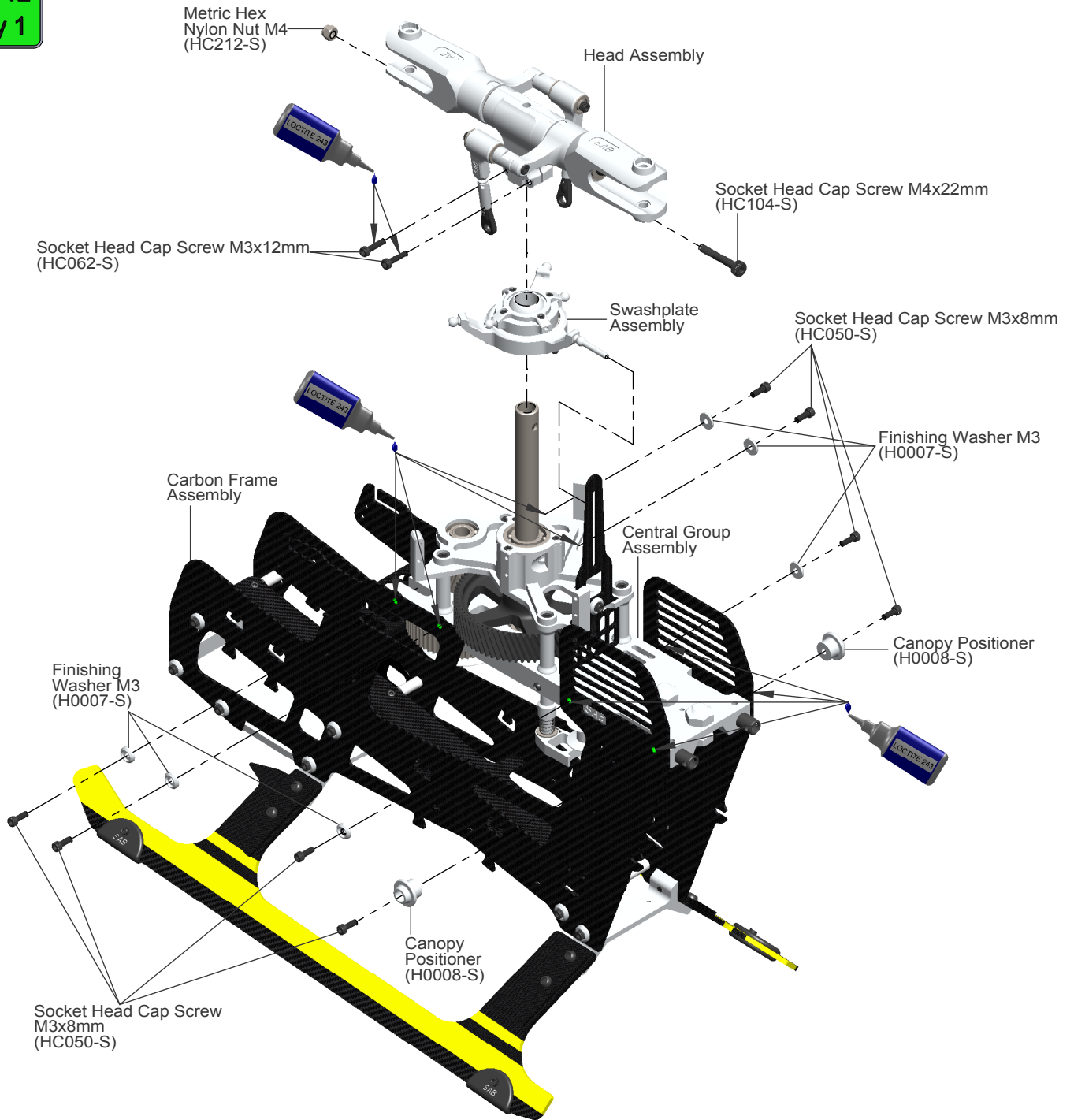
**Note:** Please note that the boom edges might be rough and can eventually chafe or cut your tail servo lead - we recommend protecting the leads with heat shrink or even electrical tape.







**Bag 12  
Tray 1**



Socket Cap M3x8mm



Socket Cap M3x12mm



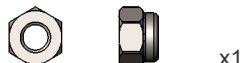
Socket Cap M4x22mm



Finishing Washer M3



Metric Hex Nylon Nut M4

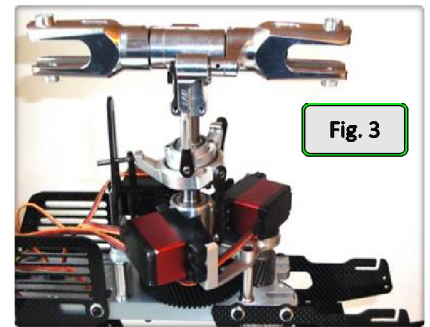
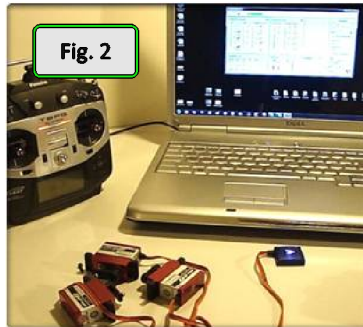
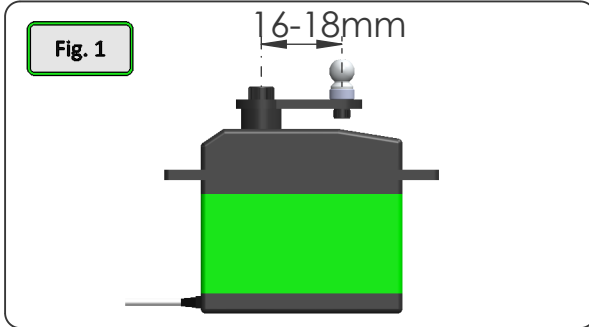






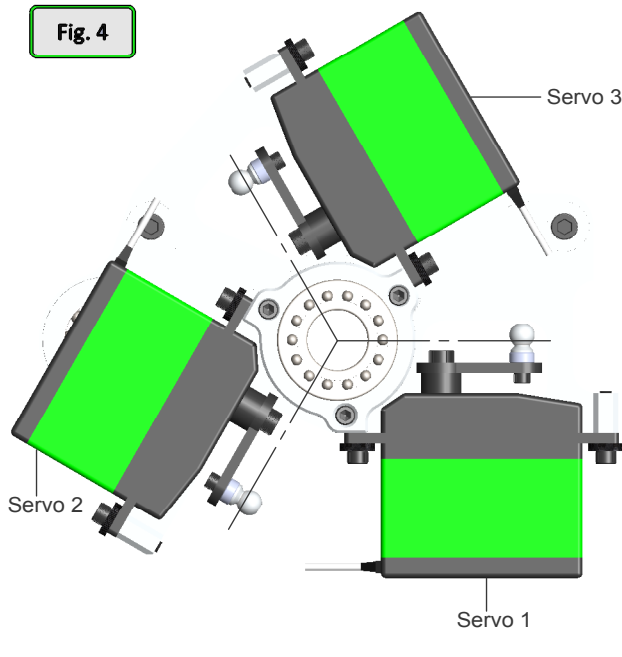
**INSTALLATION OF SWASHPLATE SERVOS**

The linkage ball must be positioned between **16-18 mm** out on the servo arm (**figure 1**). The 120° placement of the servos inside Goblin means the arms are difficult to access. For this reason it is advisable to ensure alignment of the servo arms (and sub trim set) before installation of the servos in the model (**figure 2**). Proceed with installation following the instructions below. **Figure 3** shows a completed installation.



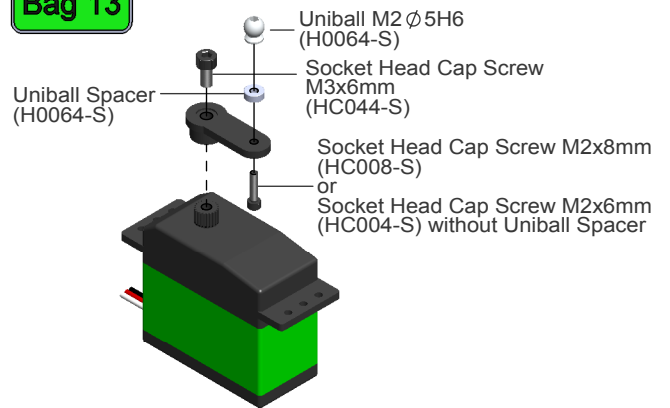
**Assembly of the Ball on the Horn.**

The rods going from the servos to the swash plate must be as vertical as possible. Not all servos are equal, so to better align them you can choose to use the supplied spacer H0031. Figure 4 illustrates this.



**Bag 13**

**Servos Assembly 1, 2, 3**



**Bag 13**

Socket Head Cap Screw M2.5x8mm

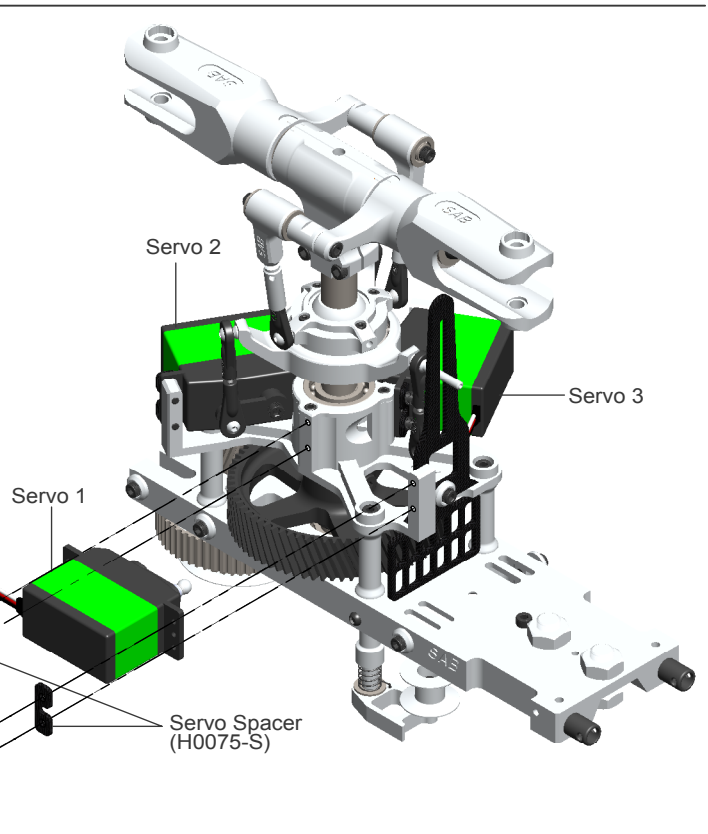


Socket Head Cap Screw M2.5x12mm



Socket Head Cap Screw M2.5x8mm (HC020-S)

Socket Head Cap Screw M2.5x12mm (HC026-S)





The wire for the front servo must be positioned here.

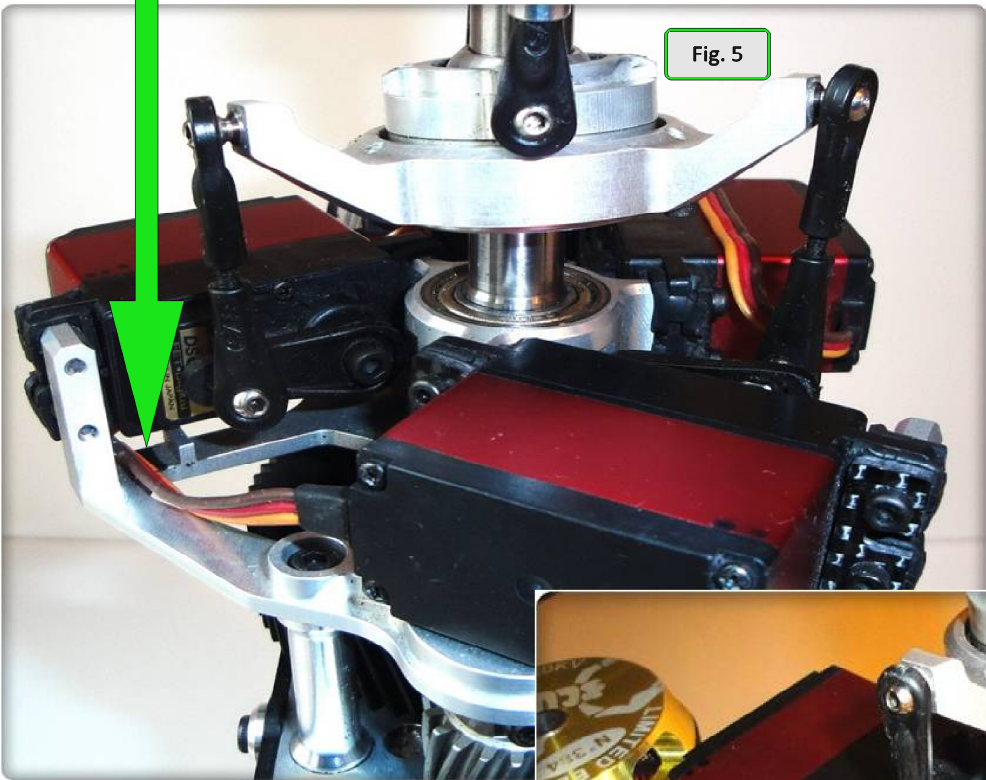


Fig. 5

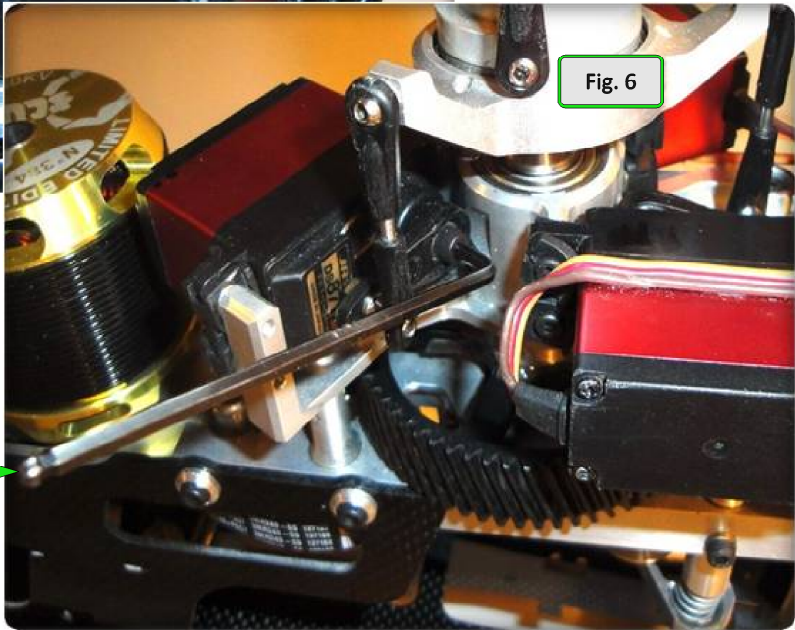


Fig. 6

**Bag 14**

Tool HA002

If it is necessary to tighten the horn screw, use the included hexagonal wrench (HA002).

**Bag 13**

Plastic ball link (H0066-S)

Set Screw M2.5x18mm (HC140-S)

Plastic ball link (H0066-S)

Approx. 47.5mm

Initial length for the rods from the servos to the swash plate.

Approx. 19.5mm

Approx. 17.5mm

Approx. 66mm

Initial length for the rods from the swash plate to the blade grips.





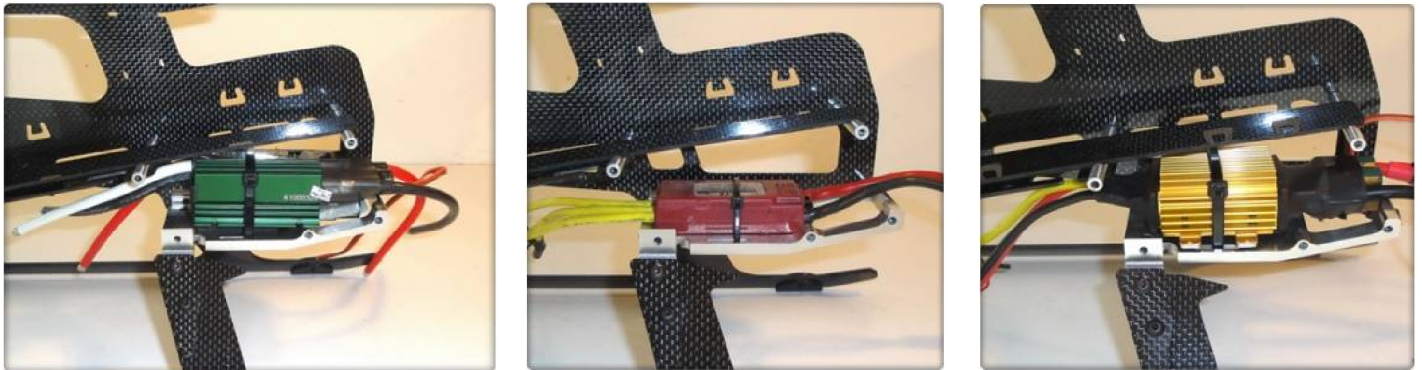
**DE-BURR THE SIDE FRAMES**

We recommend de-burring the edges of the carbon parts in areas where electrical wires run.



**ESC INSTALLATION**

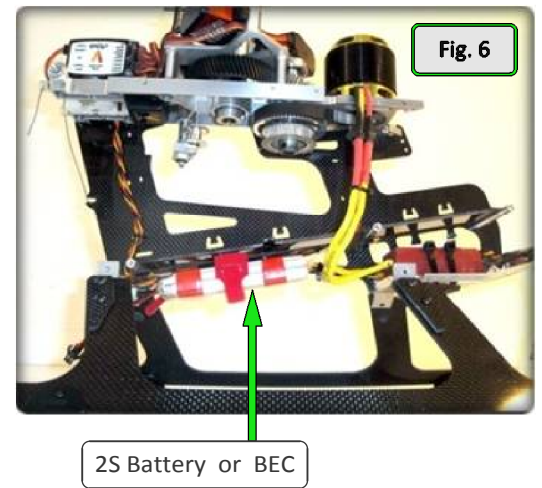
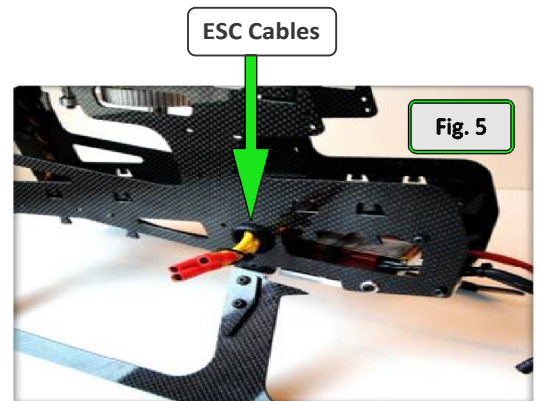
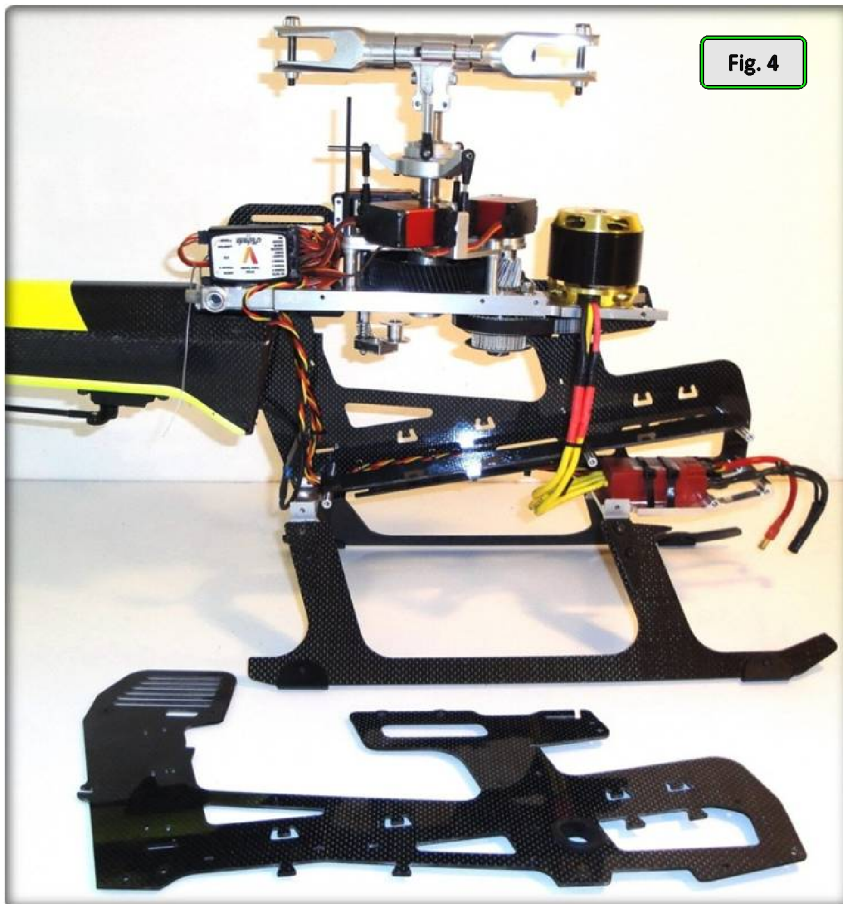
The electronic speed control (ESC) is installed in the front part of the helicopter. The support is made of aluminum, which further acts as a heat sink for the ESC. The figures below show the installation of three different brands of ESC.



**Figure 4:** Shows the wiring which connects the receiver and ESC (in this picture one frame has been removed).  
If the BEC used is combined with the ESC, it is recommended to use a dual wire connection.

**Figure 5:** The passage of the controller wires to the motor is highlighted.

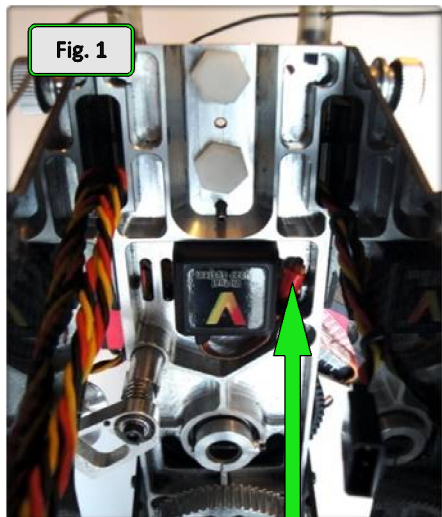
**Figure 6:** Shows the installation of a 2S battery for the flight control system.  
Alternatively, a BEC could be placed in the same area.



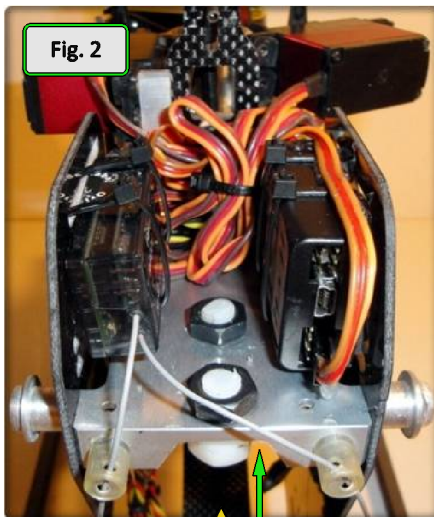


**FLYBARLESS CONTROL UNIT AND RX INSTALLATION**

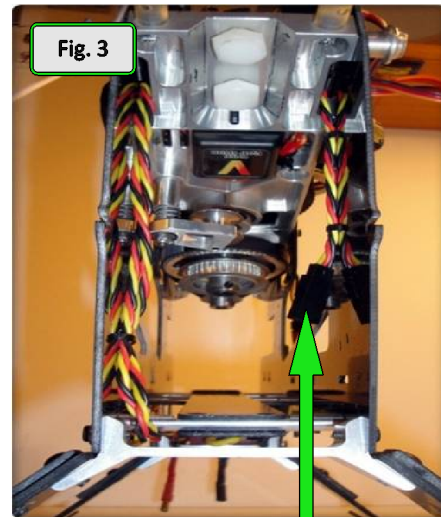
It is possible to install any commercially available Flybarless control unit in the goblin. For Flybarless systems with a separate sensor, the sensor must be installed under the plate (Figure 1). Figure 2 shows an example of installation of the receiver and flybarless control unit. In Figure 3 you can see the extension lead for the tail servo. It is very important to include a connector for fast disassembly of the boom module. The connector will prevent servo damage in case of boom separation during a crash.



Slot for sensor cable

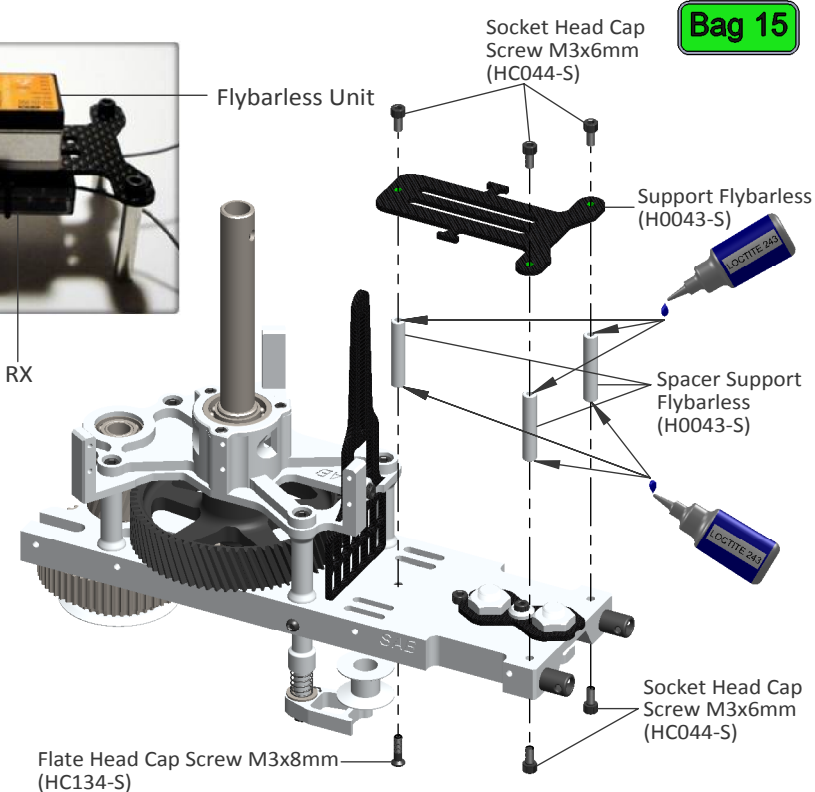
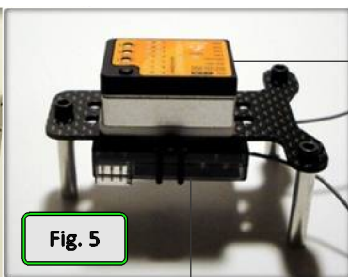
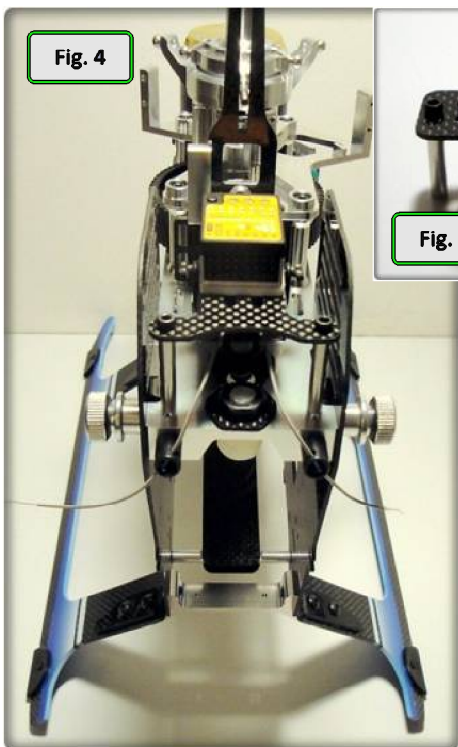


It is important to lock the plugs of the flybarless unit with an adhesive - for example hot glue.



Tail servo extension cable

To install a one piece Flybarless system it is necessary to add the support shown in these figures. Figure 3 shows the installed support. Figure 4 shows the control unit and the receiver installed on the support.



**Bag 15**





## TRANSMISSION SETUP

It is important to choose the right reduction ratio to maximize efficiency based on your required flight performance. The Goblin has many possible reduction ratios at your disposal. It is possible to optimize any motor and battery combination. It is recommended to use wiring and connectors appropriate for the currents generated in a helicopter of this class.

If you are using a head speed calculator which requires a main gear and pinion tooth count, use **204** teeth for the main gear (this takes into account the two stage reduction) and the tooth count of your pulley as the pinion count.

Below is a list of available reduction ratios:

H0015-18-S - 18T Pinion = ratio 11.3:1	H0015-22-S - 22T Pinion = ratio 9.3:1
H0015-19-S - 19T Pinion = ratio 10.7:1	H0015-23-S - 23T Pinion = ratio 8.9:1
H0015-20-S - 20T Pinion = ratio 10.2:1	H0015-24-S - 24T Pinion = ratio 8.5:1
H0015-21-S - 21T Pinion = ratio 9.7:1	H0015-26-S - 26T Pinion = ratio 7.8:1

Some example configurations:

GOBLIN 700 CONFIGURATIONS							
							Rev 01
Performance	Battery	Motor	ESC	Pinion	Gov	RPM	Pitch
GENERAL	12S 4000/5000 min 30C	Scorpion HK 4035-560	Ice 120 HV V2	21T	Set Rpm	2050	± 12.5
			Jive 80 HV	19T	Yes @80%	2050	± 12.5
		Kontronik Pyro 700-520	Ice 120 HV V2	22T	Set Rpm	2050	± 12.5
			Jive 80 HV	20T	Yes @80%	2050	± 12.5
3D	12S 4000/5000 min 45C	Scorpion HK 5025-440	Ice 120 HV V2	26T	Set Rpm	2120	± 12.5
			Jive 120 HV	24T	Yes @80%	2120	± 12.5
		XERA 4530-500 LE	Ice 120 HV V2	24T	Set Rpm	2200	± 12.5
			Jive 120 HV	22T	Yes @80%	2200	± 12.5
		Scorpion HK 4525-520	Ice 160 HV V2	23T	Set Rpm	2200	± 12.5
			Jive 120 HV	21T	Yes @80%	2200	± 12.5
HARD 3D	12S 4000/5000 min 50C	Scorpion HK 4525-520	Ice 160 HV V2	24T	Set Rpm	2250	± 12.5
			Jive 120 HV	22T	Yes @80%	2250	± 12.5
EXTREME	12S 4000/5000 50/70C	Scorpion HK 4530-540	Ice 160 HV V2	24T	Set Rpm	2300	± 12.5
			Jive 120 HV	22T	Yes @80%	2300	± 12.5

Note: Although the Goblin can fly at high rpm, for safety reasons we suggest to not exceed 2200 rpm.

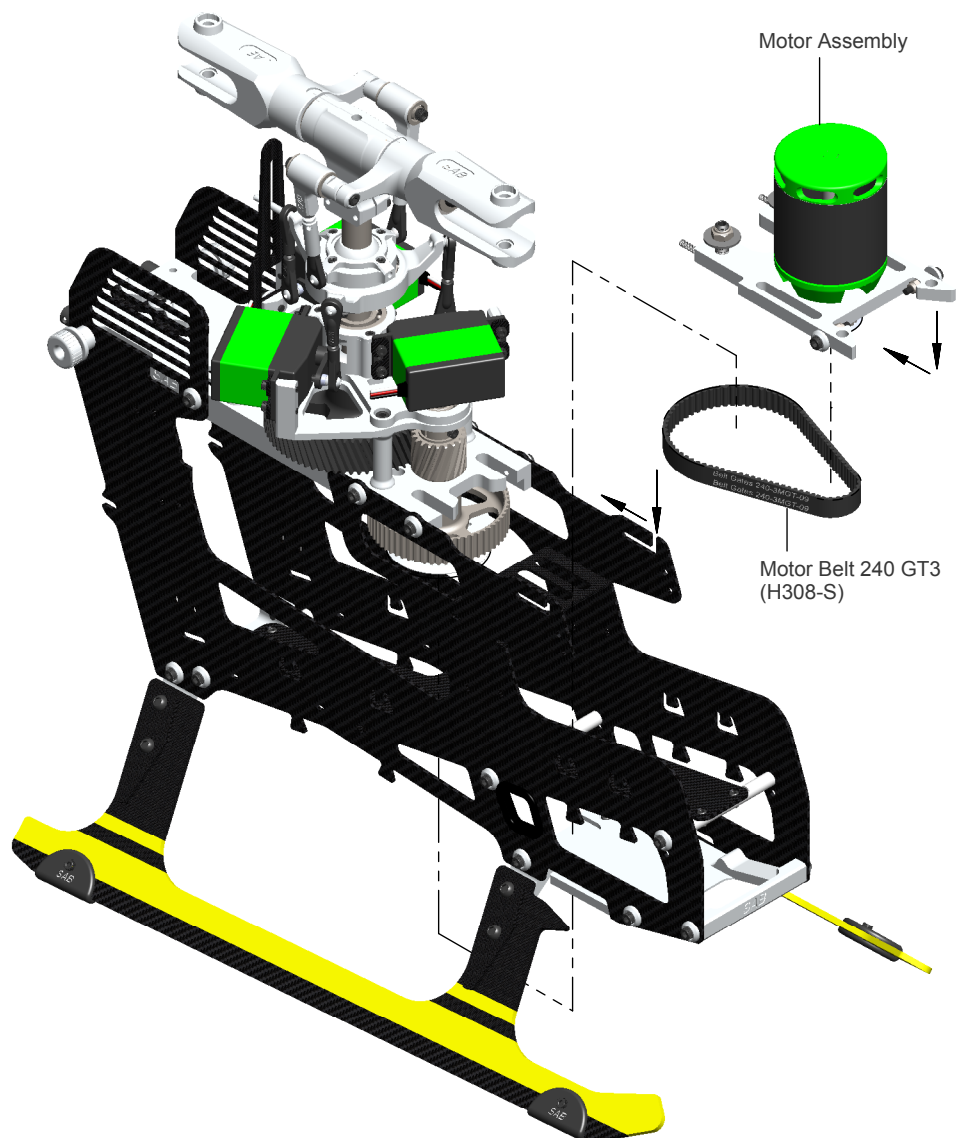


### MOTOR BELT TENSION

- \* Assemble the motor and pinion to its mounting plate.
- \* Fit the motor assembly into position.
- \* Compress the springs by pushing the motor toward the main shaft.
- \* At maximum compression, temporarily tighten one of the slide screws.
- \* With the minimum centre distance it is easy to install the belt. First put the belt on the motor pinion.
- \* Then put the belt around the big pulley.
- \* Rotate the motor several times by hand.
- \* Release the screw that locks the slide.
- \* The springs keep the belt in tension.
- \* Help the springs by pulling the motor slightly.
- \* Lock all screws.

Figure 1 shows the motor correctly wired. It is advisable to cover the wire joints between the motor and the ESC with heat shrink tubing.

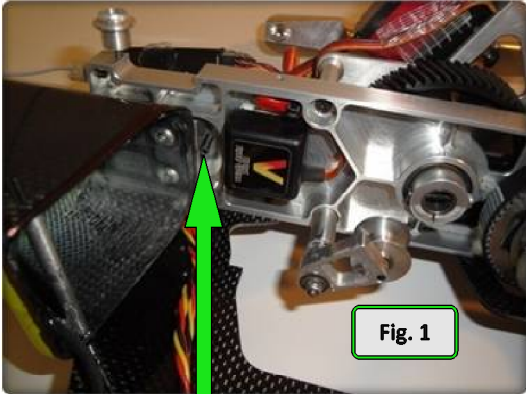
If you want to see a video of this operation, consult the SAB Heli Division YouTube channel





**BOOM ASSEMBLY**

- \*Insert the tail boom assembly making sure that the aluminum part of the tube touches the M3x16 screw.
- \*Lock the M8 nuts with the HA005 special tool supplied (Tray 2).
- \*Firmly lock the lateral M3 nuts.
- \*Assemble the H0038 carbon security plate .
- \*Connect the tail servo wire to the previously fitted extension lead.

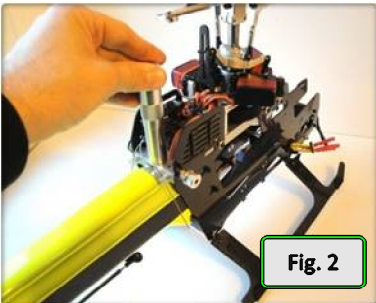
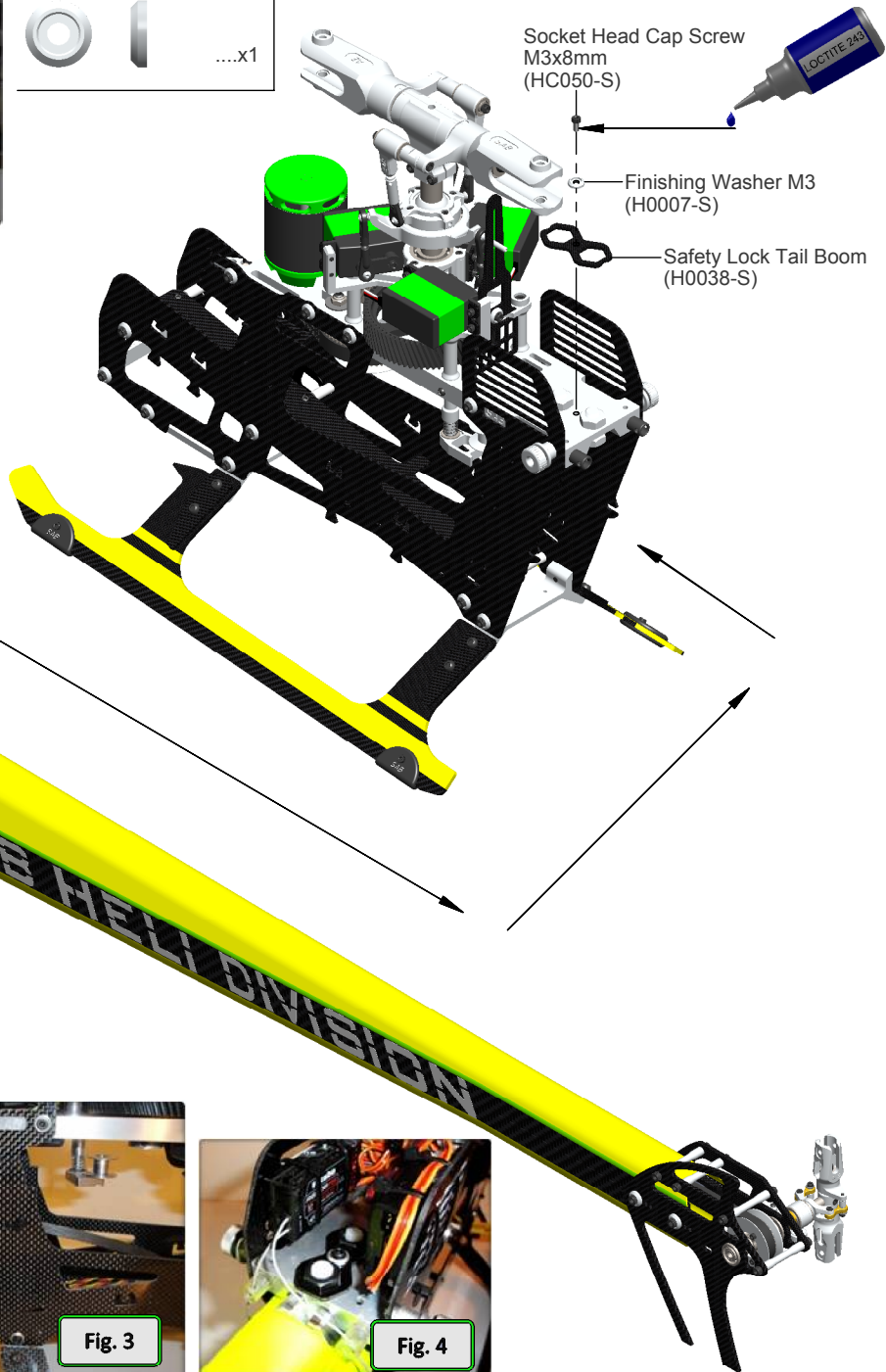


**Fig. 1**

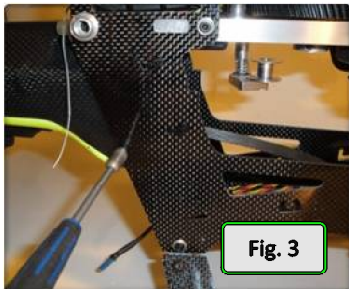
The Socket Head Cap Screw M3x16mm correctly positions the boom assembly.

- Socket Head Cap Screw M3x8mm ...x1
- Finishing Washer M3 ...x1

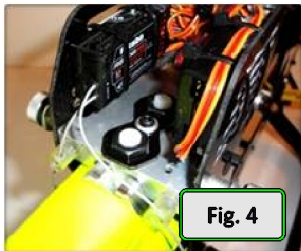
**Bag 12**



**Fig. 2**



**Fig. 3**



**Fig. 4**

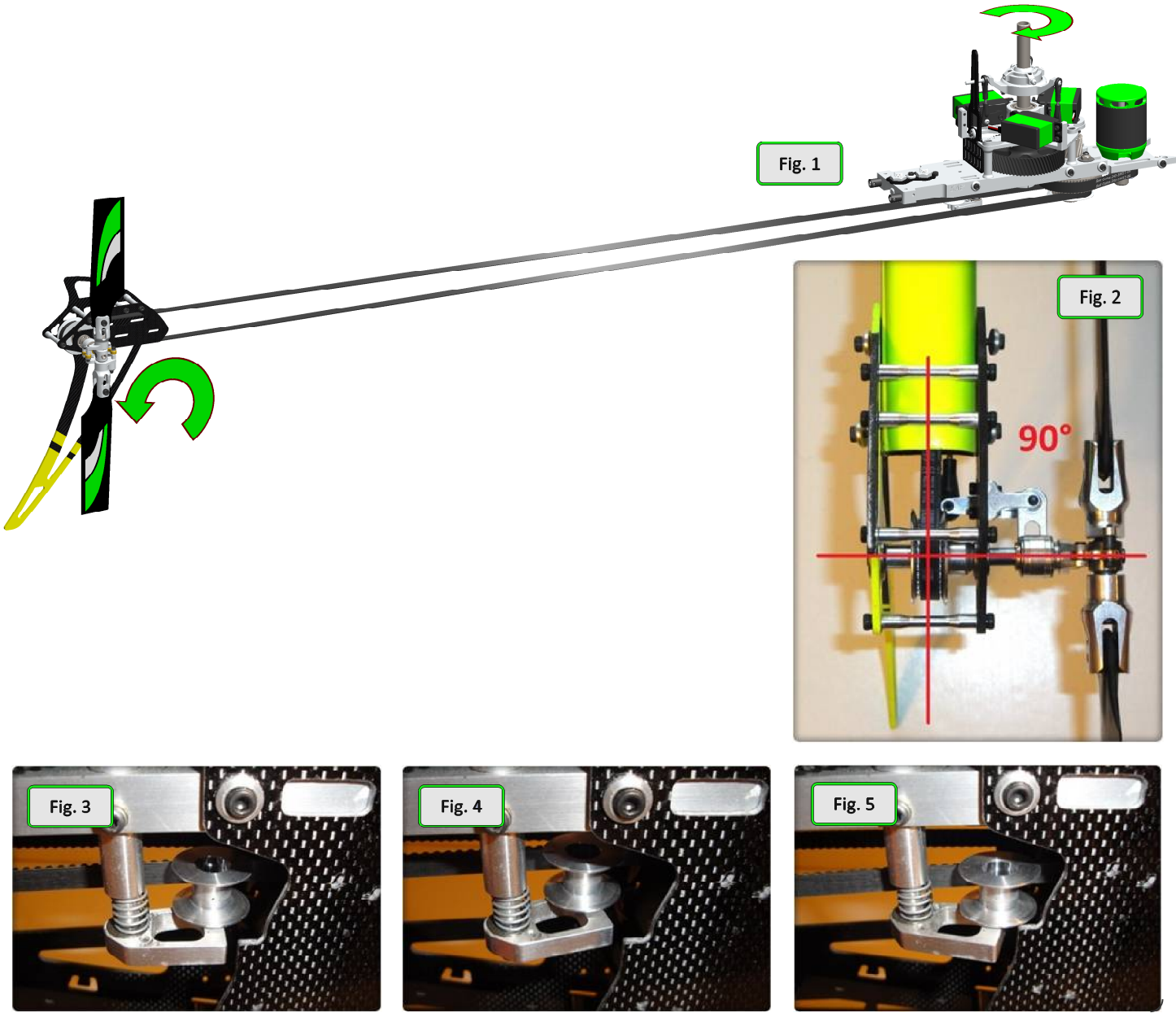




TAIL BELT TENSION

- \*Check the proper assembly of the tail boom.
- \*Check that the aluminum part of the tube is against the M3 stop screw.
- \*Loosen the tail group by loosening the 4 M3 screws.
- \*Install the belt onto the pulley, taking care to respect the direction of rotation (figure 1).
- \*Rotate the tail drive several times by hand.
- \*Load the spring by rotating the tensioning arm 270° clockwise (when looking down from the top of the helicopter).
- \*Tension the boom until the tensioning arm is aligned with the frame.
- \*Tighten the 4 screws.
- \*Check that the tail output shaft is perpendicular to the tube. (figure 2)
- \*In figure 3,4,5 you can see the three conditions, ok, too loose and too tight.

NOTE. To disassemble the tail boom it is possible to remove the pulley H0016-S without loosening the tail unit. Remove the locking screw and pull down.







## BATTERIES

To secure the batteries, use the supplied O-rings HA012 [Bag 14]. Install them as shown in **figure 1**

To correctly secure the batteries it is necessary to use hook and loop type tape on the battery support and batteries themselves (**figure 2**).

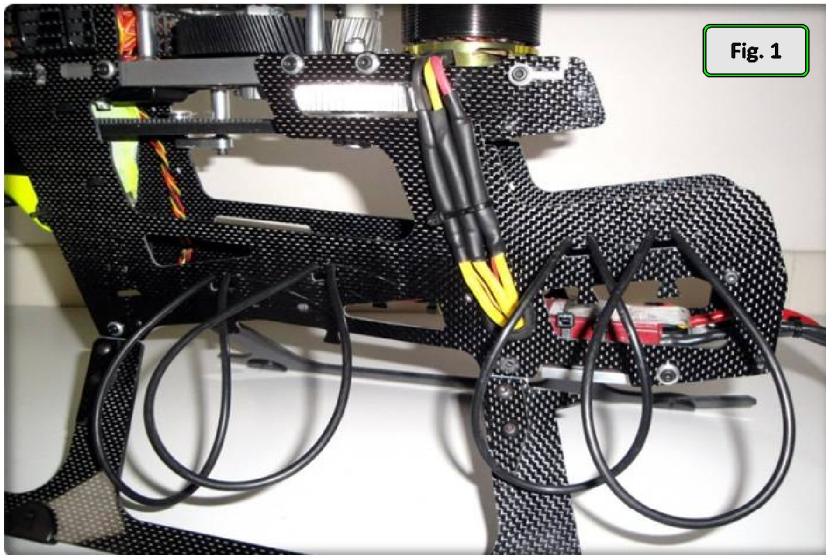


Fig. 1

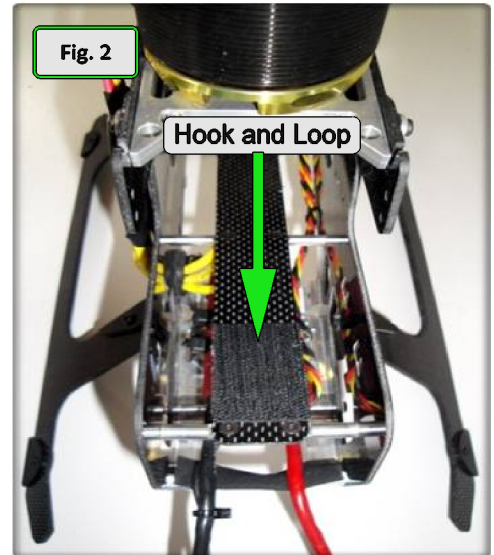


Fig. 2

## CANOPY

On the Goblin, the canopy touches the frame. To avoid triggering vibration, it is necessary to attach an adhesive foam tape to the canopy HA006 [Bag 14] (**figure 3**).

The canopy is locked at the point shown in **figure 4** and with two H0036 knobs (both equipped with OR HA008 [Bag 14])(**figure 5**). Confirm the canopy is secure prior to each flight.



Fig. 5



Fig. 3



Fig. 4



## OPERATIONS BEFORE FLIGHT

\*Set up the remote control and the flybarless system with utmost care.

\*It is advisable to test the correct settings of the remote and flybarless system without main blades or tail blades fitted.

**!** \*Check that all wiring is isolated from the carbon/aluminum parts. It is good practice to protect them at the points where they are at most risk.

\*Be sure of the gear ratio, verifying carefully the motor pulley in use. The forces acting on the mechanics increase enormously with increasing of rpm. Although the Goblin can fly at high rpm, for safety reasons we suggest to not exceed 2200 rpm.

\*Check the correct tension of the tail belt through the belt tensioner.

\*Fit the main blades and tail blades. (Fig.1 and Fig.2)

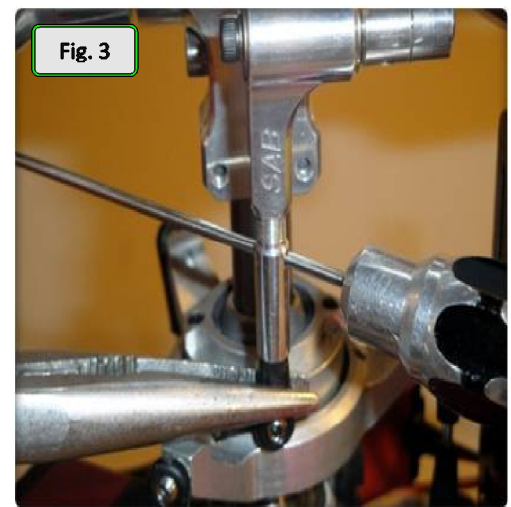
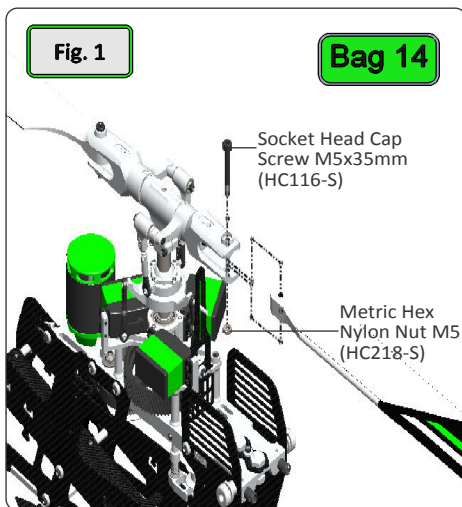
\*Please make sure the main blades are tight on the blade grips, you should be able to violently jerk the head in both directions and the blades should not fold. Failure to tighten the blades properly can result in a boom strike. To fold the blades for storage, it is advisable to loosen them.

\*Check the collective and cyclic pitch. For 3D flight, set about +/- 12°-13°.

\*It is important to check the correct tracking of the main blades.

\*On the Goblin, in order to correct the tracking, adjust the main link rod as shown in figure 3. This is provided with a right/left thread system that allows continuous fine adjustments of the length of the control rod; for this adjustment it is not necessary to detach the ball link.

**!** \*Perform the first flight at a low headspeed, 1700/1800 RPM.  
After this first flight, do a general check of the helicopter. Verify that all screws are correctly tightened.



## IN FLIGHT

During its first flights the Goblin has to be "run in".

The Damper, the main gear, the uniball and other parts must undergo some slight wear to operate smoothly. It is likely that during the very first flights the model may exhibit a swaying phenomena, particularly at low head speed.

This phenomena disappears after a few flights.

If you want to fly in a generic way, using both low headspeed and high headspeed, the standard setting is the best compromise.

However, if you prefer flying at low speed [ $< 2000$  rpm], for best results we recommend changing the tail pulley for a smaller one to increase tail rotor rpm. In this way, you will have extremely precise tail control even at low RPM. This pulley is available in the upgrade list [H0103-S]

It is important to check the rigidity of the head dampening frequently. This can be adjusted by adding or removing shims to preload the dampers. If you notice a loss of head stiffness over time, add a 0.2 mm shim to each side (HC232-S). It is extremely important that the blade grips do not have sideways play in the head, the head is already assembled and preloaded with 2 shims, if needed you can find two extra shims in the box [HC232 - Bag 14].





## MAINTENANCE

\*On the Goblin, areas to look for wear include:

- \* Motor belt
- \* Tail belt
- \* Damper
- \* Main gear and pinion

The lifespan of these components varies according to the type of flying. On average it is recommended to replace these special parts every **100** flights.

\*The head tends to lose rigidity after a while. Check this condition every **20** flights. Preloading with precision shim washers, it is possible to vary the rigidity of the head.

\*Check all uniballs often.

\*Check the head control linkages at the thread between the two aluminum parts (**figure 1**). The play present in this coupling is desired. Check after each flight that the play remains constant.

\*The most stressed bearings are definitely those of the tail shaft. Check them frequently. All other parts are not particularly subject to wear.

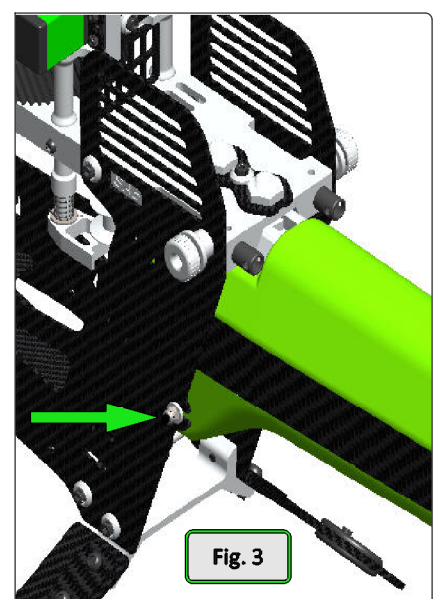
\*Periodically lubricate the tail slide movement and its linkages as well as the swashplate movement and its linkages.

\*Lubricate the main gear with silicone and Tri-Flow Synthetic grease, even though the gear is made of technopolymer, a high mineral based filler, it still requires some lubrication.

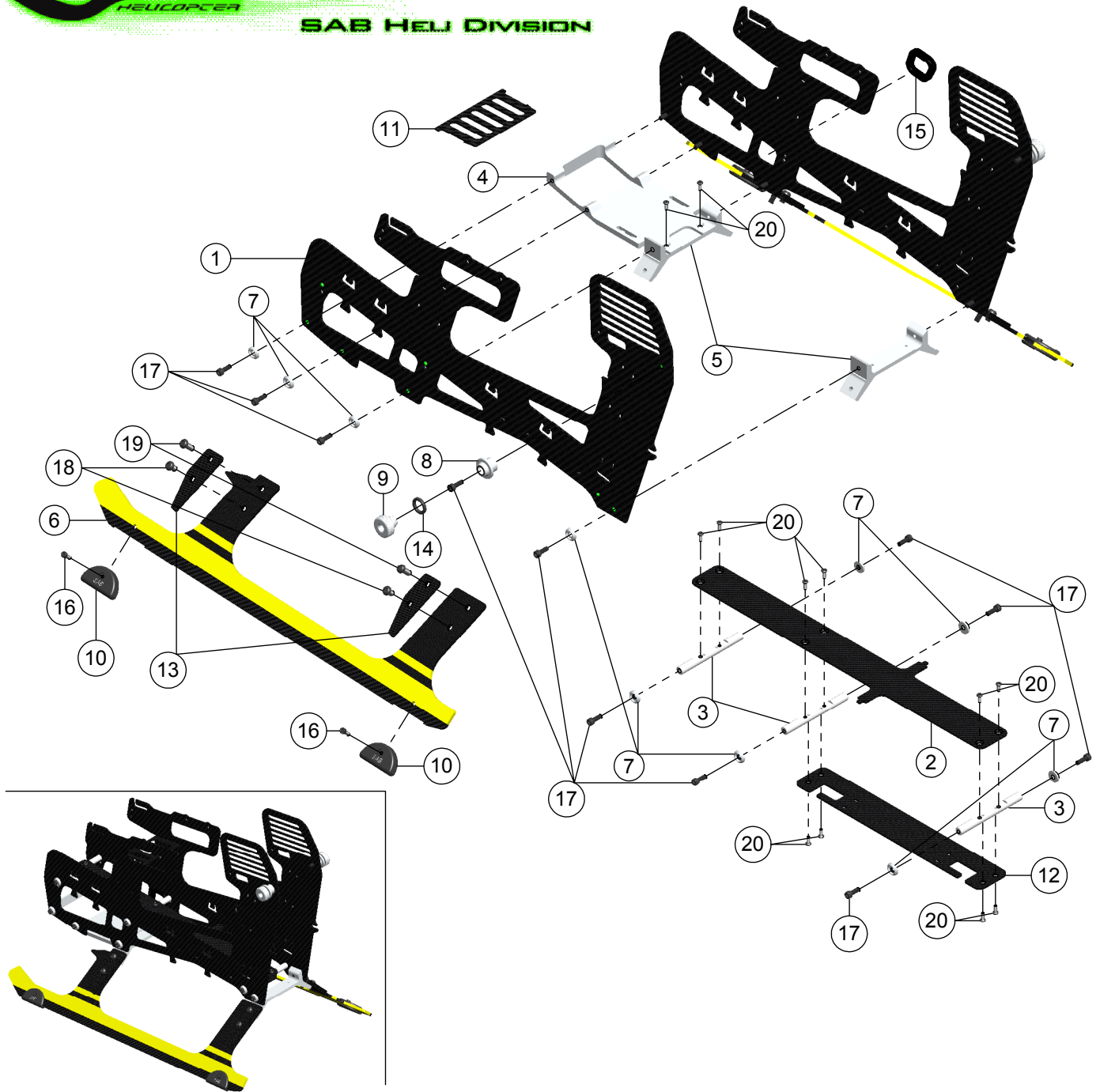
\*Check the screws that are highlighted in the following images frequently, make sure you remain tight (**fig.2** and **fig.3**).

\*To ensure safety you should do a general inspection of the helicopter after each flight. You should check:

- \* The maintenance of proper belt tension.
- \* The proper isolation of wires from the carbon and aluminum parts.
- \* That all screws remain tight.

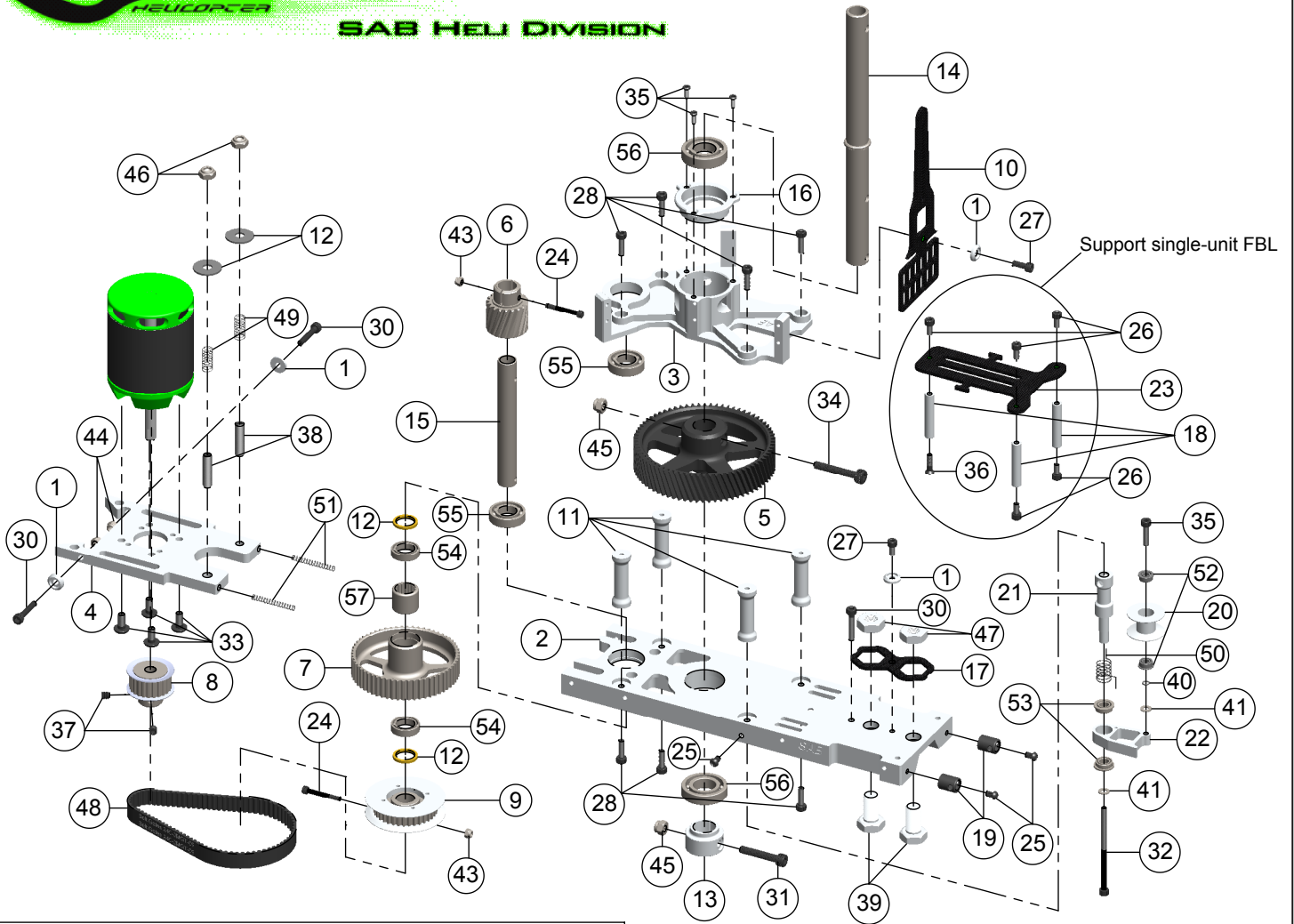






Main Frame				
POS	COD	Name	Specification	Quantity
1	H0001	Main Frames	Carbon Fiber	2
2	H0002	Battery Tray	Carbon Fiber	1
3	H0003	Frame Spacers	Aluminum	3
4	H0004	ESC Support	Aluminum	1
5	H0005	Landing Gear Supports	Aluminum	2
6	H0105	Yellow Landing Gears	Carbon Fiber	2
7	H0007	Finishing Washers M3	Aluminum	20
8	H0008	Canopy Positioners	Aluminum	2
9	H0036	Canopy Lockings	Aluminum	2
10	H0039	Landing Gear Protection	Plastic	4

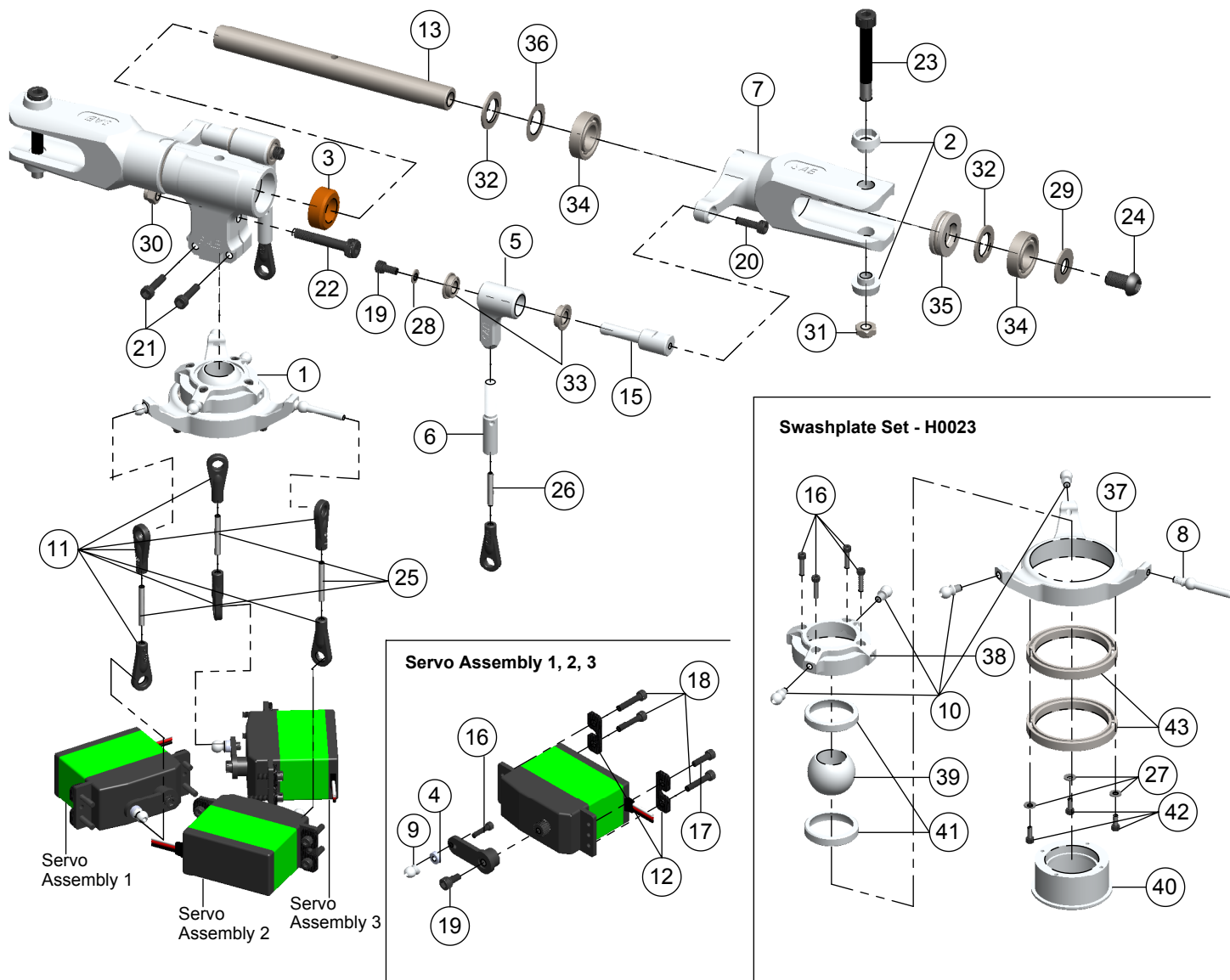
Main Frame				
POS	COD	Name	Specification	Quantity
11	H0042	Battery Protection	Carbon Fiber	1
12	H0073	Battery Support	Carbon Fiber	1
13	H0074	Landing Gear Struts	Carbon Fiber	4
14	HA008	Canopy ORs	Oring 3030	2
15	HA010	Cable Pass	Ø 16 x Ø 24 x 2mm	1
16	HC018	Socket Head Cap Screws	M2.5 x 6mm	4
17	HC050	Socket Head Cap Screws	M3 x 8mm	22
18	HC096	Button Head Cap Screws	M4 x 6mm	4
19	HC100	Button Head Cap Screws	M4 x 10mm	4
20	HC128	Flat Head Cap Screws	M2.5 x 5mm	12



TRANSMISSION ASSEMBLY				
POS	COD	Name	Specification	Quantity
1	H0007	Finishing Washers M3	Aluminum	4
2	H0009	Main Structure	Aluminum	1
3	H0010	Servo Support	Aluminum	1
4	H0011	Motor Support	Aluminum	1
5	H0012	Main Gear	68T M1	1
6	H0125	Drive Pinion	20T M1	1
7	H0104	Pulley	60T	1
8	H0015-21	Pulley	21T	1
9	H0101	Pulley	37T	1
10	H0017	Swash plate Anti-Rotation Guide	Carbon Fiber	1
11	H0018	Columns	Aluminum	4
12	H0110	Bush-One Ways	Ø10 x Ø13 x 1.4mm	2
13	H0121	M4 Locking Collar		1
14	H0122	Main Shaft		1
15	H0022	Tail Shaft		1
16	H0024	Main Shaft Bearing Support		1
17	H0038	Safety Locking Tail Boom	Carbon Fiber	1
18	H0043	Spacers Flybarless		3
19	H0050	Antenna Guide	Plastic	2
20	H0069	Tail Belt Idler		1
21	H0070	Belt Tensioner Support		1
22	H0071	Belt Tensioner Arm		1
23	H0077	Flybarless Support	Carbon Fiber	1
24	HC033	Socket Head Cap Screw Shoulderreds	M2.5 x 19mm	2
25	HC038	Button Head Cap Screws	M3 x 4mm	3
26	HC044	Socket Head Cap Screws	M3 x 6mm	5
27	HC050	Socket Head Cap Screws	M3 x 8mm	2
28	HC056	Socket Head Cap Screws	M3 x 10mm	7
29	HC062	Socket Head Cap Screw	M3 x 12mm	1

TRANSMISSION ASSEMBLY				
POS	COD	Name	Specification	Quantity
30	HC068	Socket Head Cap Screws	M3 x 16mm	3
31	HC104	Socket Head Cap Screw	M4 x 22mm	1
32	HC092	Socket Head Cap Screw	M3 x 50mm	1
33	HC098	Button Head Cap Screws	M4 x 8mm	4
34	HC110	Socket Head Cap Screw	M4 x 25mm	1
35	HC128	Flat Head Cap Screws	M2.5 x 5mm	3
36	HC134	Flat Head Cap Screw	M3 x 8mm	1
37	HC152	Set Screws	M4 x 4mm	2
38	HC158	Set Screws	M5 x 20mm	2
39	HC164	Vite Nylon Esa	M8 x 14mm	2
40	HC176	Washer	Ø3 x Ø4x0.5mm	1
41	HC180	Washers	Ø3.2 x Ø6 x 0.5mm	2
42	HC188	Washers	Ø5.3 x Ø15 x 1mm	2
43	HC200	Metric Hex Nylon Nuts	M2.5 H3.5mm	2
44	HC206	Metric Hex Nylon Nuts	M3 H4mm	2
45	HC212	Metric Hex Nylon Nuts	M4 H5mm	2
46	HC218	Metric Hex Nylon Nuts	M5 H4.8mm	2
47	HC224	Metric Hex Nuts Low	M8 H6.5mm	2
48	HC308	Belt Gates	240-3MGT-13	1
49	HC310	Springs	De 5.8-df0.3-LL9	2
50	HC312	Spring	De 8-df0.5-LL8	1
51	HC314	Springs	De 8-df0.5-LL12	2
52	HC402	Flanged Bearings	Ø3 x Ø7 x 3mm	2
53	HC410	Flanged Bearings	Ø5 x Ø9 x 3mm	2
54	HC420	Bearings	Ø10 x Ø15 x 4mm	2
55	HC422	Bearings	Ø10 x Ø19 x 5mm	2
56	HC426	Bearings	Ø12 x Ø24 x 6mm	2
57	HC442	One Way Bearing	Ø10 x Ø14 x 12mm	1

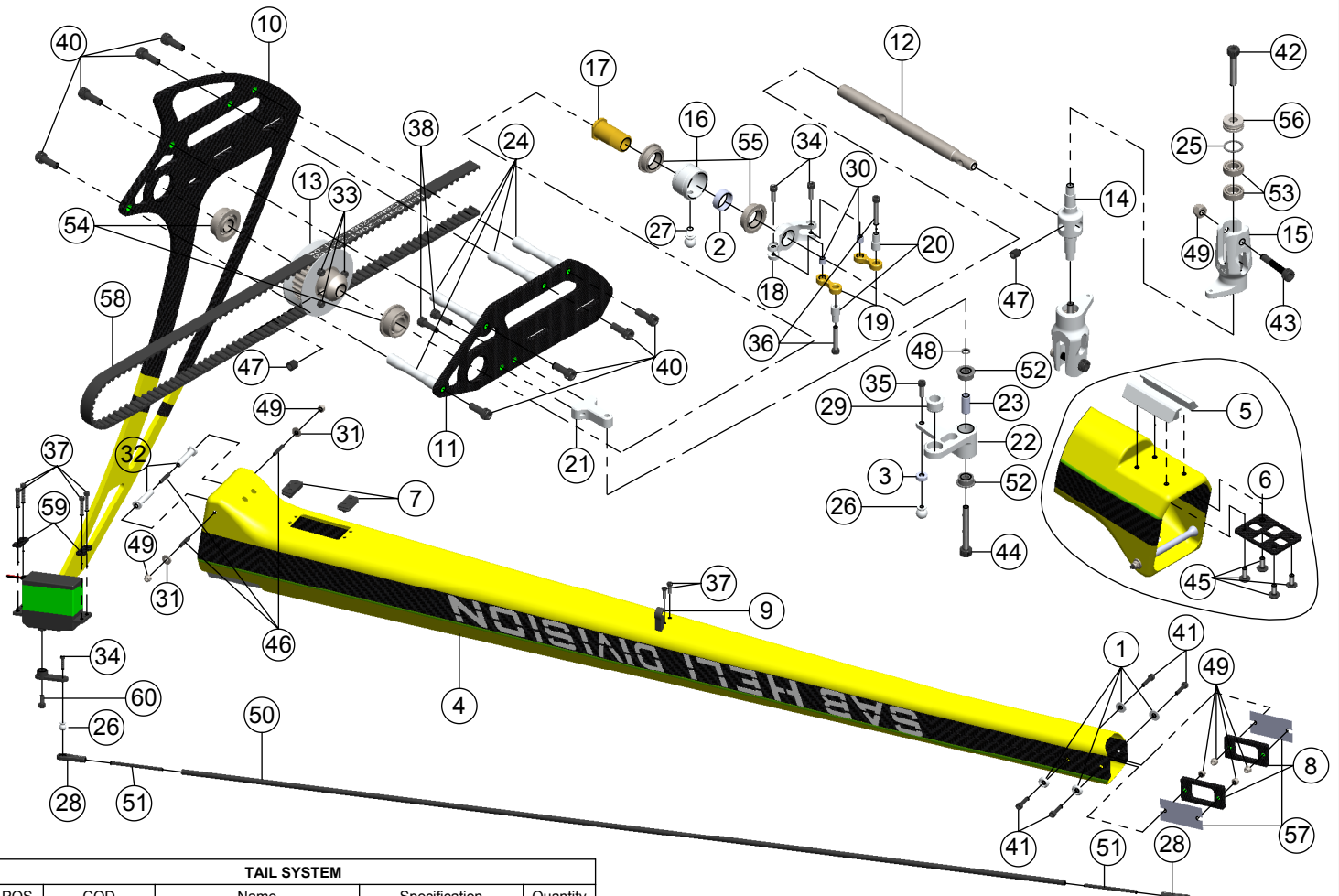




Head System				
POS	COD	Name	Specification	Quantity
1	H0023	Swashplate Set		1
2	H0025	Locking Nut Main Blade Grips	Aluminum	4
3	H0027	Damper Hards		2
4	H0031	Uniball Spacers		3
5	H0032	Blade Grip Links	Aluminum	2
6	H0033	Main Linkages	Aluminum	2
7	H0034	Main Blade Grips	Aluminum	2
8	H0063	Uniball	M3 x 4 Ø5 H18	1
9	H0064	Uniballs	M2.5 Ø5 H6	3
10	H0065	Uniballs	M3 x 4 Ø5 H3	4
11	H0066	Plastic Ball Linkages	Plastic	8
12	H0075	Servo Spacers	Carbon Fiber	6
13	H0079	Spindle		1
14	H0080	Center Hub	Aluminum	1
15	H0081	Center Hub Grip Links	Aluminum	2
16	HC008	Socket Head Cap Screws	M2 x 8mm	7
17	HC020	Socket Head Cap Screws	M2.5 x 8mm	3
18	HC026	Socket Head Cap Screws	M2.5 x 12mm	9
19	HC044	Socket Head Cap Screws	M3 x 6mm	4
20	HC056	Socket Head Cap Screws	M3 x 10mm	2
21	HC062	Socket Head Cap Screws	M3 x 12mm	2
22	HC104	Socket Head Cap Screw	M4 x 22mm	1

Head System				
POS	COD	Name	Specification	Quantity
23	HC116	Socket Head Cap Screw Shouldered	M5 x 35mm	2
24	HC122	Button Head Cap Screws	M6 x 10mm	2
25	HC140	Set Screws	M2.5 x 18mm	3
26	HC146	Set Screws	M2.5 x 15mm	2
27	HC170	Washers	Ø2 x Ø5 x 0.5mm	3
28	HC180	Washers	Ø3 x Ø6 x 0.5mm	2
29	HC194	Washers	Ø6 x Ø14 x 1.5mm	2
30	HC212	Metric Hex Nylon Nut	M4 H5	1
31	HC218	Metric Hex Nylon Nuts	M5 H4.8	2
32	HC230	Washers	Ø10 x Ø16 x 1mm	4
33	HC410	Flanged Bearings	Ø5 x Ø9 x 3mm	4
34	HC422	Bearings	Ø10 x Ø19 x 5mm	4
35	HC438	Thrust Bearings	Ø10 x Ø18 x 5.5mm	2
36	HC232	Washers	Ø10 x Ø16 x 0.2mm	2
37	H0023-01	Swashplate 01		1
38	H0023-02	Swashplate 02		1
39	H0023-03	Swashplate 03		1
40	H0023-04	Swashplate 04		2
41	H0023-05	Swashplate 05		1
42	HC002	Socket Head Cap Screws	M2 x 5mm	3
43	HC430	Bearing Rads	Ø30 x Ø37 x 4mm	2





TAIL SYSTEM

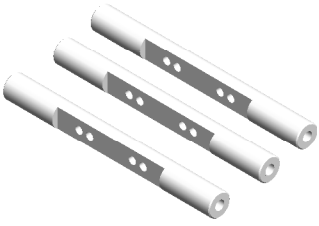



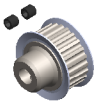
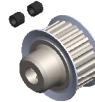
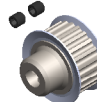
POS	COD	Name	Specification	Quantity
1	H0007	Finishing Washer M3	Aluminum	4
2	H0029	Spacer	Ø8.1 x Ø9.2 x 3.2mm	1
3	H0031	Uniball Spacer		1
4	H0037	Tail Boom	Carbon Fiber	1
5	H0037-01	Tail Boom Interface	Aluminum	1
6	H0037-02	Locking Interface	Carbon Fiber	1
7	H0040	Tail Servo Locks	Plastic	2
8	H0041	Locking Element Tails	Carbon Fiber	2
9	H0045	Linkage Tail Support	Plastic	1
10	H0046	Vertical Fin	Carbon fiber	1
11	H0047	Tail Side Plate	Carbon fiber	1
12	H0048	Tail Rotor Shaft		1
13	H0102	Tail Pulley	27T	1
14	H0051	Tail Rotor Hub		1
15	H0052	Tail Blade Grips	Aluminum	2
16	H0053	Tail Pitch Slider 01		1
17	H0054	Tail Pitch Slider 02		1
18	H0055	Tail Pitch Slider 03		1
19	H0056	Grip Links		2
20	H0057	Main Grip Link Bushs		2
21	H0058	Bell Crank Base	Aluminum	1
22	H0059	Bell Crank Lever	Aluminum	1
23	H0060	Spacer	Ø3 x Ø4 x 9.6mm	1
24	H0061	Tail Case Spacers	Aluminum	4
25	H0062	Spacers	Ø7 x Ø9 x 0.5mm	2
26	H0064	Uniballs	M2.5 Ø5 H6	2
27	H0065	Uniball	M3 x 4 Ø5 H3	1
28	H0066	Plastic Ball Links	Plastic	2
29	H0072	Bush Bell Crank		1
30	H0076	Grip Link Bushs		2
31	H0078	Washers	Ø3.1 x Ø12 x 1.8mm	2

TAIL SYSTEM


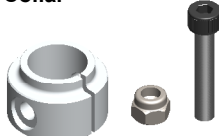
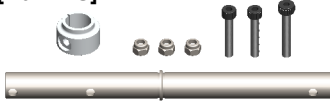
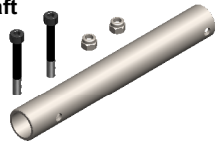

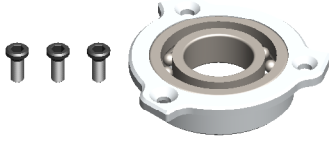
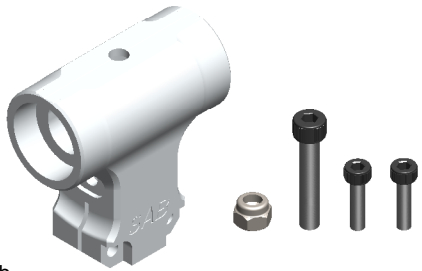
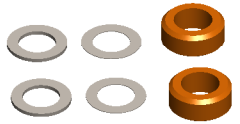




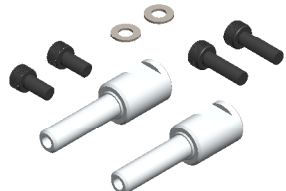
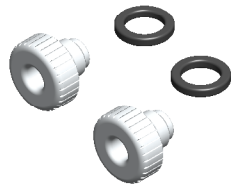


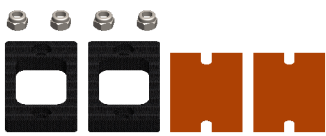



POS	COD	Name	Specification	Quantity
32	H0082	Boom Spacers		2
33	HC002	Socket Head Cap Screws	M2 x 5mm	6
34	HC004	Socket Head Cap Screws	M2 x 6mm	3
35	HC008	Socket Head Cap Screw	M2 x 8mm	1
36	HC014	Socket Head Cap Screws	M2 x 12mm	2
37	HC018	Socket Head Cap Screws	M2.5 x 6mm	2
38	HC020	Socket Head Cap Screws	M2.5 x 8mm	2
39	HC026	Socket Head Cap Screws	M2.5 x 12mm	4
40	HC050	Socket Head Cap Screws	M3 x 8mm	8
41	HC062	Socket Head Cap Screws	M3 x 12mm	4
42	HC068	Socket Head Cap Screws	M3 x 16mm	2
43	HC074	Socket Head Cap Screw Shoulderreds	M3 x 16mm	2
44	HC086	Socket Head Cap Screw	M3 x 22mm	1
45	HC098	Button Head Cap Screws	M4 x 8mm	4
46	HC150	Set Screws	M3 x 20mm	3
47	HC152	Set Screws	M4 x 4mm	2
48	HC176	Washer	Ø3 x Ø4 x 0.5mm	1
49	HC206	Metric Hex Nylon Nuts	M3	8
50	HC236	Carbon Rod	Ø2.5 x Ø4 x 682mm	1
51	HC242	Threaded Rods	M2.5 x 40mm	2
52	HC402	Flanged Bearings	Ø3 x Ø7 x 3mm	2
53	HC406	Bearings	Ø5 x Ø9 x 3mm	4
54	HC414	Flanged Bearings	Ø6 x Ø13 x 5mm	2
55	HC418	Flanged Bearings	Ø8 x Ø12 x 3.5mm	2
56	HC434	Thrust Bearings	Ø4 x Ø9 x 4mm	2
57	HA015	Double-Sided Tapes		2
58	HC304	Belt Gates	2061-3GT-06	1
59	H0075	Servo Spacers	Carbon Fiber	2
60		Screw supplied with Servo		1





<p><b>Main Frame [H0001-S]</b></p>  <p>- 1 x CF Main Frame.</p>	<p><b>Battery Tray [H0002-S]</b></p>  <p>- 1 x CF Battery Tray. - 6 x Flat Head Cap Screws M2.5x5mm.</p>	<p><b>Frame Spacer [H0003-S]</b></p>  <p>- 3 x Frame Spacers.</p>			
<p><b>ESC Support [H0004-S]</b></p>  <p>- 1 x ESC Support. - 2 x Flat Head Cap Screws M2.5x5mm.</p>	<p><b>Landing Gear Support [H0005-S]</b></p>  <p>- 1 x Landing Gear Support.</p>	<p><b>Yellow Landing Gear [H0105-S]</b></p>  <p>- 1 x CF Yellow Landing Gear.</p>			
<p><b>Finishing Washer M3 [H0007-S]</b></p>  <p>- 10 x Finishing Washers M3.</p>	<p><b>Canopy Positioner [H0008-S]</b></p>  <p>- 2 x Canopy Positioners.</p>	<p><b>Main Structure [H0009-S]</b></p>  <p>- 1 x Main Structure.</p>	<p><b>Servo Support [H0010-S]</b></p>  <p>- 1 x Servo Support.</p>		
<p><b>Motor Support [H0011-S]</b></p>  <p>- 1 x Motor Support. - 2 x Set Screws M5x20mm. - 2 x Washers 5.3x15x1mm. - 2 x Metric Hex Nylon Nuts M5H4.8. - 2 x Finishing Washers M3. - 2 x Socket Head Cap Screws M3x16mm. - 2 x Metric Hex Nylon Nuts M3H4. - 2 x Springs de 5.8/ df0.5 / LL9. - 2 x Springs de 3/ df0.5 / LL12.</p>	<p><b>68T Main Gear [H0012-S]</b></p>  <p>- 1 x 68T Main Gear . - 1 x Socket Head Cap Screw M4x25mm. - 1 x Metric Hex Nylon Nut M4 H5.</p>	<p><b>20T Drive Pinion [H0125-S]</b></p>  <p>- 1 x 20T Drive Pinion. - 1 x Socket Head Cap Screw Shouldered M2.5x19mm. - 1 x Metric Hex Nylon Nut M2.5 H3.5.</p>	<p><b>60T Pulley [H0104-S]</b></p>  <p>- 1 x 60T Pulley . - 2 x Bush One Ways. - 2 x Bearings 10x15x4mm - 1 x One Way Bearing 10x14x12mm.</p>		
<p><b>16T Pulley [H0015-16-S]</b></p>  <p>- 1 x 16T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>18T Pulley [H0015-18-S]</b></p>  <p>- 1 x 18T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>19T Pulley [H0015-19-S]</b></p>  <p>- 1 x 19T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>20T Pulley [H0015-20-S]</b></p>  <p>- 1 x 20T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>21T Pulley [H0015-21-S]</b></p>  <p>- 1 x 21T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>22T Pulley [H0015-22-S]</b></p>  <p>- 1 x 22T Pulley. - 2 x Set Screws M4x4.</p>
<p><b>23T Pulley [H0015-23-S]</b></p>  <p>- 1 x 23T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>24T Pulley [H0015-24-S]</b></p>  <p>- 1 x 24T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>26T Pulley [H0015-26-S]</b></p>  <p>- 1 x 26T Pulley. - 2 x Set Screws M4x4.</p>	<p><b>37T Pulley [H0101-S]</b></p>  <p>- 1 x 37T Pulley. - 4 x Socket Head Cap Screws M2x8mm - 1 x Socket Head Cap Screw Shouldered M2.5x19mm. - 1 x Metric Hex Nylon Nut M2.5H3.5.</p>	<p><b>Swashplate Anti-Rotation Guide [H0017-S]</b></p>  <p>- 1 x CF Swashplate Anti-Rotation Guide. - 1 x Finishing Washer M3. - 1 x Socket Head Cap Screw M3x8mm.</p>	

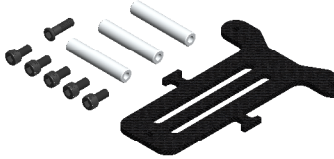



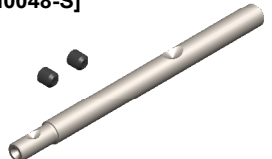
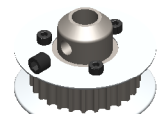
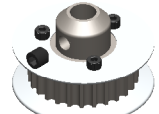



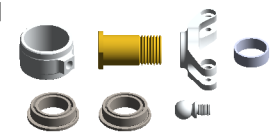
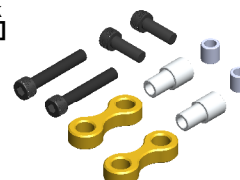

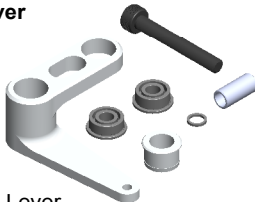
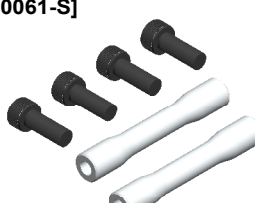

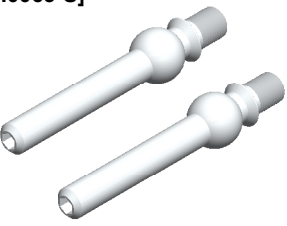

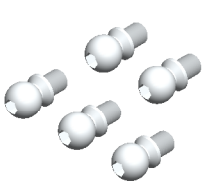

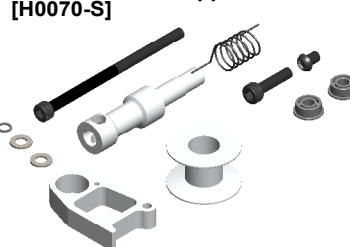
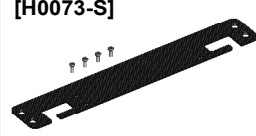
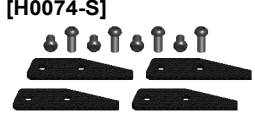

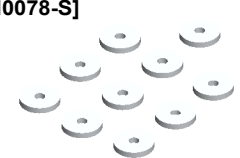


<p><b>Column [H0018-S]</b></p>  <p>- 4 x Columns.</p>	<p><b>M4 Locking Collar [H0121-S]</b></p>  <p>- 1 x M4 Locking Collar. - 1 x Socket Head Cap Screw M4x22mm. - 1 x Metric Hex Nylon Nut M4 H5.</p>	<p><b>Main Shaft [H0122-S]</b></p>  <p>- 1 x Main Shaft. - 1 x M4 Locking Collar - 1 x Socket Head Cap Screw M4x25mm. - 2 x Socket Head Cap Screws M4x22mm. - 3 x Metric Hex Nylon Nuts M4 H5.</p>	<p><b>Secondary Shaft [H0022-S]</b></p>  <p>- 1 x Secondary Shaft. - 2 x Socket Head Cap Screws Shouldered M2.5x19mm. - 2 x Metric Hex Nylon Nut M2.5 H2.5.</p>
<p><b>Swashplate [H0023-S]</b></p>  <p>- 1 x Swashplate Assembly. - 2 x Bearings 30x Ø37x4mm. - 4 x Uniballs M3x4 Ø5 H3. - 1 x Uniball M3x4 Ø5 H18. - 3 x Socket Head Cap Screws M2x5mm. - 4 x Socket Head Cap Screws M2x8mm.</p>	<p><b>Bearing Support [H0024-S]</b></p>  <p>- 1 x Bearing Support. - 1 x Bearing Ø12xØ24x6mm. - 3 x Flat Head Cap Screws M2.5x5mm.</p>	<p><b>Center Hub [H0080-S]</b></p>  <p>- 1 x Center Hub. - 1 x Socket Head Cap Screw M4x22mm. - 1 x Metric Hex Nylon Nut M4 H5. - 2 x Socket Head Cap Screws M3x12mm.</p>	
<p><b>Damper [H0027-S]</b></p>  <p>- 2 x Dampers. - 2 x Shims Ø10xØ16x1mm. - 2 x Shims Ø10xØ16x0.2mm.</p>	<p><b>Spindle [H0079-S]</b></p>  <p>- 1 x Spindle. - 2 x Button Head Cap Screws M6x10mm. - 2 x Washers Ø6xØ14x1mm.</p>	<p><b>Blade Grip Arm [H0032-S]</b></p>  <p>- 2 x Blade Grip Arms. - 4 x Flange Bearings Ø5xØ9x3mm (MF95ZZ).</p>	<p><b>Main Linkage [H0033-S]</b></p>  <p>- 2 x Main Linkages. - 2 x Plastic Balls Link. - 2 x Set Screws M2.5x15mm.</p>
<p><b>Blade Grip [H0034-S]</b></p>  <p>- 1 x Blade Grip. - 2 x Bush Blade Grips.</p>	<p><b>Center Blade Grip Arm [H0081-S]</b></p>  <p>- 2 x Center Blade Grip Arms. - 2 x Socket Head Cap Screws M3x6mm. - 2 x Socket Head Cap Screws M3x10mm. - 2 x Washers Ø3.2xØ6x0.5mm</p>	<p><b>Canopy Locking [H0036-S]</b></p>  <p>- 2 x Canopy Lockings. - 2 x Canopy ORs.</p>	<p><b>Safety Lock Tail Boom [H0038-S]</b></p>  <p>- 1 x Safety Lock Tail Boom. - 1 x Finishing Washer M3. - 1 x Socket Head Cap Screw M3x8mm.</p>
<p><b>Tail Boom [H0037-S]</b></p>  <p>- 1 x Tail Boom. - 1 x Tail Boom Interface. - 1 x Locking Interface. - 2 x Tube Spacers. - 2 x Locking Element Tails. - 4 x Button Head Cap Screws M4x8mm.</p> <p>- 3 x Set Screws M3x20mm. - 2 x Washers Ø3.1xØ12x1.8mm. - 2 x Metric Hex Nylon Nuts M3 H4. - 2 x Vite Nylon Esa M8x14mm. - 2 x Metric Hex Nuts M8 H6.5. - 2 x Double Sided Tapes.</p>			
<p><b>Locking Element Tail [H0041-S]</b></p>  <p>- 2 x Locking Element Tails. - 4 x Metric Hex Nylon Nuts M3. - 2 x Double Sided Tapes.</p>	<p><b>Sliding Landing Gear [H0039-S]</b></p>  <p>- 4 x Sliding Landing Gears. - 4 x Socket Head Cap Screws M2.5x6mm.</p>	<p><b>Tail Servo Lock [H0040-S]</b></p>  <p>- 2 x Tail Servo Locks. - 2 x Servo Spacers. - 4 x Socket Head Cap Screws M2.5x12mm.</p>	<p><b>Battery Protection [H0042-S]</b></p>  <p>- 1 x Battery Protection.</p>


































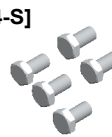
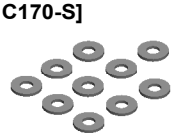

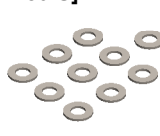

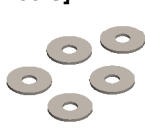








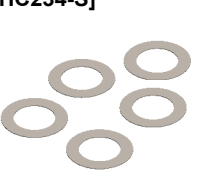


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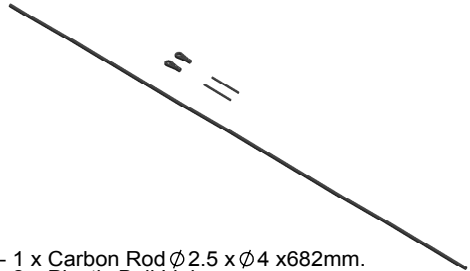
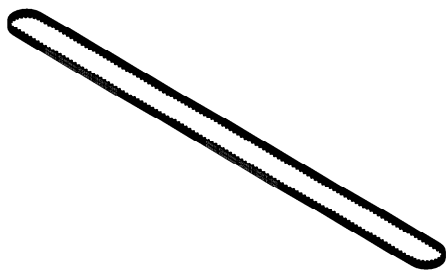

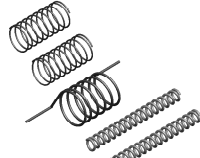

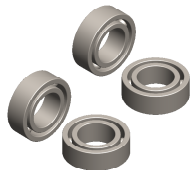







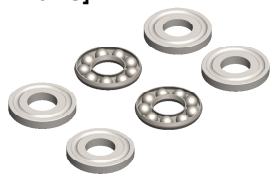
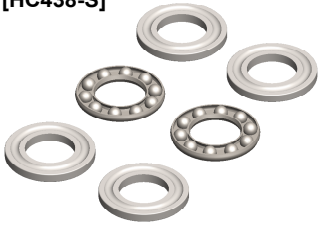
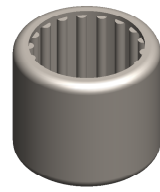

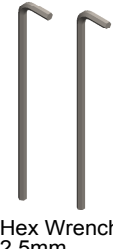





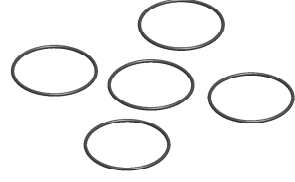



<p><b>Spacer Flybarless [H0043-S]</b></p>  <ul style="list-style-type: none"> <li>- 3 x Spacer Flybarless.</li> <li>- 1 x Supporto Flybarless.</li> <li>- 1 x Flat Head Cap Screw M3x8mm.</li> <li>- 5 x Socket Head Cap Screws M3x6mm.</li> </ul>	<p><b>Linkage Tail Support [H0045-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Linkage Tail Support.</li> <li>- 2 x Socket Head Cap Screws M2.5x6mm.</li> </ul>	<p><b>Vertical Fin [H0046-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Vertical Fin.</li> <li>- 2 x Socket Head Cap Screws M3x12mm.</li> <li>- 2 x Finishing Washers M3.</li> </ul>	<p><b>Tail Side Plate [H0047-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Tail Side Plate.</li> <li>- 2 x Socket Head Cap Screws M3x12mm.</li> <li>- 2 x Finishing Washers M3.</li> </ul>	
<p><b>Tail Rotor Shaft [H0048-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Tail Rotor Shaft.</li> <li>- 2 x Set Screws M4x4mm.</li> </ul>	<p><b>26T Tail Pulley [H0103-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x 26T Tail Pulley.</li> <li>- 1 x Set Screw M4x4mm.</li> <li>- 6 x Socket Head Cap Screws M2x5mm.</li> </ul>	<p><b>27T Tail Pulley [H0102-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x 27T Tail Pulley.</li> <li>- 1 x Set Screw M4x4mm.</li> <li>- 6 x Socket Head Cap Screws M2x5mm.</li> </ul>	<p><b>Antenna Guide [H0050-S]</b></p>  <ul style="list-style-type: none"> <li>- 2 x Antenna Guide.</li> <li>- 2 x Button Head Cap Screws M3x4mm.</li> </ul>	<p><b>Tail Rotor Hub [H0051-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Tail Rotor Hub.</li> <li>- 1 x Set Screw M4x4mm.</li> <li>- 2 x Socket Head Cap Screws M3x16mm.</li> </ul>
<p><b>Tail Blade Grip [H0052-S]</b></p>  <ul style="list-style-type: none"> <li>- 2 x Tail Blade Grips.</li> <li>- 2 x Socket Head Cap Screws M3x16mm.</li> <li>- 4 x Bearings <math>\phi 5x\phi 9x3mm</math>.</li> </ul>	<p><b>Tail Pitch Slider [H0053-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Tail Pitch Slider 01.</li> <li>- 1 x Tail Pitch Slider 02.</li> <li>- 1 x Tail Pitch Slider 03.</li> <li>- 1 x Spacer <math>\phi 8x\phi 9x3.2mm</math>.</li> <li>- 1 x Uniball M3x4 <math>\phi 5H3</math>.</li> <li>- 2 x Flanged Bearings <math>\phi 8x\phi 12x3.5mm</math></li> </ul>	<p><b>Grip Link [H0056-S]</b></p>  <ul style="list-style-type: none"> <li>- 2 x Grips Link.</li> <li>- 2 x Main Grip Link Bush.</li> <li>- 2 x Grip Link Bush.</li> <li>- 2 x Socket Head Cap Screws M2x12mm.</li> <li>- 2 x Socket Head Cap Screws M2x6mm.</li> </ul>	<p><b>Bell Crank Base [H0058-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Bell Crank Base.</li> </ul>	
<p><b>Bell Crank Lever [H0059-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Bell Crank Lever.</li> <li>- 1 x Bush Bell Crank.</li> <li>- 1 x Washer <math>\phi 3x\phi 4x0.5mm</math>.</li> <li>- 1 x Spacer <math>\phi 3x\phi 4x9.6mm</math>.</li> <li>- 1 x Socket Head Cap Screw M3x22mm.</li> <li>- 2 x Flanged Bearings <math>\phi 3x\phi 7x3mm</math>.</li> </ul>	<p><b>Tail Case Spacer [H0061-S]</b></p>  <ul style="list-style-type: none"> <li>- 2 x Tail Case Spacers.</li> <li>- 4 x Socket Head Cap Screws M3x8mm.</li> </ul>	<p><b>Spacer <math>\phi 7x\phi 9x0.5mm</math> [H0062-S]</b></p>  <ul style="list-style-type: none"> <li>- 4 x Spacers <math>\phi 3x\phi 4x0.5mm</math></li> </ul>	<p><b>Uniball M3x4 <math>\phi 5H18</math> [H0063-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x Uniball M3x4 <math>\phi 5H18</math></li> </ul>	
<p><b>Uniball M2 <math>\phi 5H6</math> [H0064-S]</b></p>  <ul style="list-style-type: none"> <li>- 5 x Uniballs M2 <math>\phi 5H6</math>.</li> <li>- 5 x Uniball Spacers.</li> <li>- 5 x Socket Head Cap Screws M2x8mm.</li> <li>- 5 x Socket Head Cap Screws M2x6mm.</li> </ul>	<p><b>Uniball M3x4 <math>\phi 5H3</math> [H0065-S]</b></p>  <ul style="list-style-type: none"> <li>- 5 x Uniballs M3x4 <math>\phi 5H3.5</math>.</li> </ul>	<p><b>Plastic Ball Link [H0066-S]</b></p>  <ul style="list-style-type: none"> <li>- 10 x Plastic Ball Links</li> </ul>	<p><b>Belt Tensioner Support [H0070-S]</b></p> 	
<p><b>RX Battery Support [H0073-S]</b></p>  <ul style="list-style-type: none"> <li>- 1 x RX Battery Support.</li> <li>- 4 x Flat Head Cap Screws M2.5x5mm.</li> </ul>	<p><b>Landing Gear Struts [H0074-S]</b></p>  <ul style="list-style-type: none"> <li>- 4 x Landing Gear Struts.</li> <li>- 4 x Button Head Cap Screws M4x6mm.</li> <li>- 4 x Button Head Cap Screws M4x10mm.</li> </ul>	<p><b>Servo Spacer [H0075-S]</b></p>  <ul style="list-style-type: none"> <li>- 10 x Servo Spacers.</li> </ul>	<p><b>Washer <math>\phi 3.1x\phi 12x1.8mm</math> [H0078-S]</b></p>  <ul style="list-style-type: none"> <li>- 10 x Washers <math>\phi 3.1x\phi 12x1.8mm</math>.</li> </ul>	<ul style="list-style-type: none"> <li>- 1 x Belt Tensioner Support.</li> <li>- 1 x Tail Belt Idler.</li> <li>- 1 x Belt Tensioner Arm.</li> <li>- 2 x Flanged Bearings <math>\phi 3x\phi 7x3mm</math>.</li> <li>- 2 x Flanged Bearings <math>\phi 5x\phi 9x3mm</math>.</li> <li>- 1 x Socket Head Cap Screw M3x50mm.</li> <li>- 1 x Washer <math>\phi 3x\phi 4x0.5mm</math>.</li> <li>- 1 x Socket Head Cap Screw M3x12mm.</li> <li>- 2 x Washers <math>\phi 3.2x\phi 6x0.5mm</math>.</li> <li>- 1 x Button Head Cap Screw M3x4mm.</li> <li>- 1 x Spring De8/df0.5/LL8.</li> </ul>



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<p><b>[HC002-S]</b></p>  <p>-10 x Socket Head Cap Screws M2x5mm.</p>	<p><b>[HC004-S]</b></p>  <p>-10 x Socket Head Cap Screws M2x6mm.</p>	<p><b>[HC008-S]</b></p>  <p>-10 x Socket Head Cap Screws M2x8mm.</p>	<p><b>[HC014-S]</b></p>  <p>-10 x Socket Head Cap Screws M2x12mm.</p>	<p><b>[HC018-S]</b></p>  <p>-10 x Socket Head Cap Screws M2.5x6mm.</p>	<p><b>[HC020-S]</b></p>  <p>-10 x Socket Head Cap Screws M2.5x8mm.</p>
<p><b>[HC026-S]</b></p>  <p>-10 x Socket Head Cap Screws M2.5x12mm.</p>	<p><b>[HC033-S]</b></p>  <p>- 4 x Socket Head Cap Screw Shouldered M2.5x19mm. - 4 x Metric Hex Nylon Nuts M2.5H3.5.</p>	<p><b>[HC038-S]</b></p>  <p>- 5 x Button Head Cap Screws M3x4mm.</p>	<p><b>[HC044-S]</b></p>  <p>-10 x Socket Head Cap Screws M3x6mm.</p>	<p><b>[HC050-S]</b></p>  <p>-10 x Socket Head Cap Screws M3x8mm.</p>	<p><b>[HC056-S]</b></p>  <p>-10 x Socket Head Cap Screws M3x10mm.</p>
<p><b>[HC062-S]</b></p>  <p>-10 x Socket Head Cap Screws M3x12mm.</p>	<p><b>[HC068-S]</b></p>  <p>-10 x Socket Head Cap Screws M3x16mm.</p>	<p><b>[HC074-S]</b></p>  <p>-2 x Socket Head Cap Screw Shouldered M3x16mm. -2 x Metric Hex Nylon Nuts M3H4.</p>	<p><b>[HC086-S]</b></p>  <p>-5 x Socket Head Cap Screws M3x22mm.</p>	<p><b>[HC092-S]</b></p>  <p>-2 x Socket Head Cap Screw Shouldered M3x50mm.</p>	
<p><b>[HC096-S]</b></p>  <p>-10 x Button Head Cap Screws M4x6mm.</p>	<p><b>[HC098-S]</b></p>  <p>-10 x Button Head Cap Screws M4x8mm.</p>	<p><b>[HC100-S]</b></p>  <p>-10 x Button Head Cap Screws M4x10mm.</p>	<p><b>[HC104-S]</b></p>  <p>-10 x Socket Head Cap Screws M4x22mm.</p>	<p><b>[HC110-S]</b></p>  <p>-10 x Socket Head Cap Screw M4x25mm.</p>	
<p><b>[HC116-S]</b></p>  <p>- 2 x Socket Head Cap Screw Shouldered M5x34mm. - 2 x Metric Hex Nylon Nuts M5H4.8.</p>	<p><b>[HC122-S]</b></p>  <p>-10 x Button Head Cap Screws M6x10mm.</p>	<p><b>[HC128-S]</b></p>  <p>-5 x Flat Head Cap Screws M2.5x5mm.</p>	<p><b>[HC134-S]</b></p>  <p>-5 x Flat Head Cap Screws M3x8mm.</p>	<p><b>[HC140-S]</b></p>  <p>- 10 x Set Screw M2.5x18mm.</p>	<p><b>[HC146-S]</b></p>  <p>- 10 x Set Screws M2.5x15mm.</p>
<p><b>[HC150-S]</b></p>  <p>- 10 x Set Screws M3x20mm.</p>	<p><b>[HC152-S]</b></p>  <p>- 10 x Set Screws M4x4mm.</p>	<p><b>[HC158-S]</b></p>  <p>- 5 x Set Screws M5x20mm.</p>	<p><b>[HC164-S]</b></p>  <p>- 5 x Vite Nylon Esa Cap M8x14mm.</p>	<p><b>[HC170-S]</b></p>  <p>- 10 x Washers Ø 2.2x Ø 5x0.3mm.</p>	<p><b>[HC176-S]</b></p>  <p>- 5 x Washers Ø 3x Ø 4x0.5mm.</p>
<p><b>[HC180-S]</b></p>  <p>- 10 x Washers Ø 3.3x Ø 6x0.5mm.</p>	<p><b>[HC182-S]</b></p>  <p>- 10 x Washers Ø 3.3x Ø 9x0.8mm.</p>	<p><b>[HC188-S]</b></p>  <p>- 5 x Washers Ø 5.3x Ø 15x1mm.</p>	<p><b>[HC194-S]</b></p>  <p>- 5 x Washers Ø 6x Ø 14x1.5mm.</p>	<p><b>[HC200-S]</b></p>  <p>- 10 x Metric Hex Nylon Nuts M2.5H3.5.</p>	<p><b>[HC206-S]</b></p>  <p>- 10 x Metric Hex Nylon Nuts M3H4.</p>
<p><b>[HC212-S]</b></p>  <p>- 10 x Metric Hex Nylon Nuts M4 H5.</p>	<p><b>[HC218-S]</b></p>  <p>- 5 x Metric Hex Nylon Nuts M5 H4.8.</p>	<p><b>[HC224-S]</b></p>  <p>- 5 x Metric Hex Nuts M8 H6.5.</p>	<p><b>[HC230-S]</b></p>  <p>- 5 x Shim Washers Ø 10x Ø 16x1mm.</p>	<p><b>[HC232-S]</b></p>  <p>- 5 x Shim Washers Ø 10x Ø 16x0.2mm.</p>	<p><b>[HC234-S]</b></p>  <p>- 5 x Shim Washers Ø 10x Ø 16x0.1mm.</p>



<p><b>[HC236-S]</b></p>  <p>- 1 x Carbon Rod <math>\varnothing 2.5 \times \varnothing 4 \times 682\text{mm}</math>. - 2 x Plastic Ball Links. - 2 x Threaded Rods M2.5x40mm.</p>	<p><b>[HC304-S]</b></p>  <p>- 1 x Belt Gates 2061-3GT-06.</p>	<p><b>[HC308-S]</b></p>  <p>- 1 x Belt Gates 240-3MGT-13.</p>			
<p><b>[HC315-S]</b></p>  <p>- 2 x Springs de 5.8/df 0.3/LL9. - 1 x Spring de 8/df 0.5/LL8. - 2 x Springs de 3/df 0.5/LL12.</p>	<p><b>[HC402-S]</b></p>  <p>- 4 x Flanged Bearings <math>\varnothing 3 \times \varnothing 7 \times 3\text{mm}</math>.</p>	<p><b>[HC406-S]</b></p>  <p>- 4 x Bearings <math>\varnothing 5 \times \varnothing 9 \times 3\text{mm}</math>.</p>	<p><b>[HC410-S]</b></p>  <p>- 4 x Flanged Bearings <math>\varnothing 5 \times \varnothing 9 \times 3\text{mm}</math>.</p>	<p><b>[HC414-S]</b></p>  <p>- 2 x Flanged Bearings <math>\varnothing 6 \times \varnothing 13 \times 5\text{mm}</math>.</p>	<p><b>[HC418-S]</b></p>  <p>- 2 x Flanged Bearings <math>\varnothing 8 \times \varnothing 12 \times 3.5\text{mm}</math>.</p>
<p><b>[HC420-S]</b></p>  <p>- 2 x Bearings <math>\varnothing 10 \times \varnothing 15 \times 4\text{mm}</math>.</p>	<p><b>[HC422-S]</b></p>  <p>- 4 x Bearings <math>\varnothing 10 \times \varnothing 19 \times 5\text{mm}</math>.</p>	<p><b>[HC426-S]</b></p>  <p>- 2 x Bearings <math>\varnothing 12 \times \varnothing 24 \times 6\text{mm}</math>.</p>	<p><b>[HC430-S]</b></p>  <p>- 2 x Bearing Rads <math>\varnothing 30 \times \varnothing 37 \times 4\text{mm}</math>.</p>	<p><b>[HC434-S]</b></p>  <p>- 2 x Thrust Bearings <math>\varnothing 4 \times \varnothing 9 \times 4\text{mm}</math>.</p>	
<p><b>[HC438-S]</b></p>  <p>- 2 x Thrust Bearings <math>\varnothing 10 \times \varnothing 18 \times 5.5\text{mm}</math>.</p>	<p><b>[HC442-S]</b></p>  <p>- 1 x One Way Bearing <math>\varnothing 10 \times \varnothing 14 \times 12\text{mm}</math>.</p>	<p><b>[HA001-S]</b></p>  <p>- 1 x Foam Blade Holder.</p>	<p><b>[HA002-S]</b></p>  <p>- 2 x Hex Wrenches 2.5mm.</p>	<p><b>[HA016-S]</b></p>  <p>- 1 x Plastic Wrench Nut M8 &amp; M6.</p>	
<p><b>[HA006-S]</b></p>  <p>- 1 x Canopy Mousse 80cm.</p>	<p><b>[HA008-S]</b></p>  <p>- 5 x Canopy ORs.</p>	<p><b>[HA0010-S]</b></p>  <p>- 1 x Cable Pass.</p>	<p><b>[HA011-S]</b></p>  <p>- 2 x Canopy Grommets.</p>	<p><b>[HA012-S]</b></p>  <p>- 5 x Battery ORs.</p>	
<p><b>[BG4690]</b></p>  <p>- SAB 690mm Carbon Fiber Main Blade.</p>	<p><b>[BG5115]</b></p>  <p>- SAB 115mm Carbon Fiber Tail Blade.</p>	<p><b>Bush One Way [H0110-S]</b></p>  <p>- 4 x Bush One Ways.</p>			





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