MANUAL

IL S2D

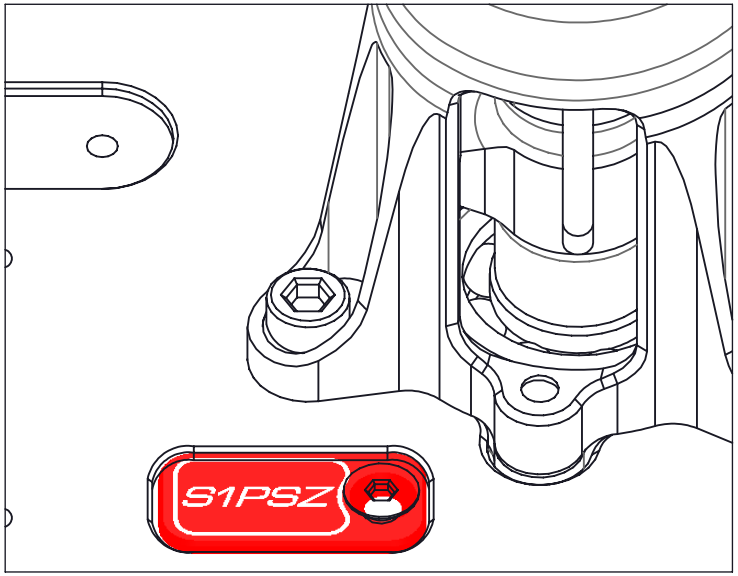
IL GOBLIN S4

IL GOBLIN

THE ITALIAN HELI

SAB HELI DIVISION

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* for updates and other important information.



VERY IMPORTANT

You will find your serial number on the RED plate inside the bag for page 7.
Please take a moment to register your kit online via our web site at:

http://www.goblin-helicopter.com

It is extremely important that you take a moment to register your helicopter with us. This is the only way to ensure that you are properly informed about changes to your kit, such as upgrades, retrofits and other important developments. SAB Heli Division cannot be held responsible for any issues with your model and will not provide support unless you register your model.

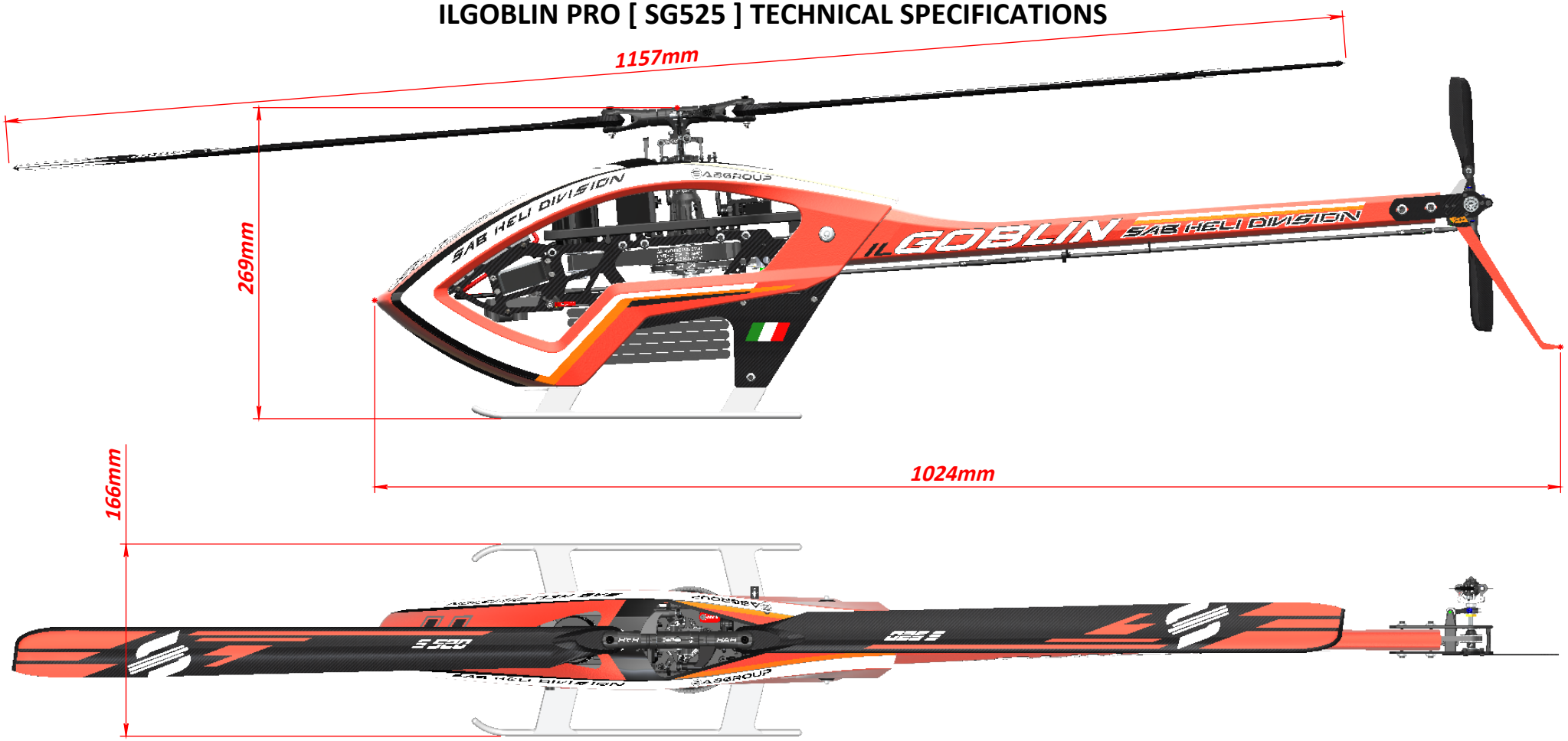
The Serial number is also engraved in the Aluminum part.

Thank you for your purchase, we hope you enjoy your new Goblin helicopter!

SAB Heli Division

INDEX

ILGOBLIN PRO [SG525] TECHNICAL SPECIFICATIONS



RTF Weight without battery: 1894gr.
Main rotor diameter: 1157mm (with 520mm blades).
MAX Length of the main blades: 525mm.
Length of the tail blades: 82mm.
Mini size Cylic servos: 35mm.
Standard tail servo: 40mm.
Maximum dimensions of the battery: 48x48x150mm.

KIT Includes:

- 1 Battery Tray with straps and connectors.

Recommended battery: 6S 3600/4500 mAh.
Recommended battery weight: 550-650gr.
Recommended ESC: 6S-150A.
Motor size: 4020 (800-900Kv).
Main ratio: 1:5/6 (5.53:1 Included).
Tail ratio: 3.88:1.

- 520mm Main Blades.
- 82mm Tail Blades.

IMPORTANT SAFETY WARNING

* This radio-controlled helicopter is not a toy. It should only be assembled, setup and operate by adult.
* This radio-controlled helicopter can be very dangerous.
* This radio-controlled helicopter is a technically complex device which must 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.
* Inexperienced pilots must be monitored by expert pilots.
* 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.
* 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.
* Fly only in areas dedicated to the use of model helicopters.
* Follow all control procedures for your radio frequency system >>>> Follow instructions and information provided by radio system, electronic speed controller, flight control system (gyro) manufacturers regarding safety, radio frequency control, setup/configuration, operations and other best practices.
* It is necessary that you know your radio system well. Check all functions of the transmitter before every flight. >>>> It is crucial that you know your radio system, electronic speed controller and flight control system well. Properly check all their functions and connections 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

ASSUMPTION OF RISK

Neither SAB Heli Division nor its agents have any control over the assembly, maintenance, and use of this product.
For this reason, SAB Heli Division is not responsible for injury, death or damage to people, things and / or to the product.
By assembling any component of this product, the user declares to have read and understood the following terms and conditions and agrees to be bound by them.
Failure to observe the above warnings and precautions may increase the risk of serious injury or death to yourself or surrounding people, damage to the product, or both.
SAB Heli Division shall not even be liable for special, indirect, or consequential damages, loss of profits or production or commercial loss in any way connected with the product, whether such claim is based in contract, warranty, negligence, or strict liability.
Further, in no event shall the liability of SAB Heli Division exceed the individual price of the Product on which liability is asserted.
By the act of use, setup, or assembly the user accepts all resulting liability.
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.
If you as the Purchaser or user are not prepared to accept the liability associated with the use of this Product, you are advised to return this Product immediately in new an unused condition to the place of purchase.

WARRANTY

SAB Heli Division reserves the right to change or modify this warranty without notice and disclaims all other warranties, express or implied.

(a) This warranty is limited to the original Purchaser ("Purchaser") and is not transferable. Replacement as provided under this warranty is the exclusive remedy of the purchaser This warranty covers only those products purchased from an authorized SAB Heli Division dealer. Third party transactions are not covered by this warranty. Proof of purchase is required for warranty claims.

(b) Limitations
SAB Heli Division makes no warranty or representation, express or implied, about non infringement, merchantability, or fitness for a particular purpose of the product. The purchaser acknowledges that they alone have determined that the product will suitably meet the requirements of the purchaser's intended use.

(c) Purchaser Remedy
SAB Heli Division's sole obligation hereunder shall be that SAB Heli Division will, at its option, replace any Product determined by SAB Heli Division to be defective in the event of a defect, this is the Purchaser's exclusive remedy. Replacement decisions are at the sole discretion of SAB Heli Division. This warranty does not cover cosmetic damage or damage due to acts of God, accident, misuse, abuse, negligence, commercial use, or modification of or to any part of the Product. This warranty does not cover damage due to improper installation, operation, maintenance, or attempted repair by anyone.

ADDITIONAL COMPONENTS REQUIRED

*Speed controller: 6S capable, 150 Amps.

*Battery: 6S 3600/4500 mAh.

*1 flybarless 3 axis control unit.

*Radio power system.

*3 Mini servos.

*1 Standard tail rotor servo.

*6 channel radio control system on 2.4 GHz.

TOOLS, LUBRICANTS, ADHESIVES

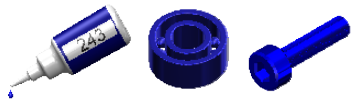
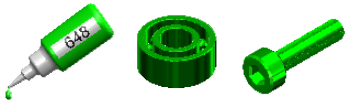
*Generic pliers.
*Hexagonal driver, size 1.5, 2, 2.5, 3mm.
*4/5mm T-Wrench.
*5.5mm Socket wrench (for M3 nuts).
*8mm Hex fork wrench (for M5 nuts).

*Medium threadlocker (SAB p/n HA116-S).
*Strong retaining compound (SAB p/n HA115-S).
*Spray lubricant (eg. Try-Flow Oil).
*Synthetic grease (eg. Microlube 261).
*Cyanoacrylate adhesive.

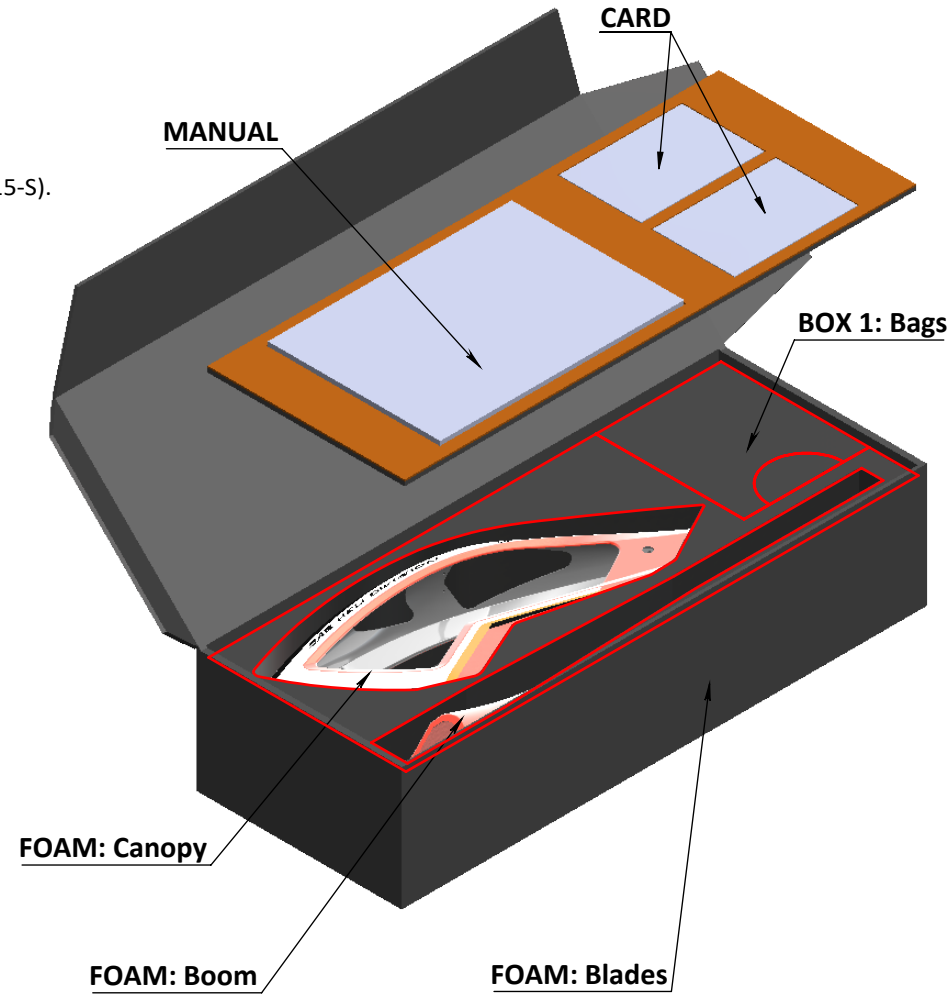
*Pitch Gauge (for set-up).
*Soldering equipment (for motor wiring).

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

Important	 Blue screw and blue bearing in the illustration means you need to use: **Thread Locker Medium Strength (SAB HA116-S)**	 Green screw and Green bearing in the illustration means you need to use: **Retaining compound (SAB HA115-S)**
BOX XX, BAGXX Indicates that for this assembly phase you need materials that are: BOX xxx, BAG xxx.	 Use CA Glue	 Use Proper Lubricant

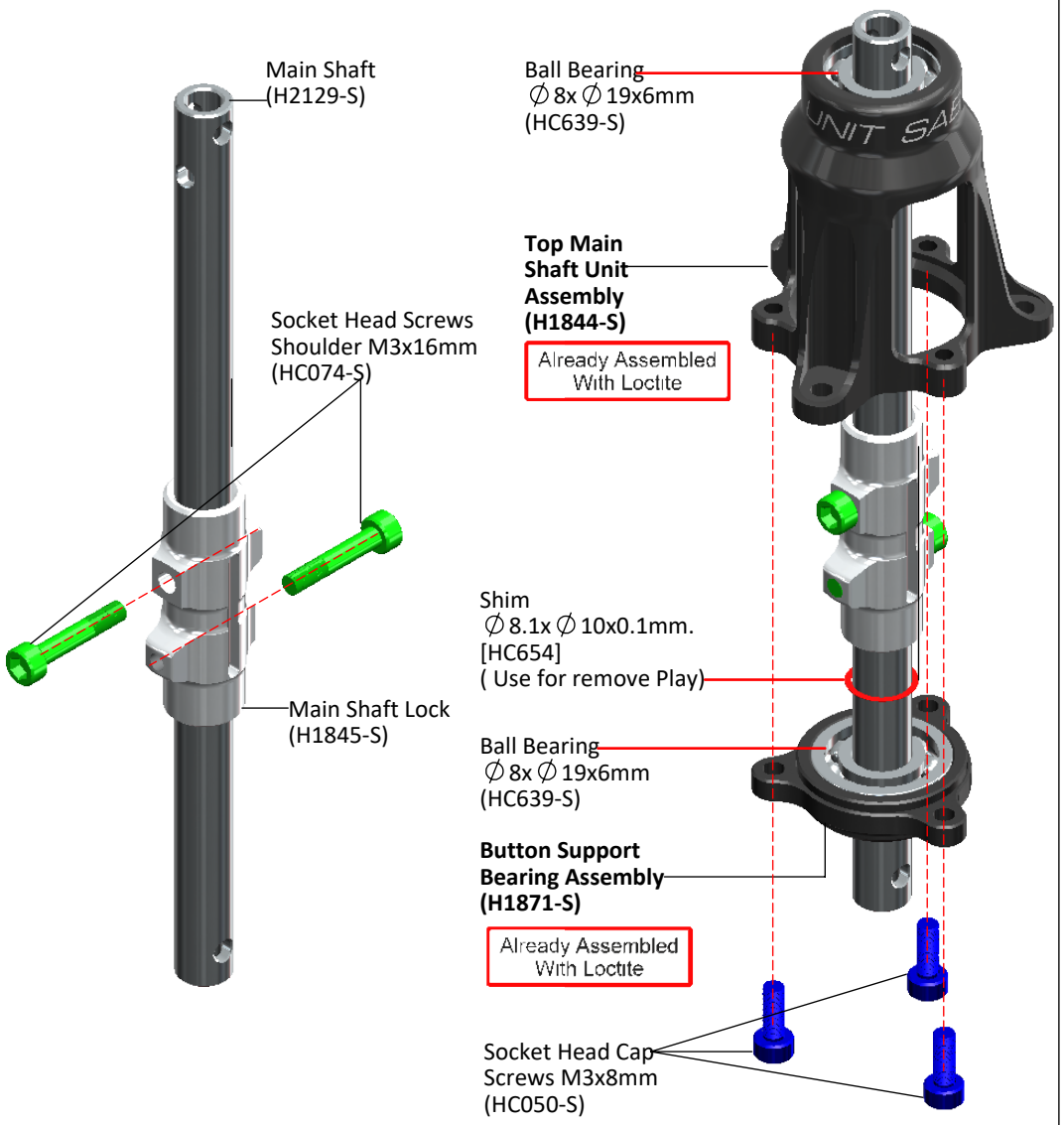
INSIDE THE MAIN BOX THERE ARE:

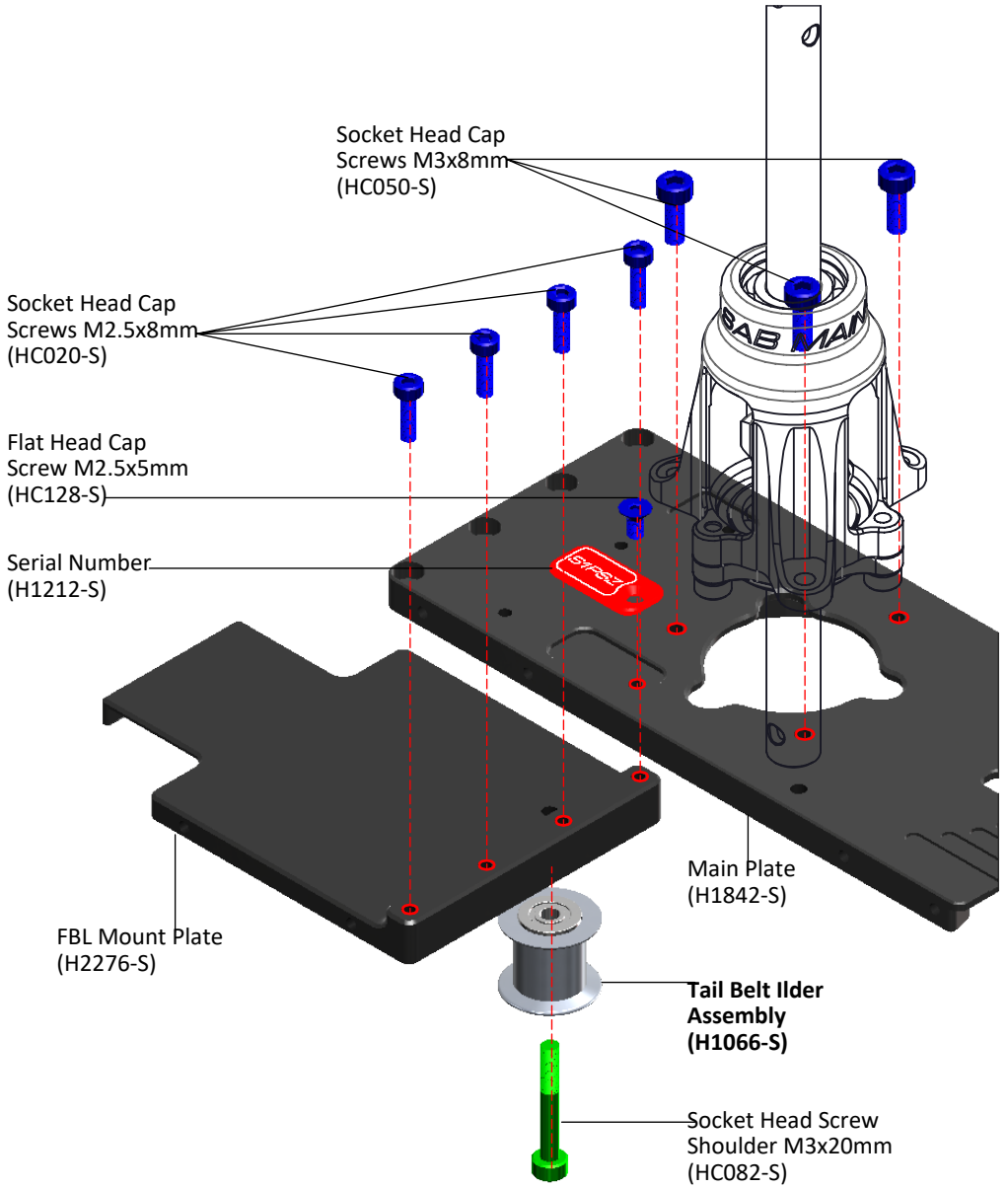


The assembly process is described in the following chapters. Each chapter provides you with the box, bag and/or foam numbers you will need for that chapter. The information is printed in a black box in the upper corner of the page.

Box 1, Bag for page 5

MAIN SHAFT ASSEMBLY

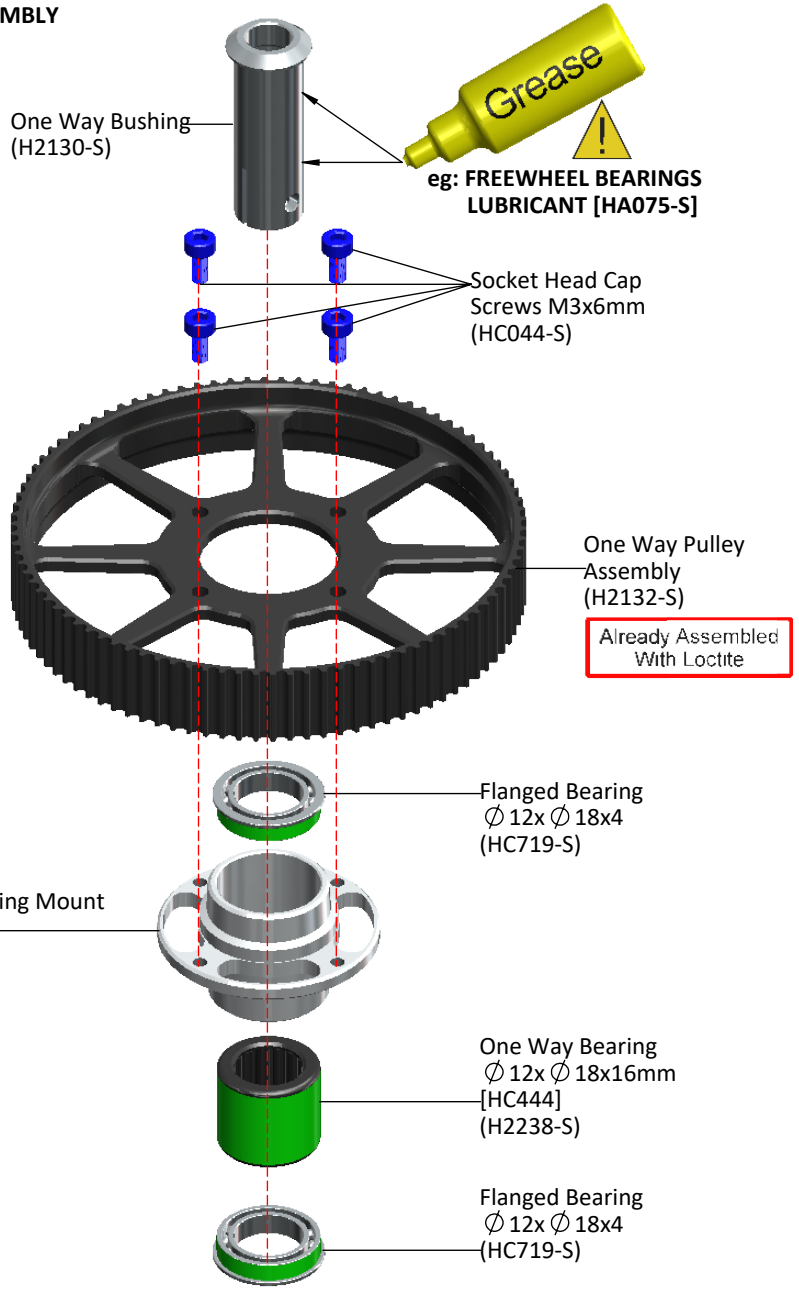


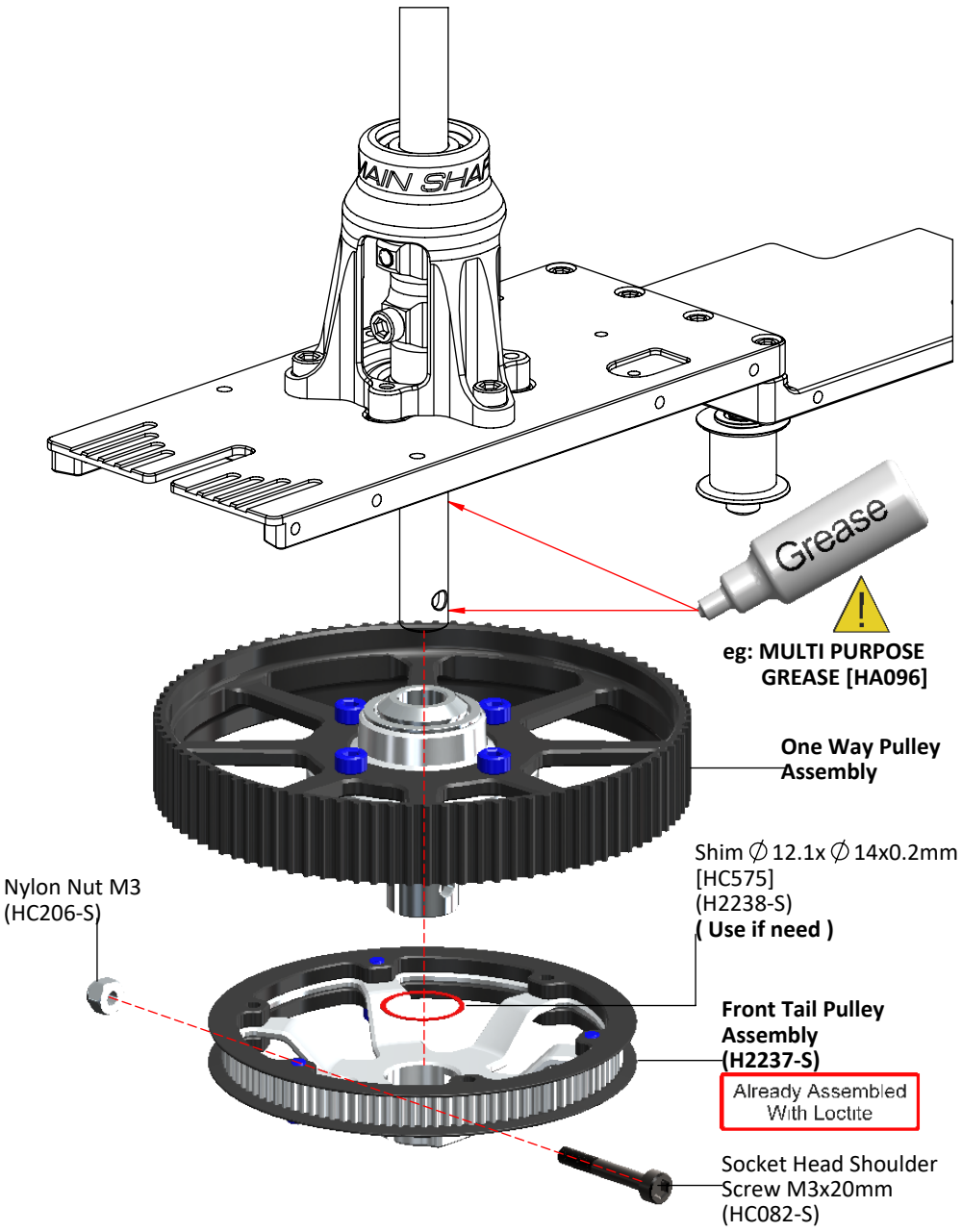


BOX 1, BAG FOR PAGE 6

ONE WAY PULLEY ASSEMBLY (H2132-S)

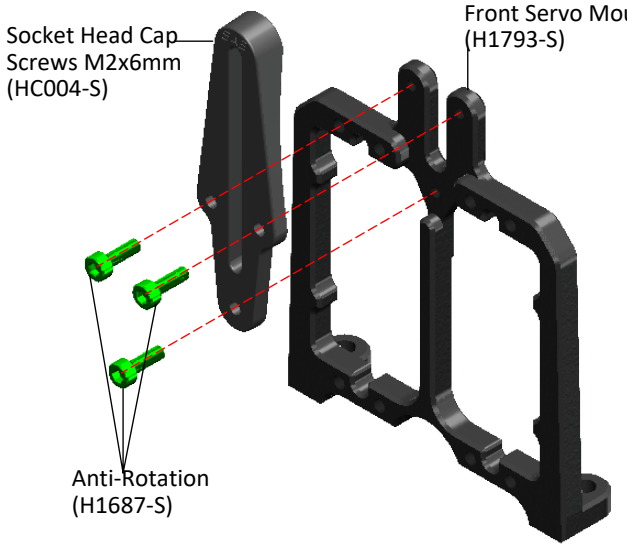
Already Assembled With Loctite





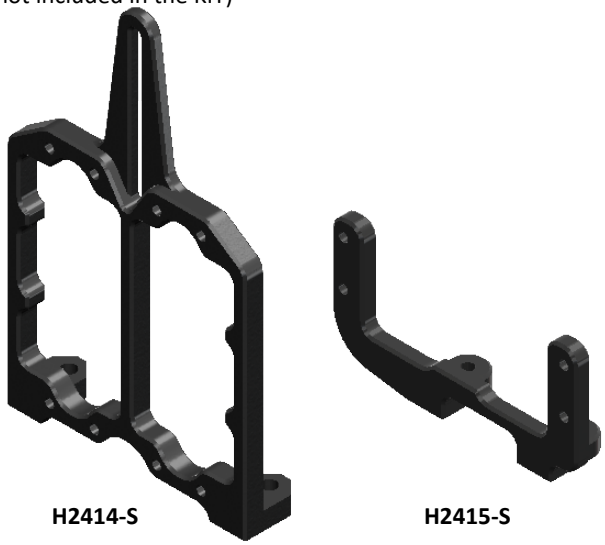
Box 1, Bag for page 7

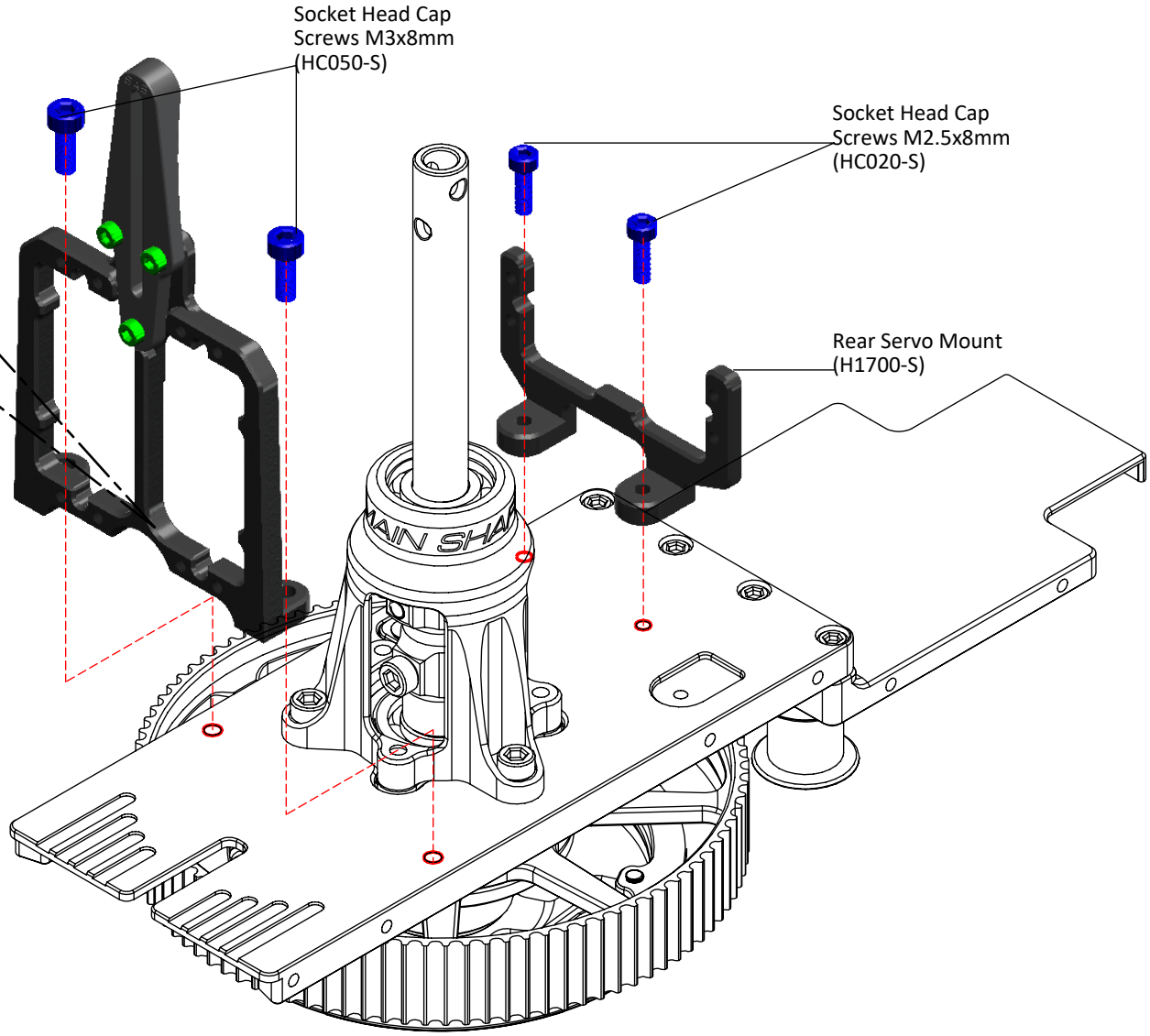
FRONT SERVO MOUNT ASSEMBLY



STANDARD SIZE SERVOS

Standard size servos can be used **[p/n H2414-S & H2415-S]**
(not included in the KIT)

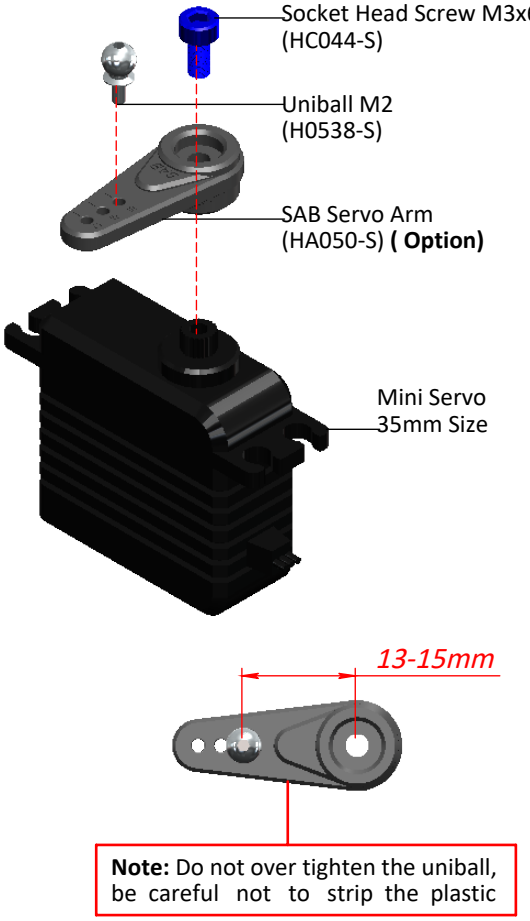




BOX 1, BAG FOR PAGE 8

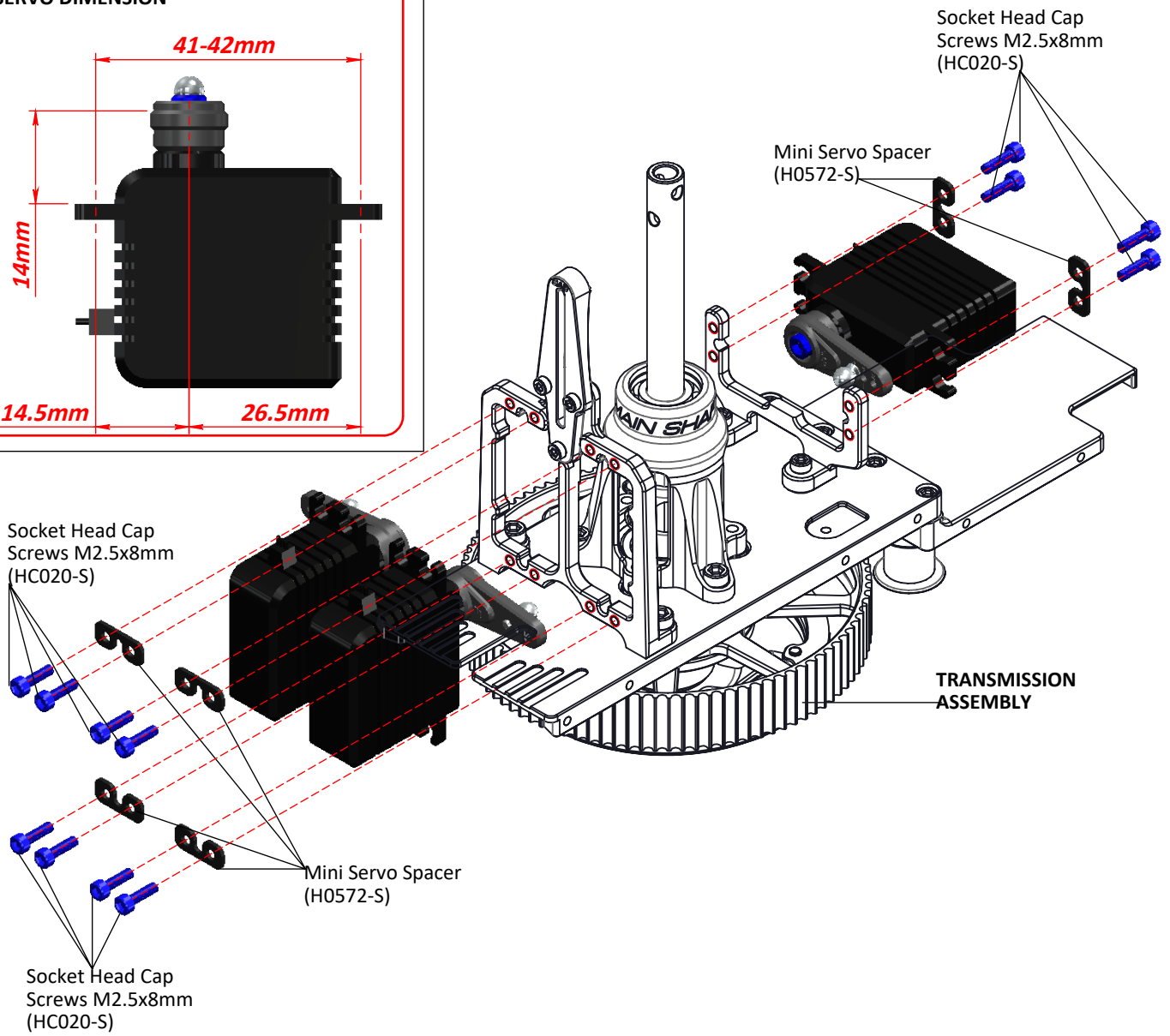
SERVO ASSEMBLY

The linkage ball must be positioned 13-15mm out on the servo arm.
The recommended servo arm to use is: SAB p/n [HA050].
Ensure the alignment of the servo arms before installation of the servos in the model.
Proceed with installation following the instructions below.



Note: Do not over tighten the uniball, be careful not to strip the plastic

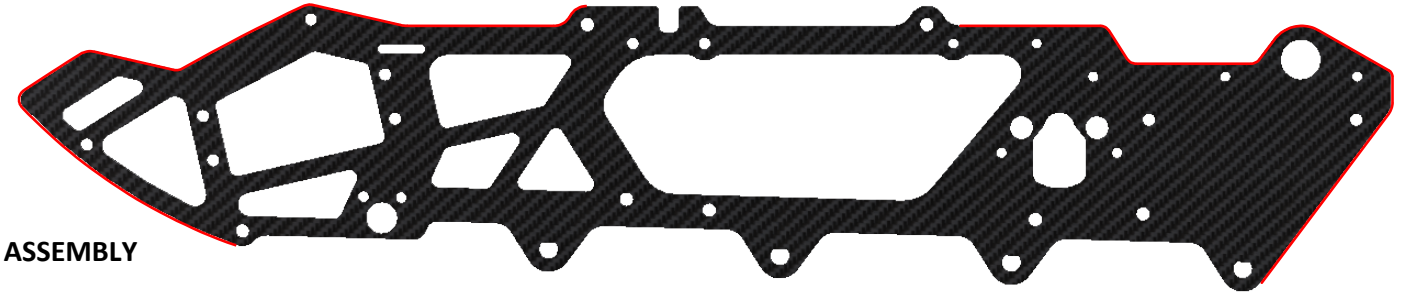
SERVO DIMENSION



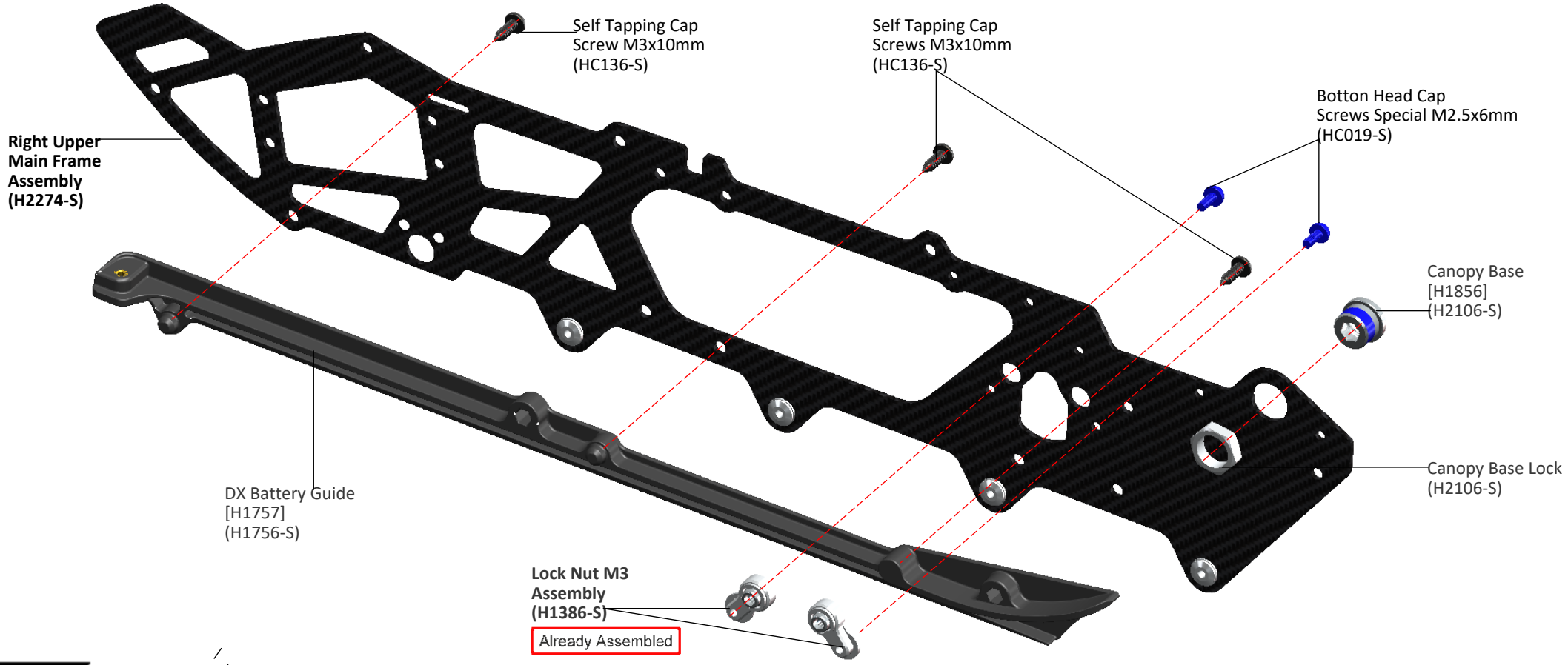
Box 1, Bag for page 9

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. It is very important to do this along the red lines.

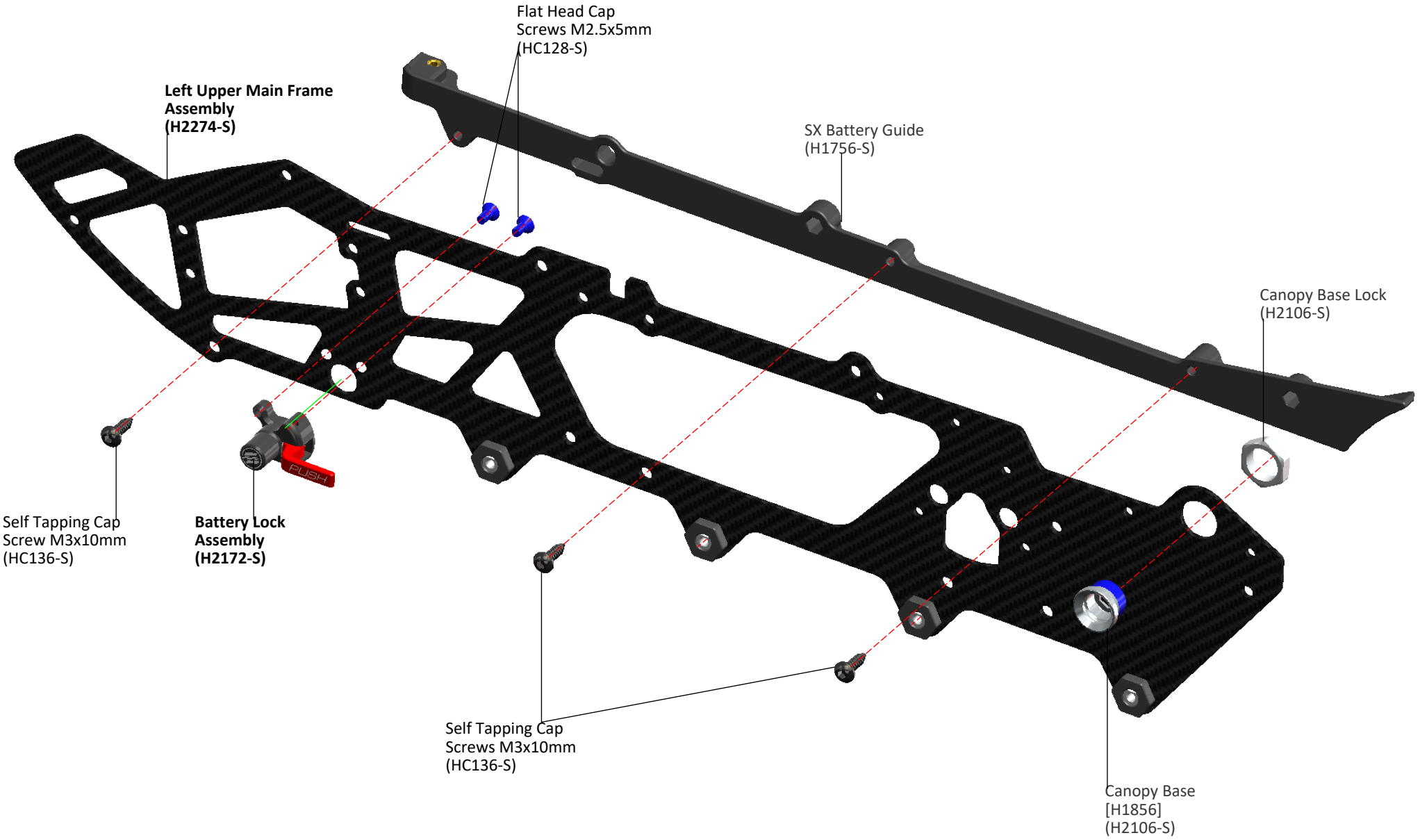


RIGHT UPPER FRAME ASSEMBLY

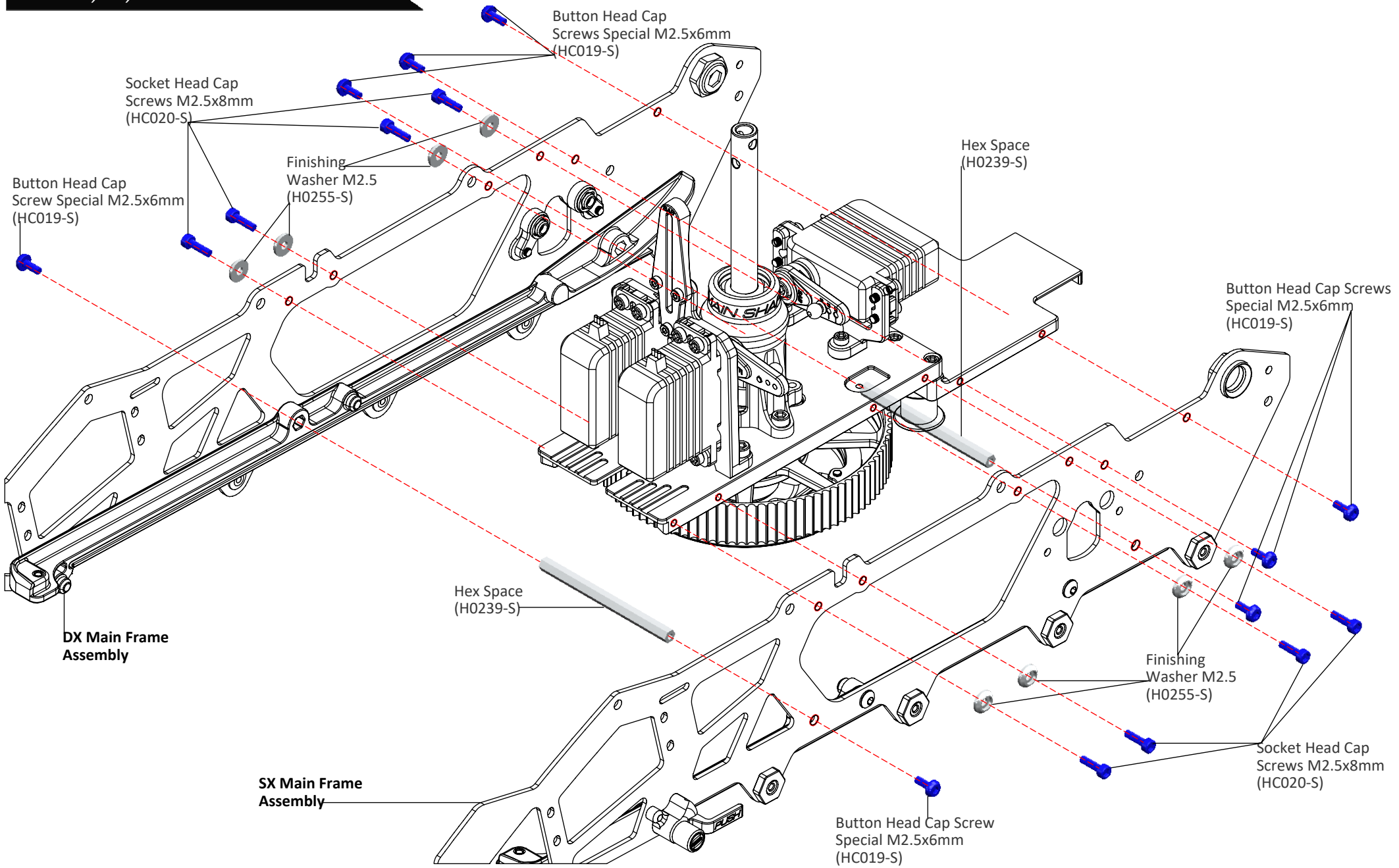


BOX 1, BAG FOR PAGE 10

LEFT UPPER FRAME ASSEMBLY



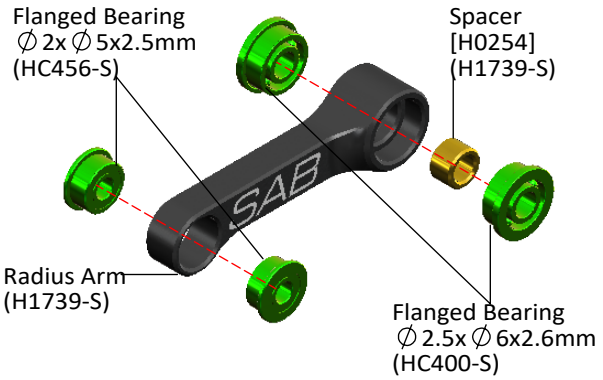
Box 2,3 , Bag for page 11



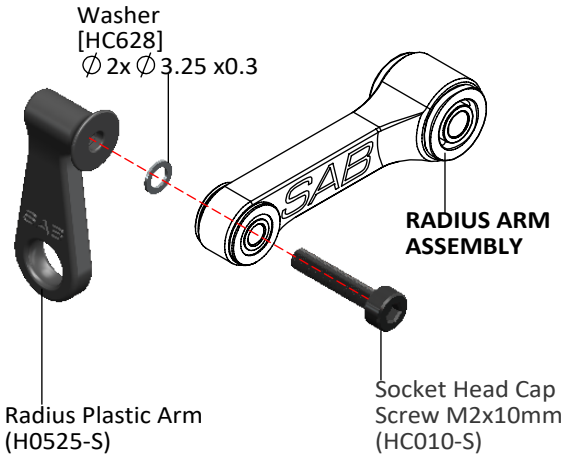
BOX 1, BAG FOR PAGE 12

RADIUS ARM ASSEMBLY ... x2

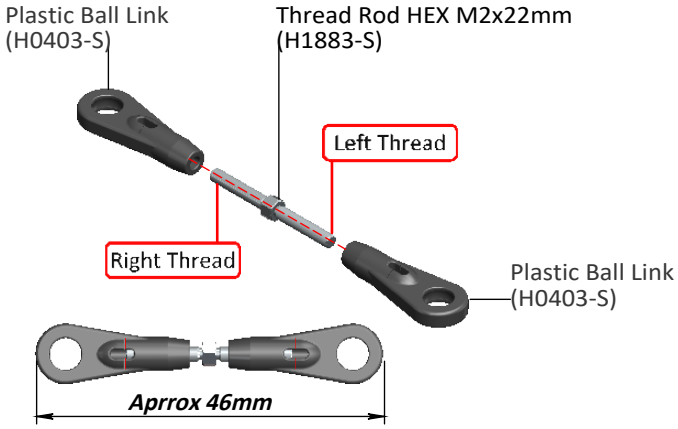
PLEASE USE GREEN THREAD LOCK to secure the bearings to the radius arms. Failure to secure the bearing will result in excessive slop/play.



RADIUS PLASTIC ARM ASSEMBLY ... x2

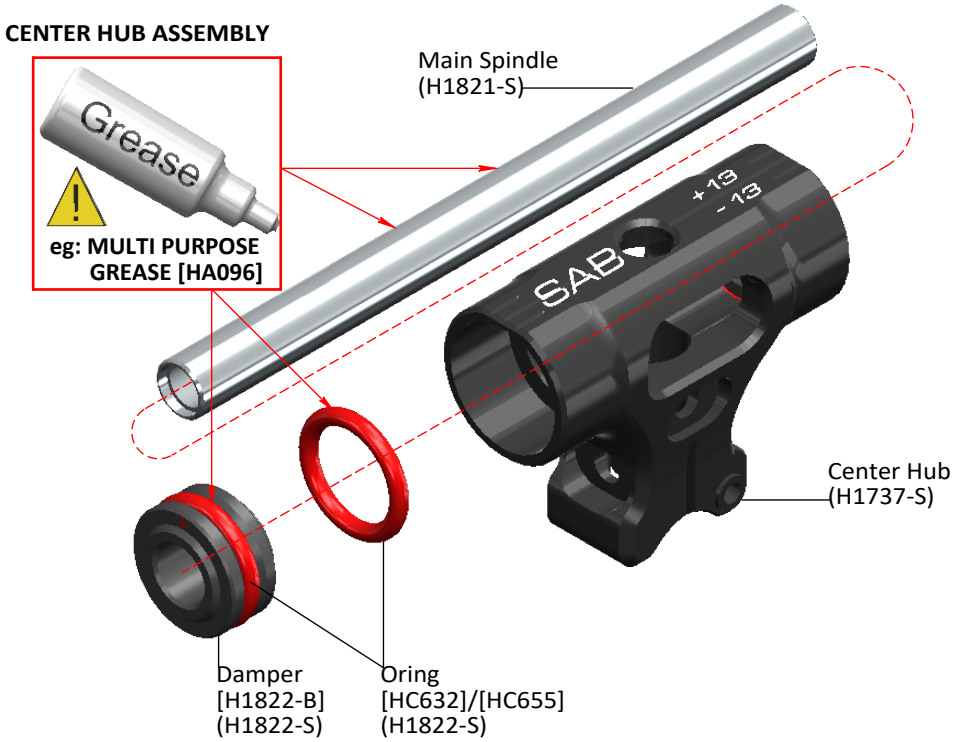


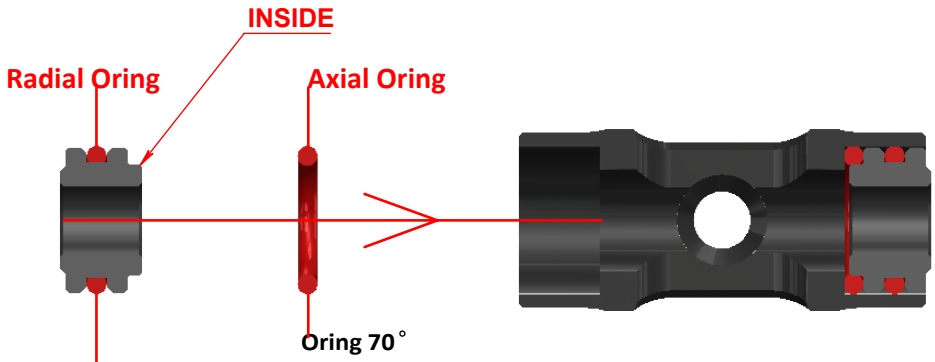
LINKAGE ROD ASSEMBLY x2



(Initial length for the rods from the swashplate to the Blade Grip.)

CENTER HUB ASSEMBLY



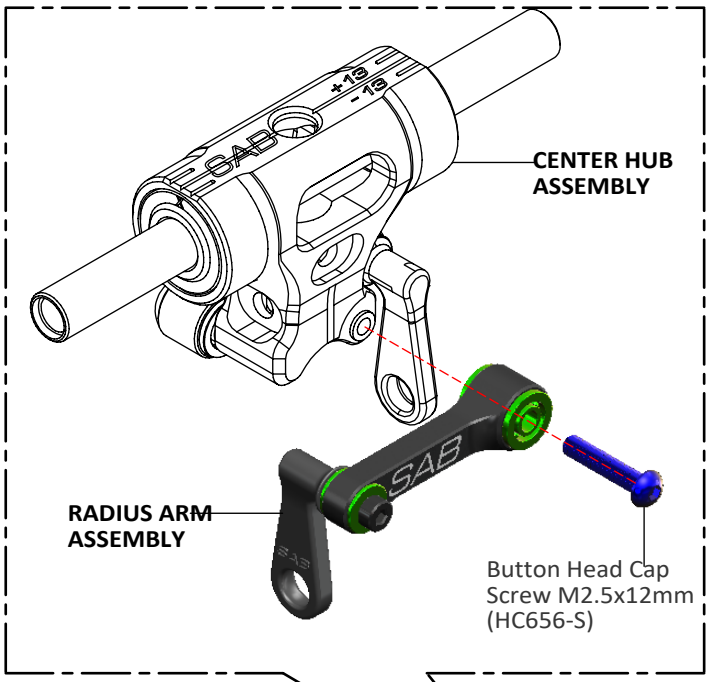


Radial O-RING SET UP

70° → Sport & 3D flight. [HC632]

90° → Hard 3D. [HC655]

Box 1, Bag for page 13



NOTE: We recommend assembling without shims.
After approximately 20/30 flights, please manually check the head dampening, you can add one 0.1mm shim each side (HC653) if the dampening feels loose.

eg: MULTI PURPOSE GREASE [HA096]

SMALLER ID

LARGER ID

Button Head Cap Screw M5x8mm (HC642-S)

Thrust Bearing ∅6x∅12x4.5mm (HC633-S)

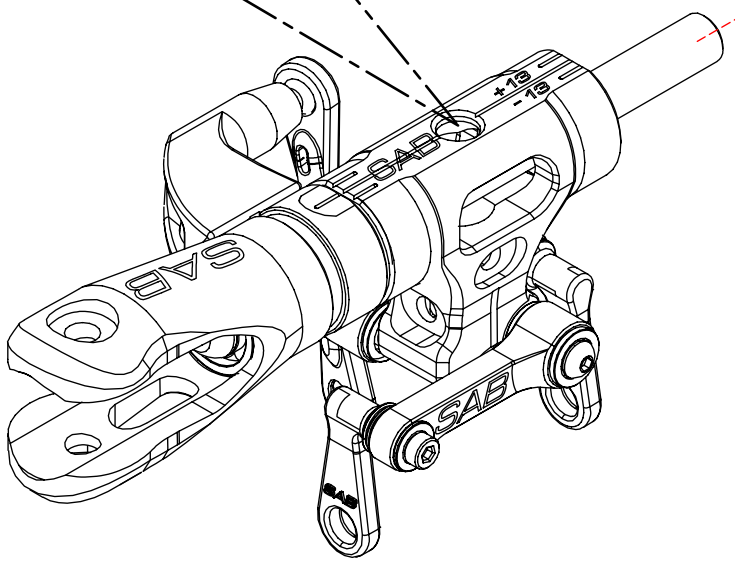
Washer ∅10x∅12.9x0.5 (H1882-S)

Ball Bearing ∅6x∅13x5mm (HC536-S)

Already Assembled With Loctite

Shim ∅6.1x∅7.9x0.1 [HC653] (H1882-S)

Main Blade Grip Assembly (H1738-S)



Ball Bearing ∅6x∅13x5mm (HC536-S)

Already Assembled With Loctite

Socket Head Cap Screw M3x8mm (HC050-S)

Uniball M2 (H0538-S)

LINKAGE ROD ASSEMBLY

Main Blade Grip Arm (H1833-S)

The blade grim arms are made of carbon plastic, they provide high strength and rigidity, but are sacrificial in the event of the crash saving more expensive parts.

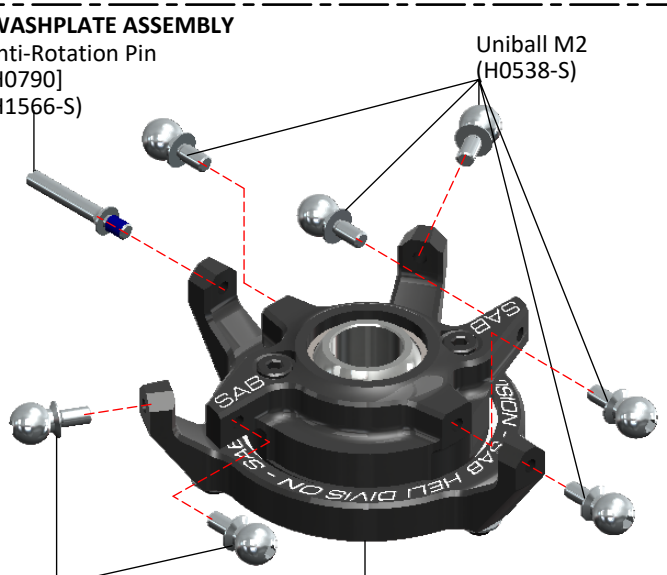
Do not over tighten the uniball and the screw.

BOX 1, BAG FOR PAGE 14

SWASHPLATE ASSEMBLY

Anti-Rotation Pin
[H0790]
(H1566-S)

Uniball M2
(H0538-S)



Uniball M2
(H0538-S)

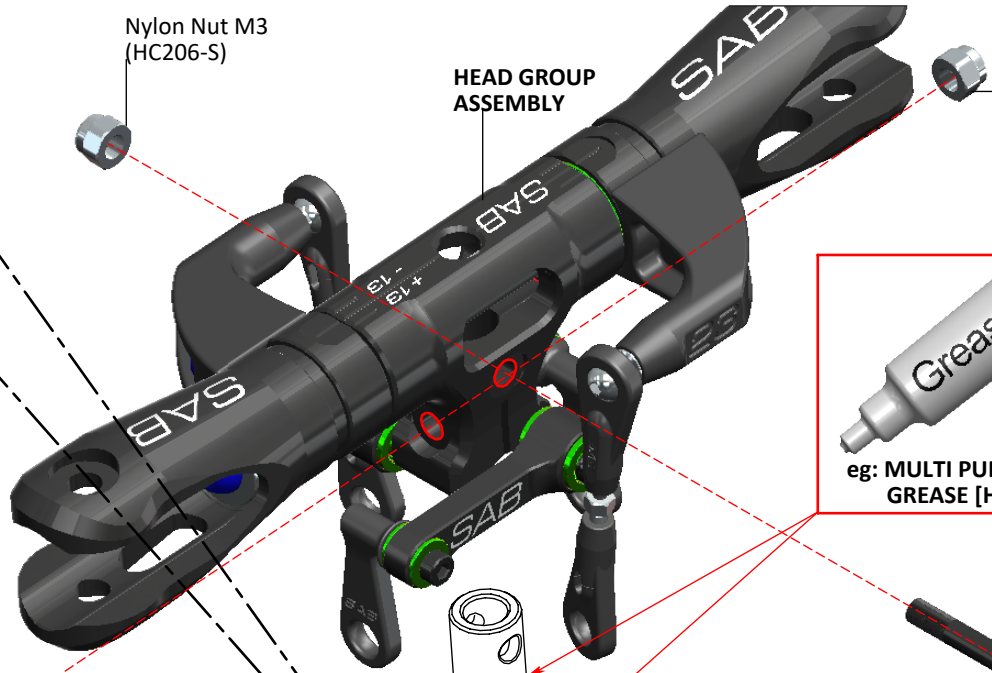
Swashplate Assembly
(H1566-S)

Already Assembled
With Loctite

Nylon Nut M3
(HC206-S)

HEAD GROUP ASSEMBLY

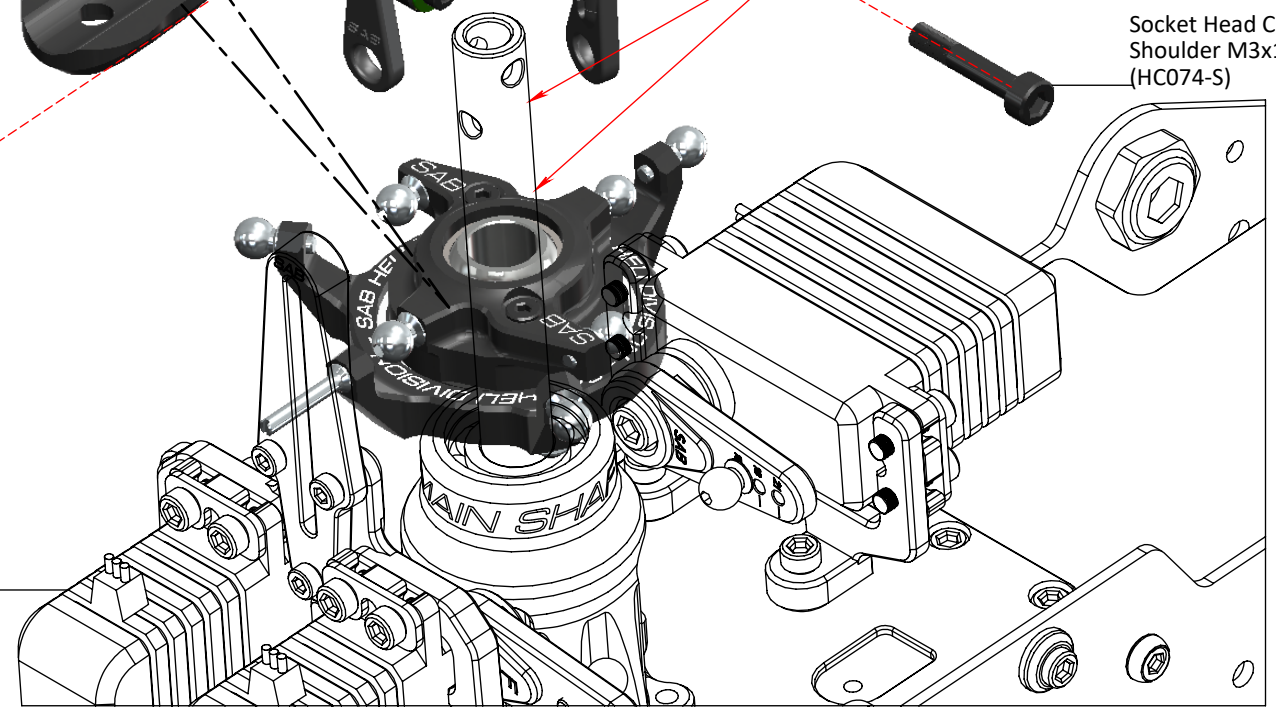
Nylon Nut M3
(HC206-S)



eg: MULTI PURPOSE GREASE [HA096]

Socket Head Cap
Shoulder M3x16
(HC074-S)

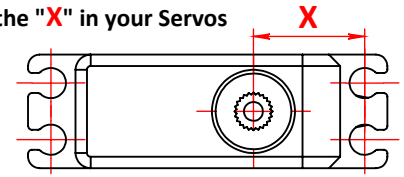
Socket Head Cap
Shoulder M3x16mm
(HC074-S)



FRAME & TRANSMISSION ASSEMBLY

Box 1, Bag for page 15

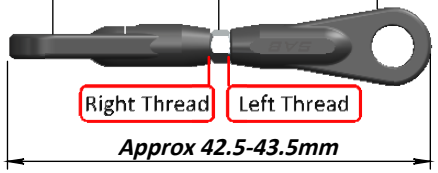
Check the "X" in your Servos



LINKAGE ROD B1 ASSEMBLY ... x2

If X = 14 - 15mm: Use Hex Linkage [H1883]

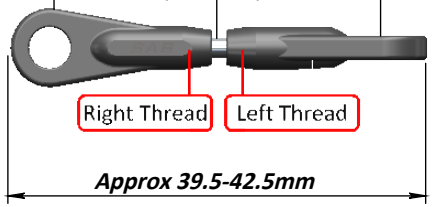
Plastic ball link (H0403-S) — Thread Rod HEX M2x22mm (H1883-S) — Plastic ball link (H0403-S)



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

If X = 11 - 14mm: Use Thread Rod [H0561]

Plastic ball link (H0403-S) — Thread Rod M2x22mm [H0561] (H1883-S) — Plastic ball link (H0403-S)



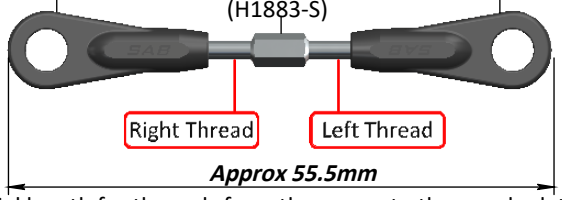
Initial length for the rods from the servos to the swash plate.

NOTE:

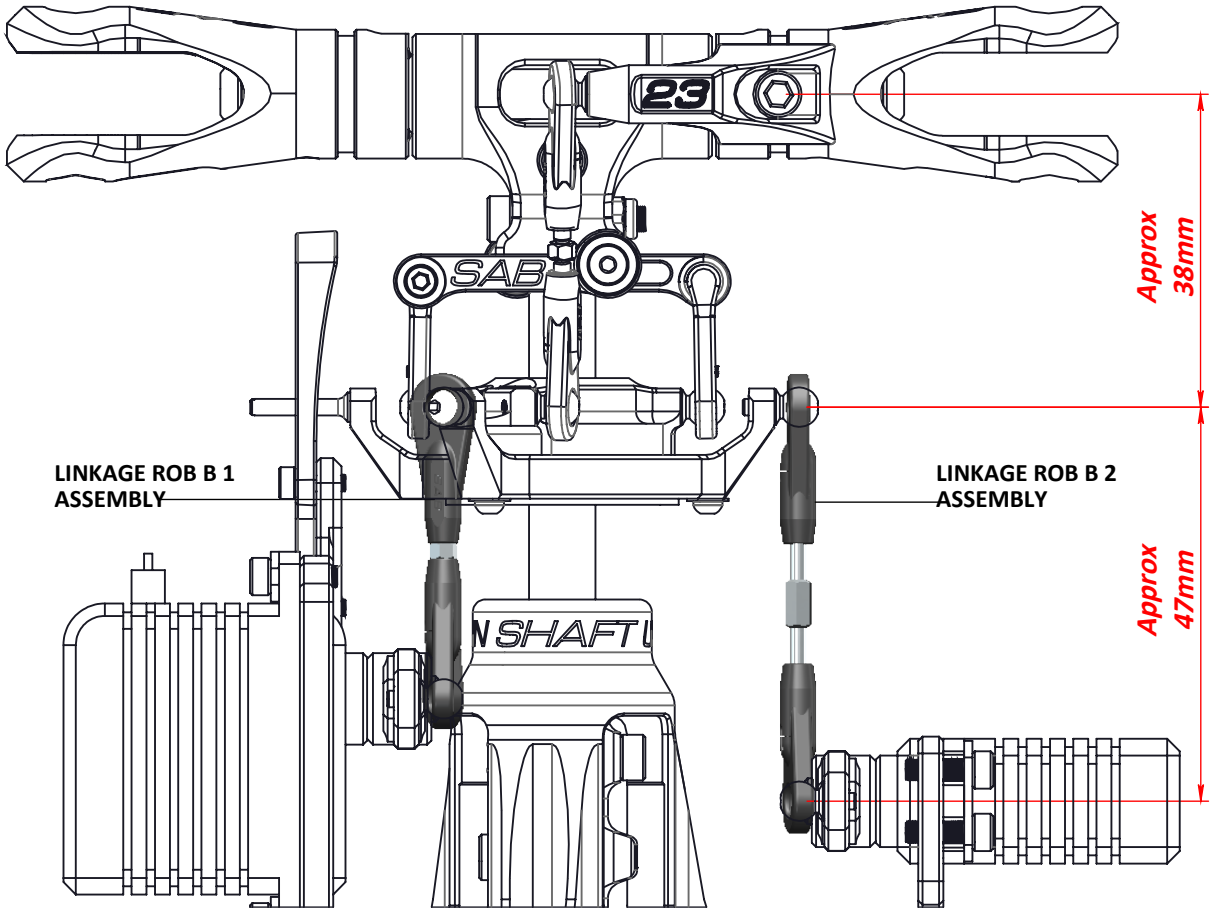
Due to a lack of standard with mini servos, if the distance between the top of the servo and the center of the servo spline is your particular servo brand is less than 14mm, you should cut between 0.5mm and 1mm off each ball link [H0403-S] (front servos only) in order for the swash to be leveled correctly.
Very carefully cut the ball link with an exacto knife.

Linkage rod B2 assembly ... x1

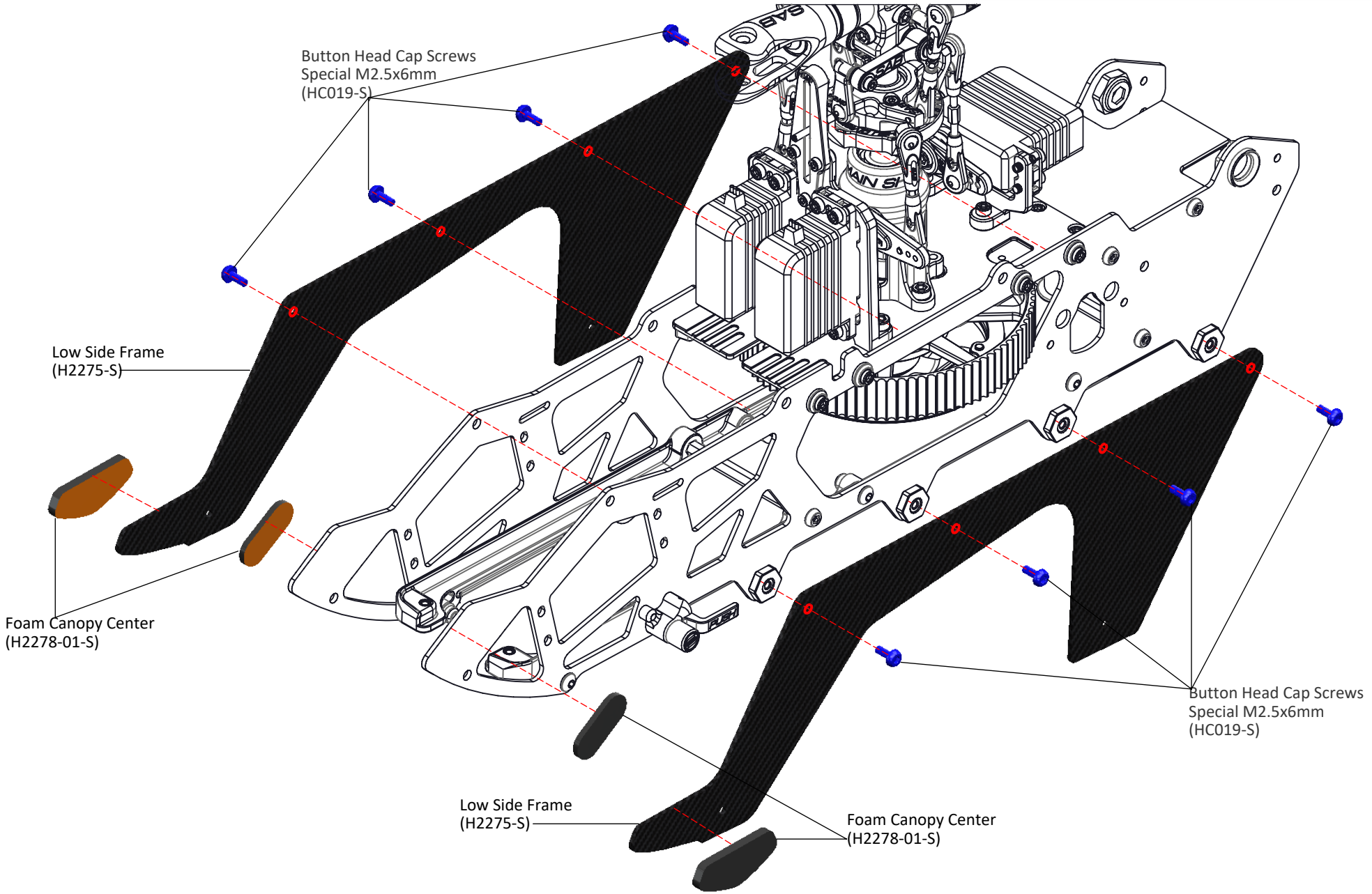
Plastic ball link (H0403-S) — Thread Rod HEX M2x32mm [H1884] (H1883-S) — Plastic ball link (H0403-S)



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

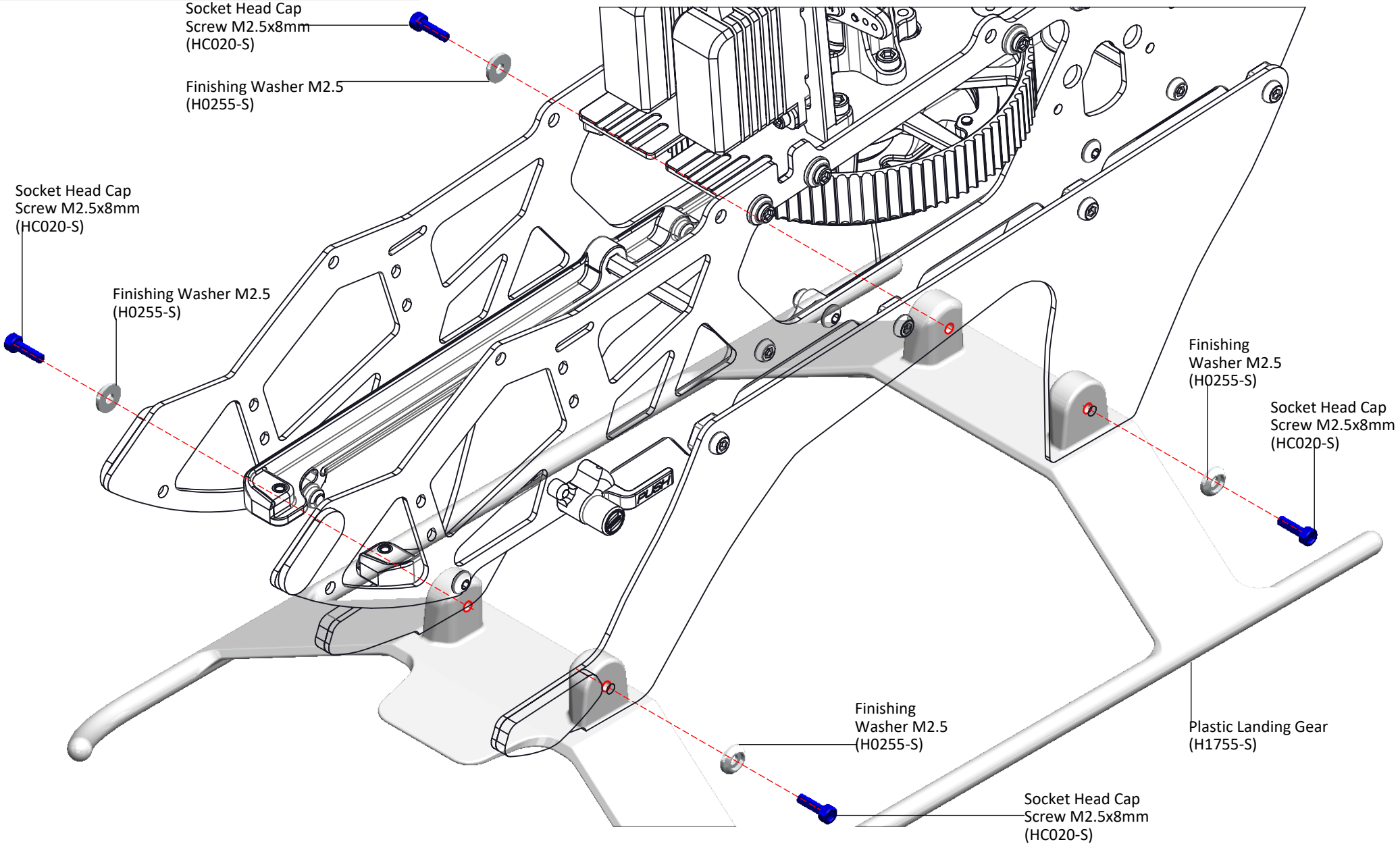


BOX 1, BAG FOR PAGE 16



LOWER SIDE FRAME INSTALLATION

Box 1, Bag for page 17



NOTE: Please note that as you install the landing gear, you'll notice slight bending of the lower frames, this is perfectly normal and expected as it creates a preload for additional rigidity.

It is important to choose the right reduction ratio to maximize efficiency based on your required flight performance.

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 94 teeth for the main gear

BELOW IS A LIST OF AVAILABLE REDUCTION RATIOS:

H0015-16-S - **16T** Pinion = ratio	**5.875 : 1**	H0015-19-S - **19T** Pinion = ratio	**4.95 : 1**
H0015-17-S - **17T** Pinion = ratio	**5.53 : 1**	H0015-20-S - **20T** Pinion = ratio	**4.7 : 1**
H0015-18-S - **18T** Pinion = ratio	**5.22 : 1**	H0015-21-S - **21T** Pinion = ratio	**4.47 : 1**

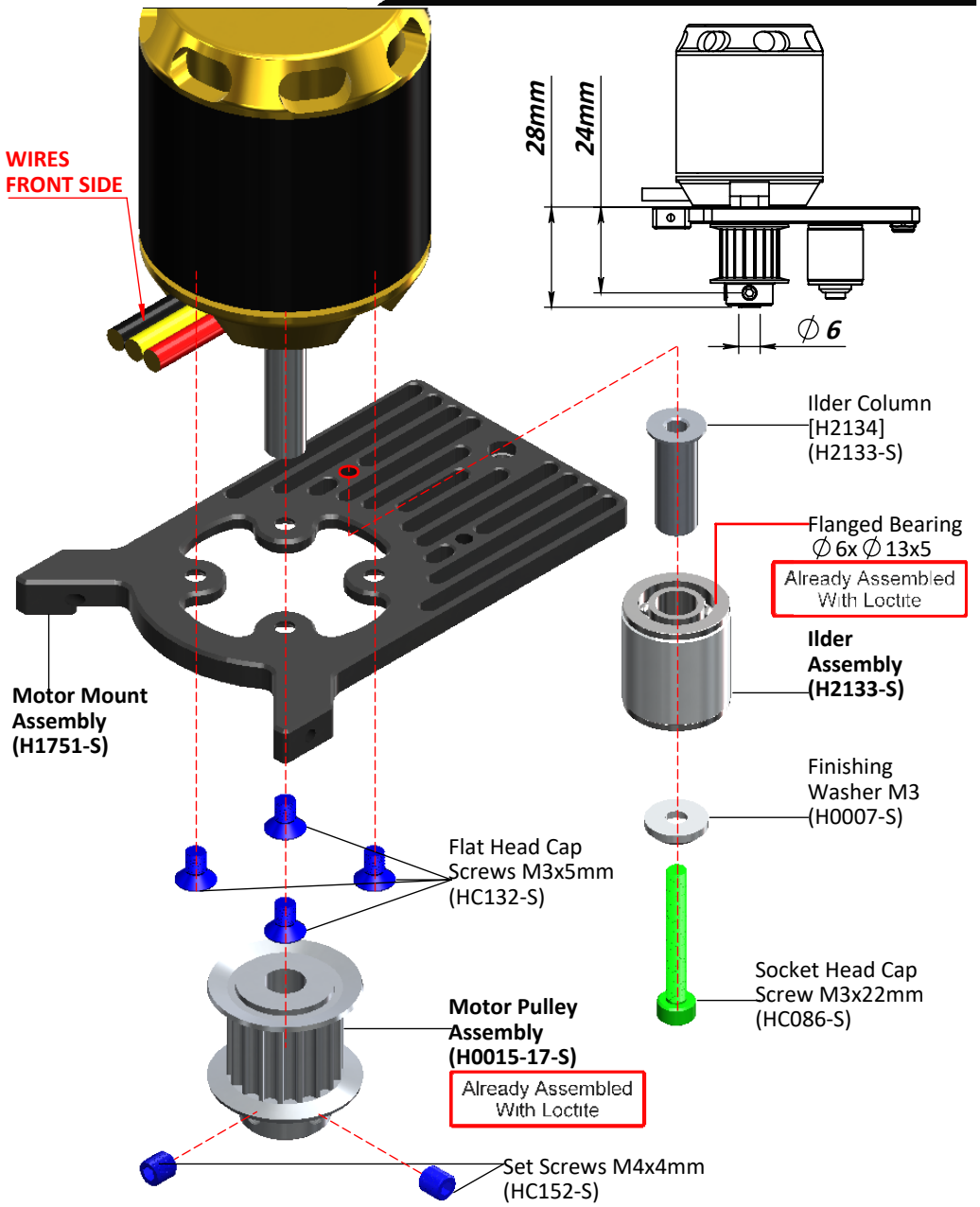
These are pulleys for motors with a 6 mm shaft.
Each pulley includes an adapter for motors with a 5 mm shaft.

IL GOBLIN 520 CONFIGURATIONS (BLADES 520mm)

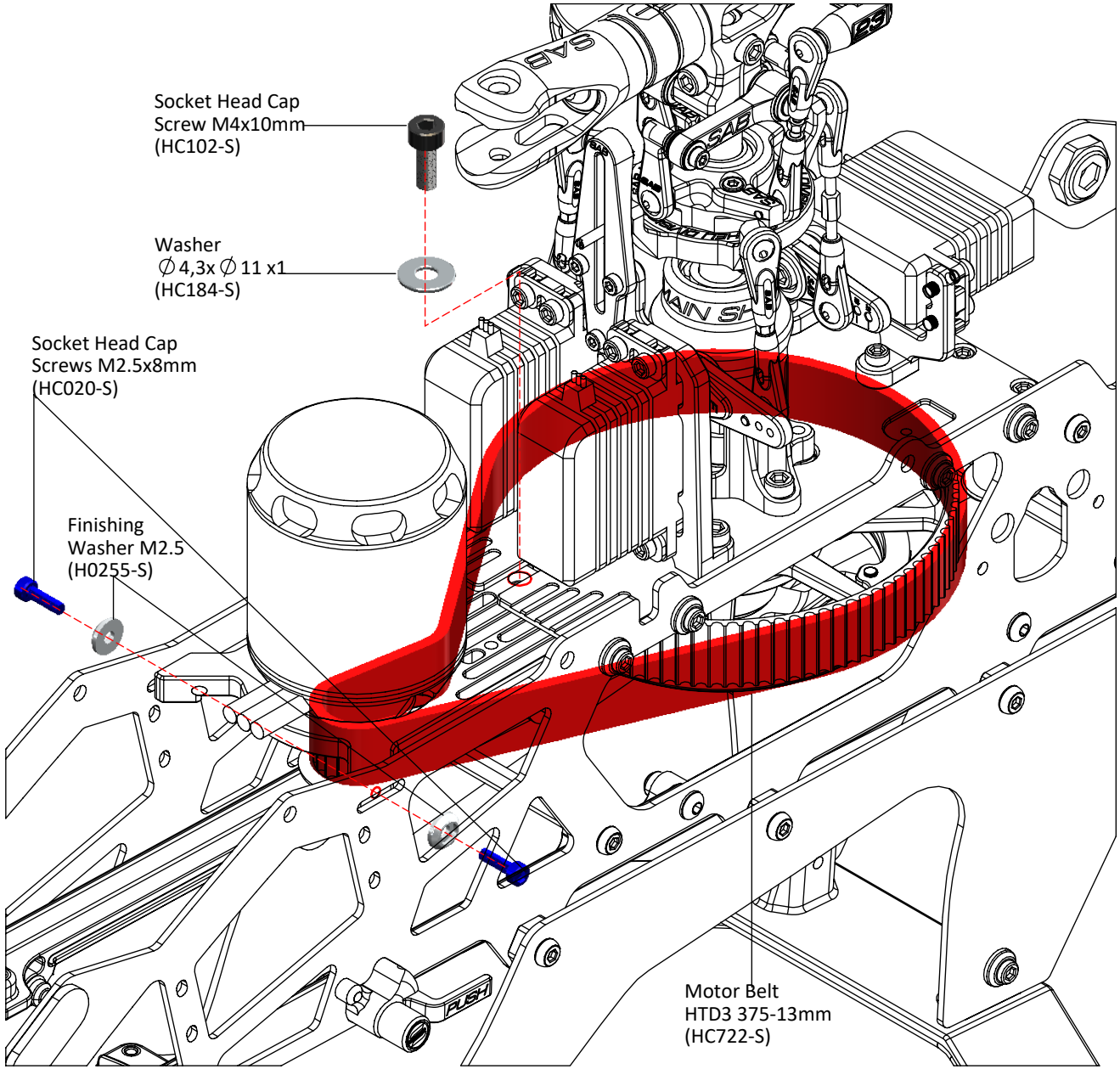
BATTERY	MOTOR	ESC	Pulley (A,B,C)	RPM Max (A,B,C)	Pitch
6S-3700 mAh (3300/4200 mAh)	Scorpion HKV 4020-850 X-NOVA 4020-850 Kv	PLATINUM 150A V5.1 Scorpion Tribunus III 06-160A	17T / 18T / 19T	2880 / 3060 / 3240 ⚠	
	X-NOVA 4020-900 Kv		16T / 17T / 18T	2880 / 3070 / 3250 ⚠	± 13

NOTE: For safety reason we recommend not exceeding 3300 RPM.

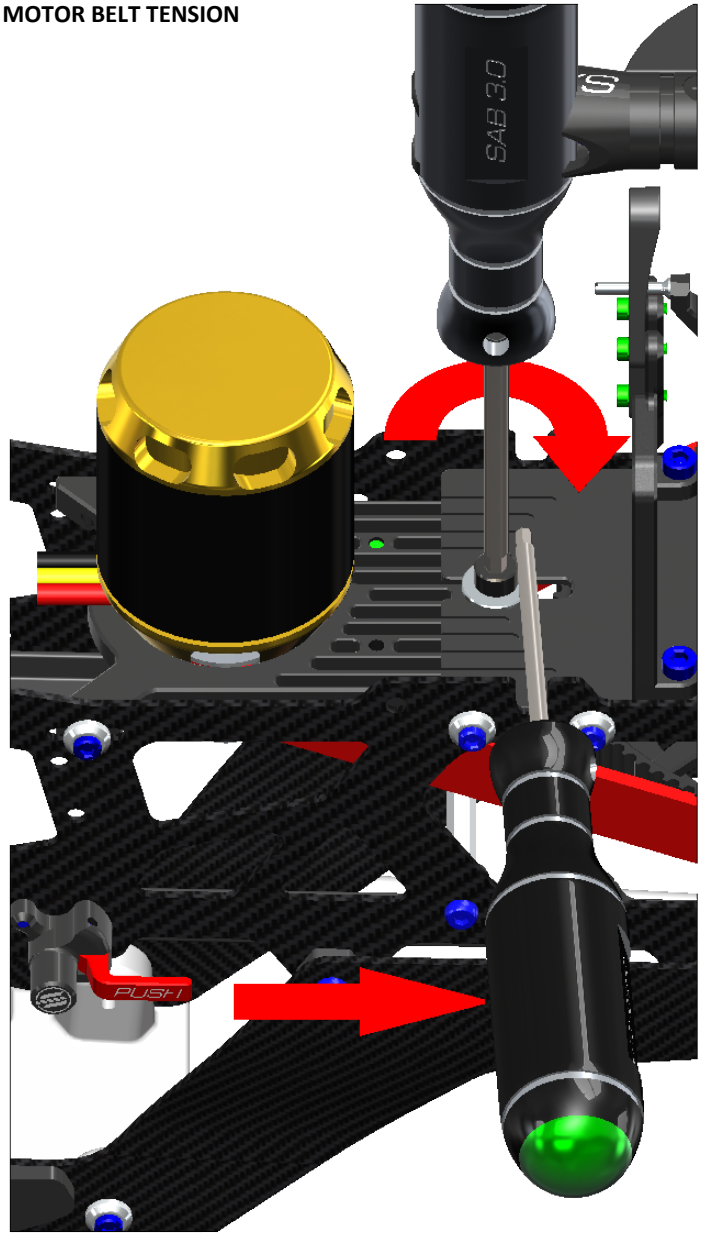
BOX 1, BAG FOR PAGE 18



Box 1, Bag for page 19



MOTOR BELT TENSION



BOX 1, BAG FOR PAGE 20

NOTE:
It is normal for the tail to feel a bit tight after initial assembly as the tail spindle preload is usually high when the helicopter is brand new. The preload will loosen up after 2-5 flights allowing the system to become smooth.

eg: MULTI PURPOSE GREASE [HA096]

LARGER ID

SMALLER ID

Socket Head Cap Screw M2.5x6mm [HC018] (HC638-S)

Washer ∅2.6x∅6x0.5 [HC173] (HC638-S)

Thrust Bearing ∅4x∅8x3.5mm [HC636] (HC638-S)

Washer ∅6.1x∅7.9x0.5 [HC652] (HC638-S)

Ball Bearing ∅4x∅8x3mm (HC641-S)

Already Assembled With Loctite

Tail Blade Grip Assembly (H1770-S)

Already Assembled With Loctite

Washer ∅4.05x∅6.5x0.3 [HC651] (HC638-S)

Shim ∅4.05x∅5.6x0.1 [HC594] (HC638-S)

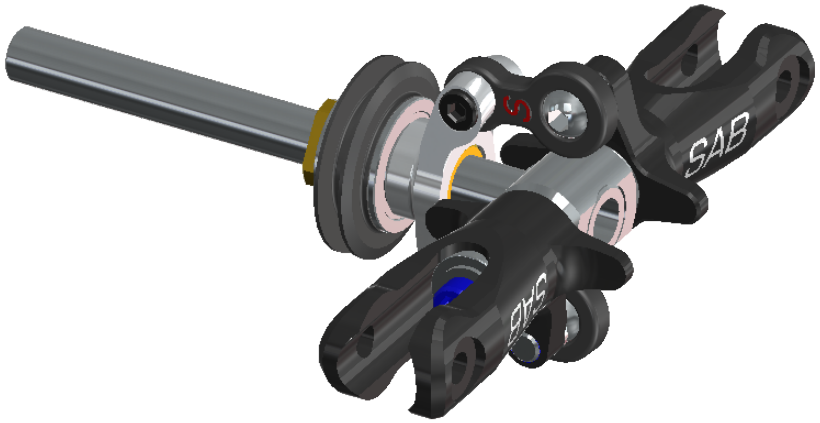
Oring [HC635] (HC638-S)

Uniball M3 (H0065-S)

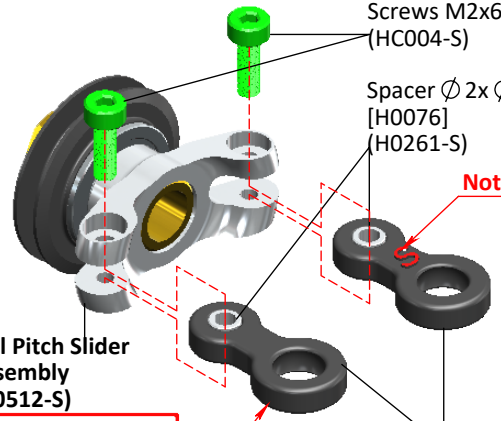
Tail Spindle (H1826-S)

Tail Shaft Assembly (H1824-S)

Already Assembled With Loctite



TAIL PITCH SLIDER ASSEMBLY



Socket Head Cap Screws M2x6mm (HC004-S)

Spacer ∅2x∅3x3mm [H0076] (H0261-S)

Note: S >> Left Side

Tail Pitch Slider Assembly (H0512-S)

Already Assembled With Loctite

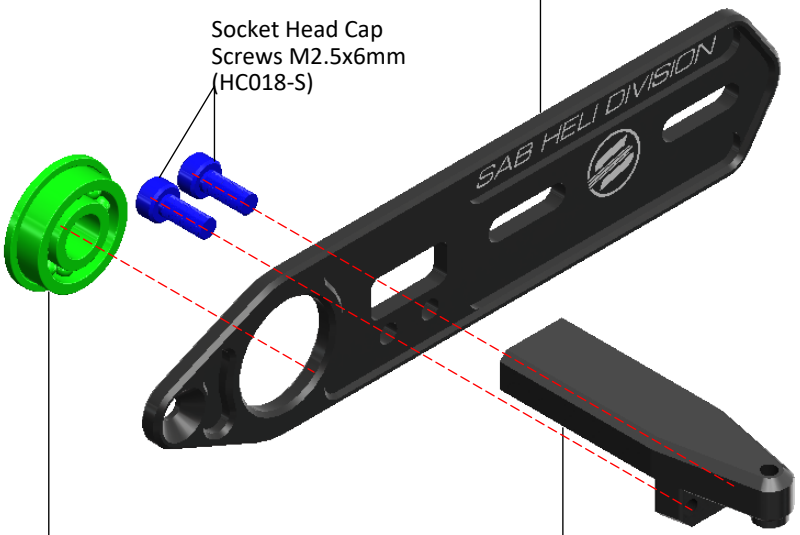
Note: S >> Right Side

Tail Pitch Slider Link (H0261-S)

Box 1, Bag for page 21

Alu Tail Side Plate Assembly (H2280-S)

Socket Head Cap Screws M2.5x6mm (HC018-S)



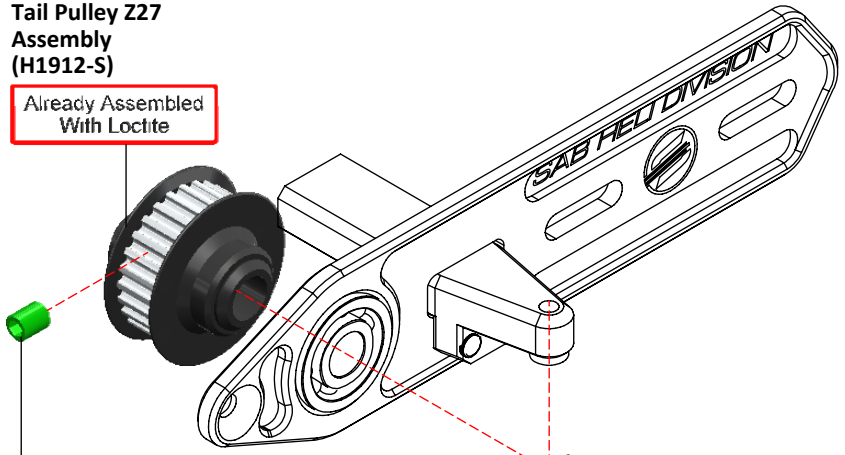
Flanged Bearing ∅5x∅13x4mm (HC412-S)

Already Assembled With Loctite

Bell Crank Mount (H2285-S)

Tail Pulley Z27 Assembly (H1912-S)

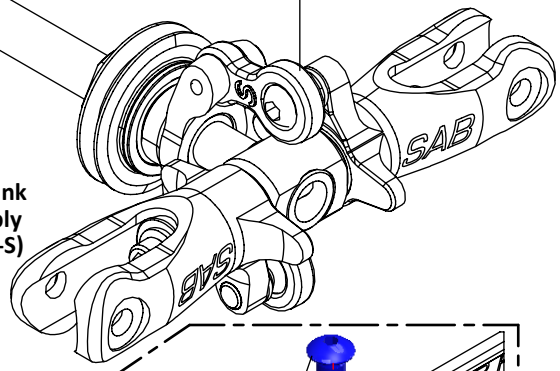
Already Assembled With Loctite



Set Screw M3x4mm (HC500-S)

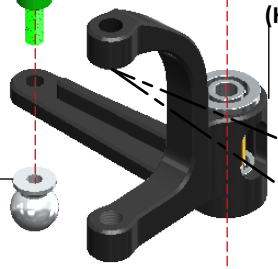
NOTE:
The set screw must align with the hole in the tail shaft

TAIL BLADE GRIP GROUP ASSEMBLY



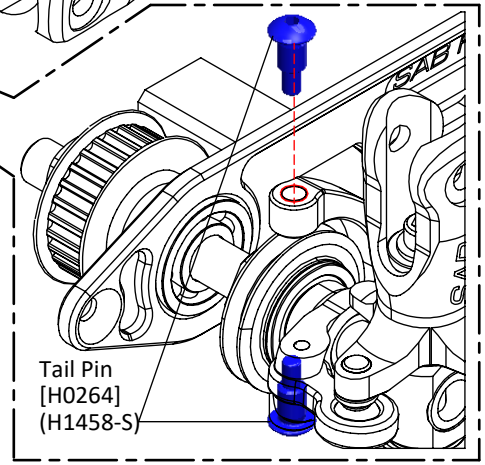
Socket Head Cap Screw M2x5mm (HC002-S)

Bell Crank Assembly (H1458-S)



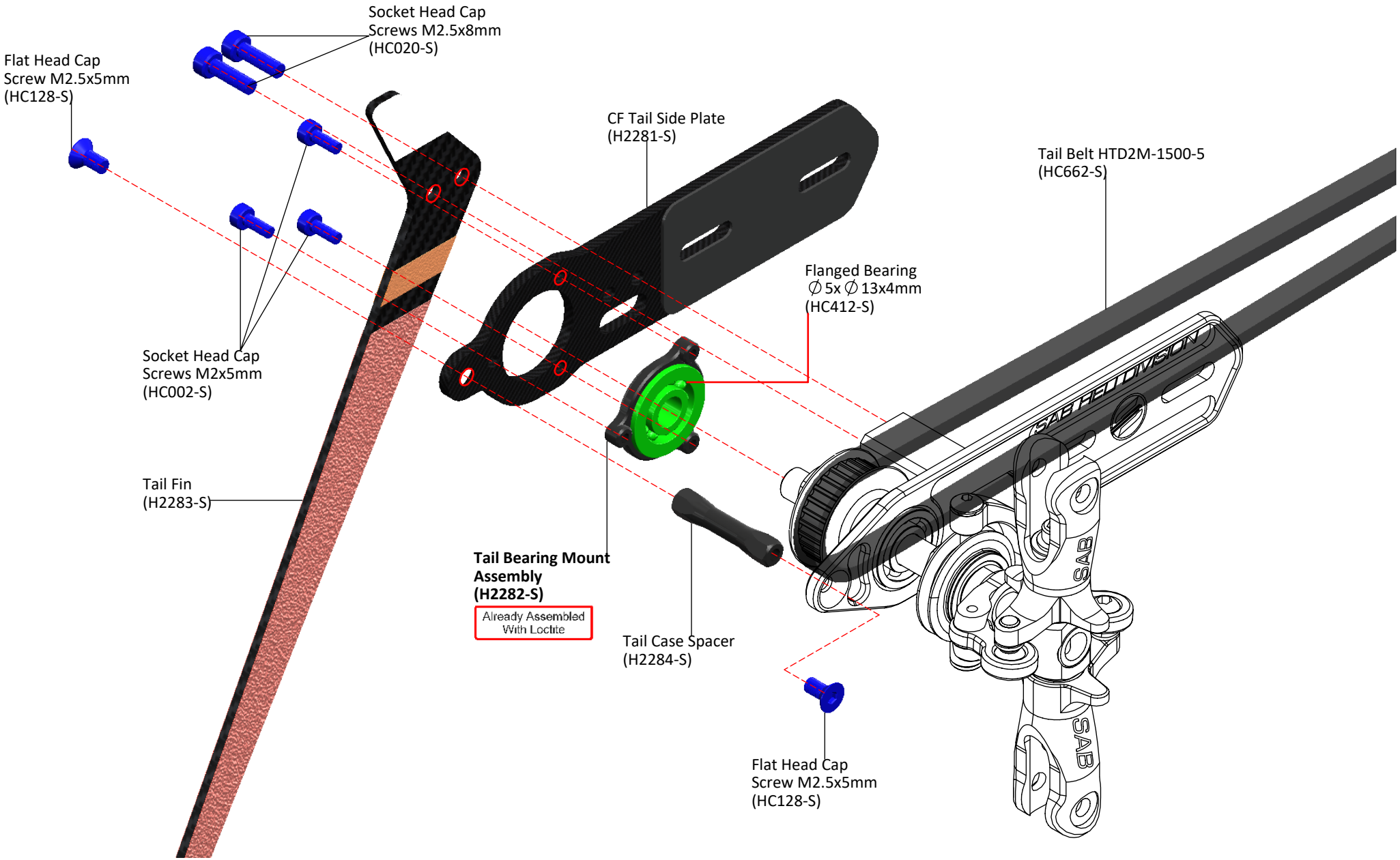
Uniball M2 (H0064-S)

Socket Head Cap Screw M2.5x18mm (HC032-S)



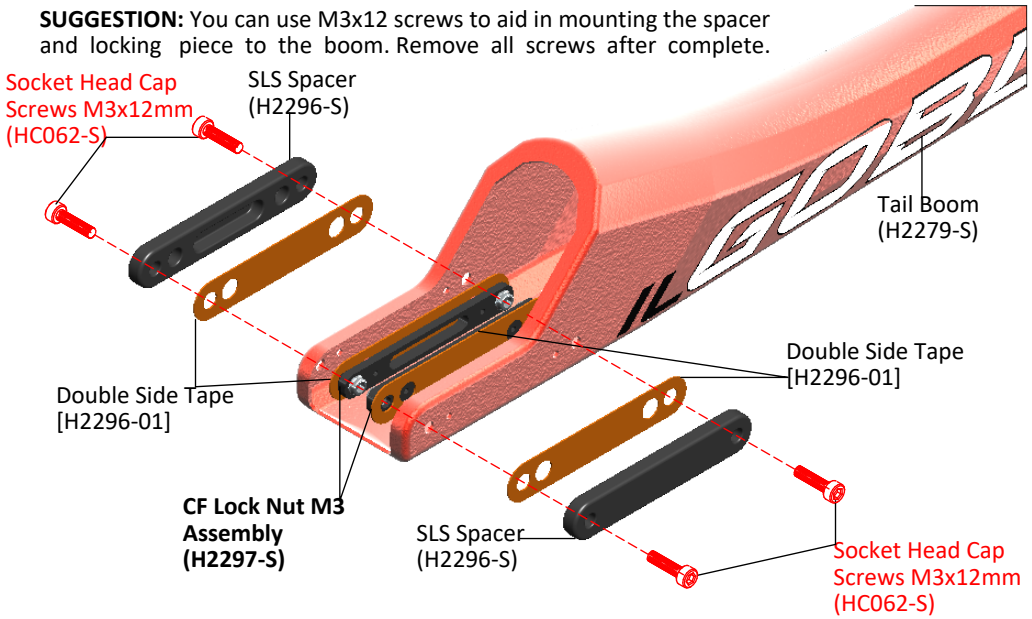
Tail Pin [H0264] (H1458-S)

BOX 1, BAG FOR PAGE 22

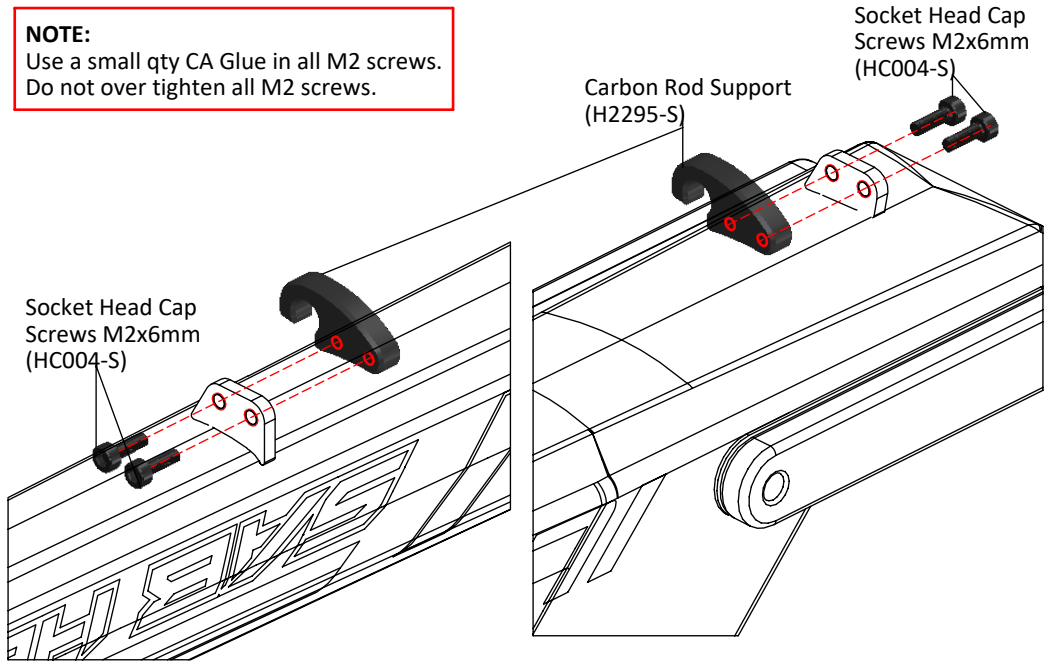


Box 1, Bag for page 23

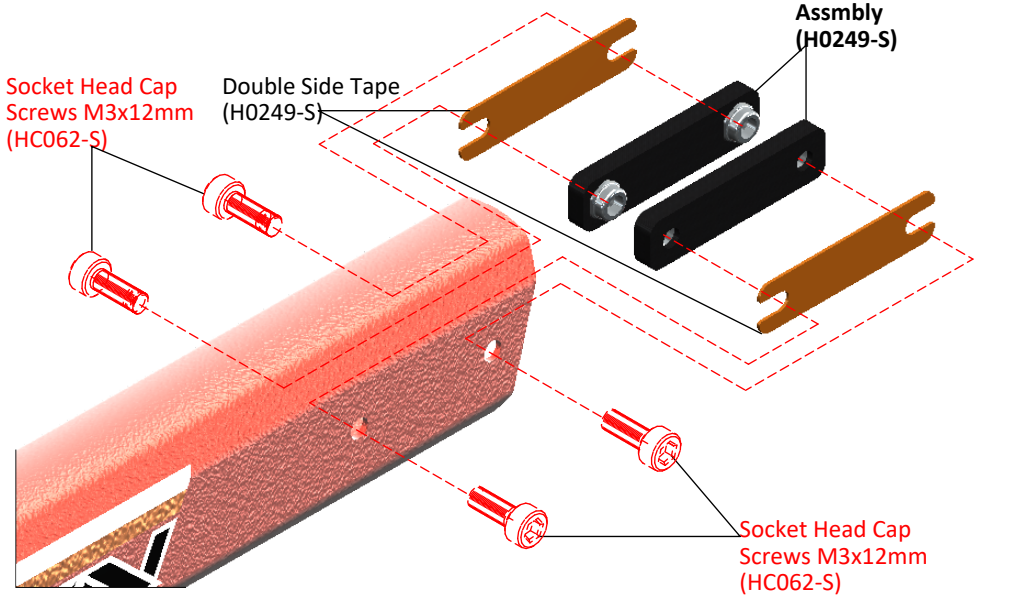
SUGGESTION: You can use M3x12 screws to aid in mounting the spacer and locking piece to the boom. Remove all screws after complete.



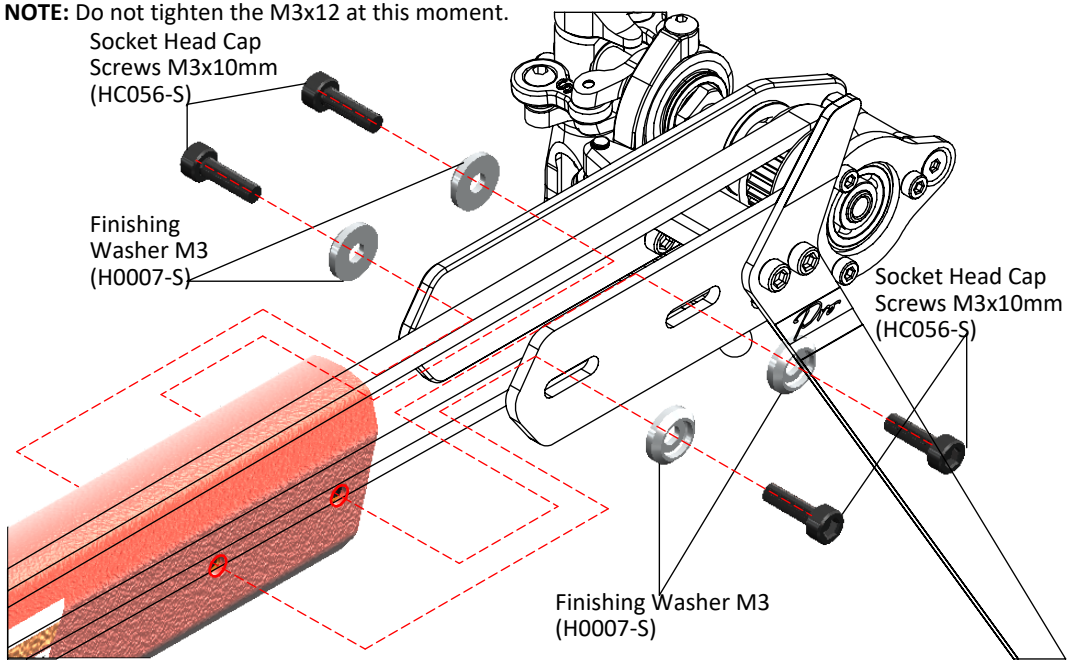
NOTE:
Use a small qty CA Glue in all M2 screws.
Do not over tighten all M2 screws.



SUGGESTION: You can use M3x12 screws to aid in mounting the spacer and locking piece to the boom. Remove all screws after complete.



NOTE: Do not tighten the M3x12 at this moment.



BOX 1, BAG FOR PAGE 24

TAIL BOOM ASSEMBLY

To fit the tail belt, loosen the tail case by loosening the 4 M3 screws (**Figure 1**).

*Install the belt onto the tail front pulley, checking the direction of rotation.

*Insert and tighten the 4 M3 screws.

*Rotate the tail drive several times by hand.

*Tension the tail case by hand and slowly tighten the 2 BLACK screws in (**Figure 2**).

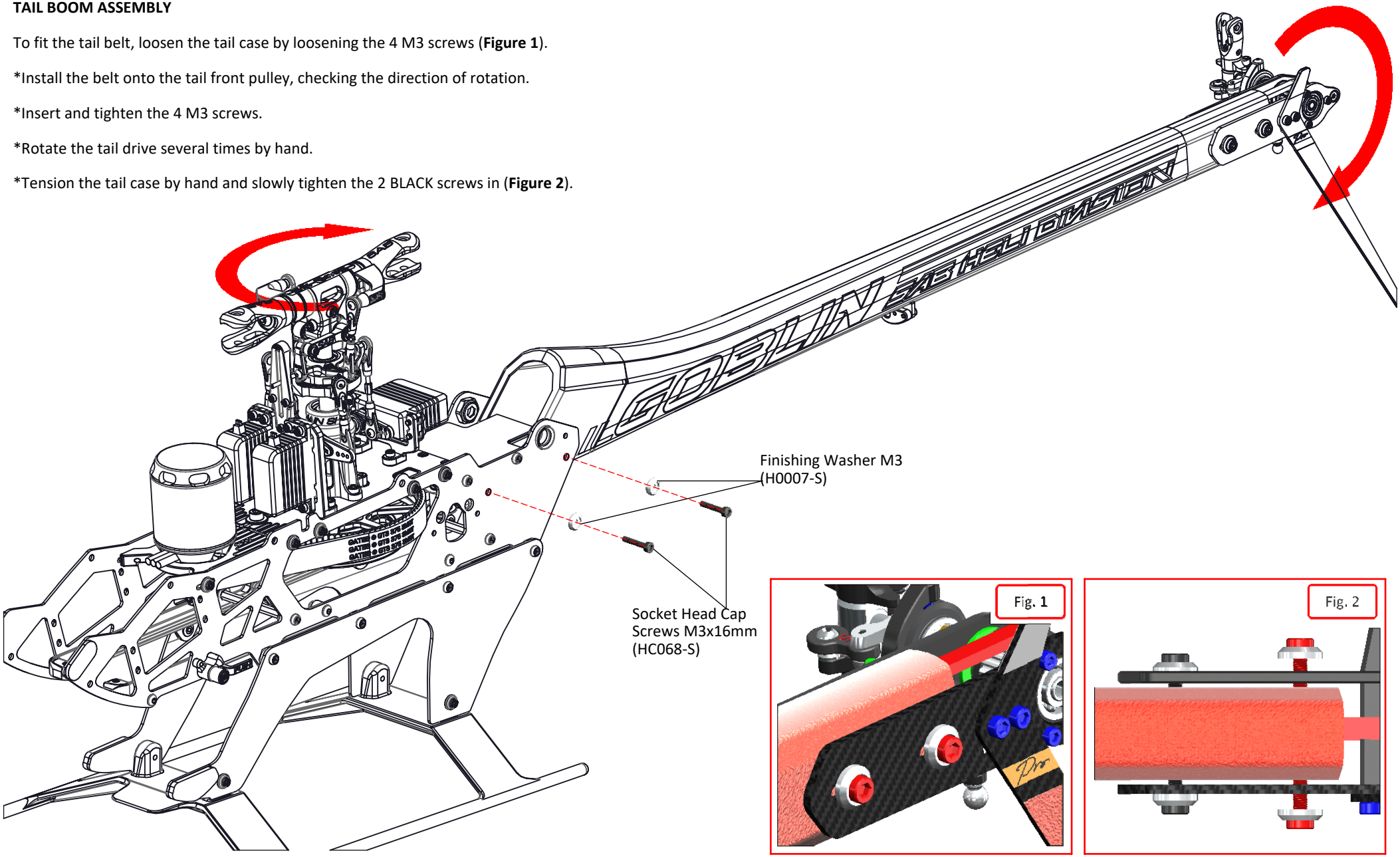


Fig. 1

Fig. 2

Box 1, Bag for page 25

PUSH TENSIONER ASSEMBLY

Eg: Grease
[HA076-S]

Flat Head Cap
Screw M2.5x5mm
(HC128-S)

Push
Tensioner 02
[H1835]
(H1834-S)

Idler Collar
[H1836]
(H1834-S)

Flanged Bearing
∅4x∅7x2.5
(HC486-S)

Tensioner Idler
[H0841]
(H1834-S)

Flanged Bearing
∅4x∅7x2.5
(HC486-S)

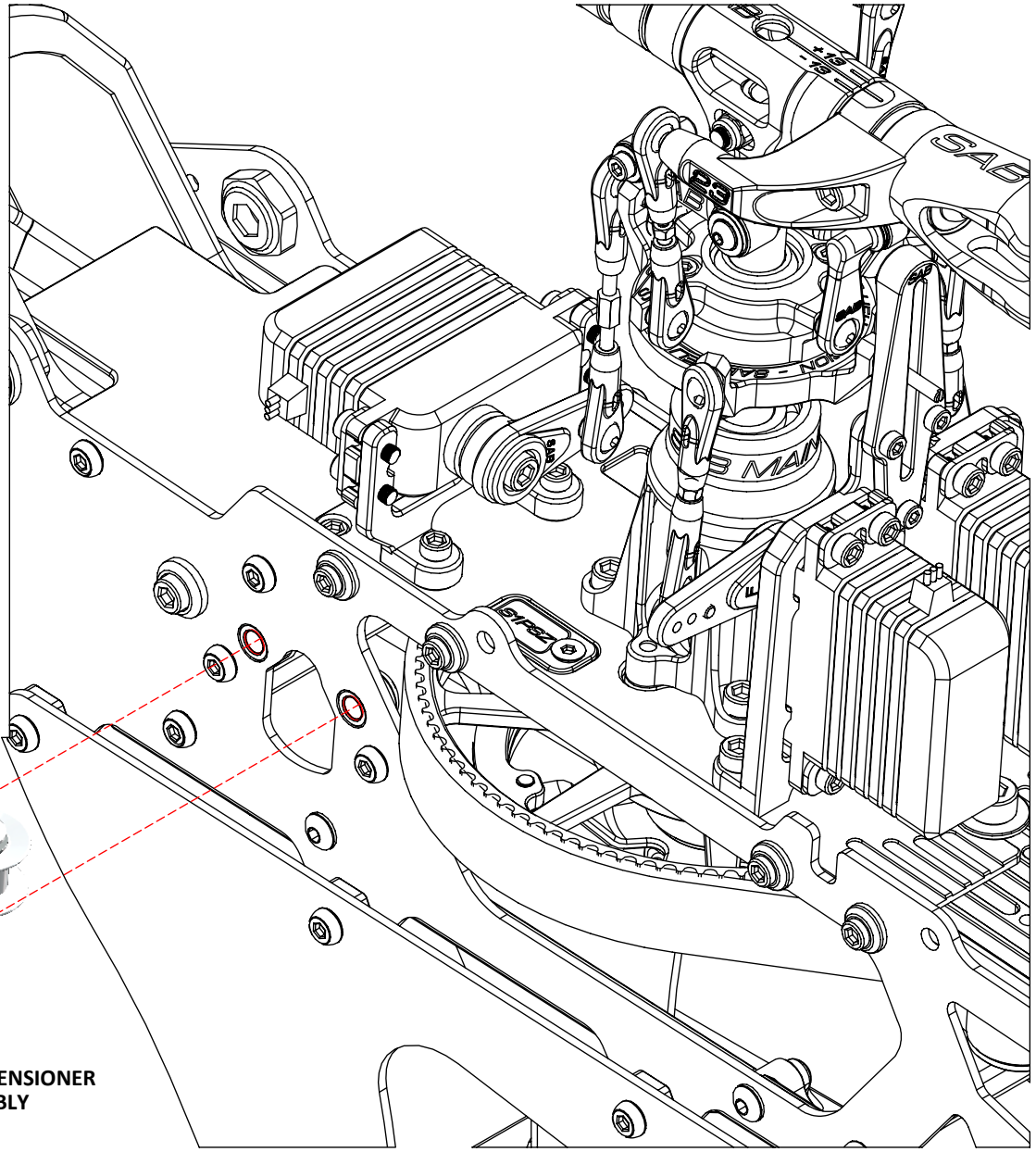
Washer
∅4.05x∅5.9x0.5
[HC746]
(H1834-S)

Pin
[H0781]
(H1834-S)

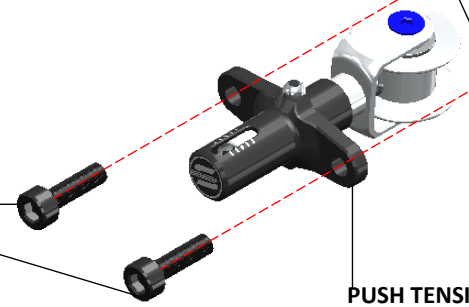
Push Tensioner 01
(H1834-S)

Push Tensioner
Spring
[H1835-01]
(H1834-S)

Flat Head Cap
Screw M2.5x5mm
(HC128-S)



Socket Head Cap
Screws M3x10mm
(HC056-S)



PUSH TENSIONER ASSEMBLY

TAIL BELT TENSION

To provide the correct tail belt tension, you can use the **"zig-zag"** method.

Figure 1, Loosen the 2 **RED** screws and the **BLUE** screw, then push the tail side in the direction indicated by the red arrow. While pushing, tighten the **BLUE** screw.

Figure 2, Loosen the 2 **RED** screws and the **YELLOW** screw, then push the tail side as indicated by the red arrow. While pushing, tighten the **YELLOW** screw. Continue adjusting step by step until the tail belt is sufficiently tight. Note that a Hard 3D flying style will require more tension; once you achieve the desired tension, ensure all screws are tight and the tail shaft is perfectly aligned and straight.

Figure 3, The tail output shaft must be perpendicular to the boom mid-line.

Figure 4, The indicator on the tensioner needs to reach **"Zero"**.

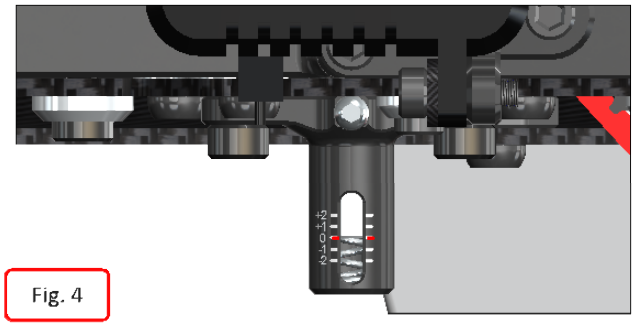


Fig. 4

Fig. 1

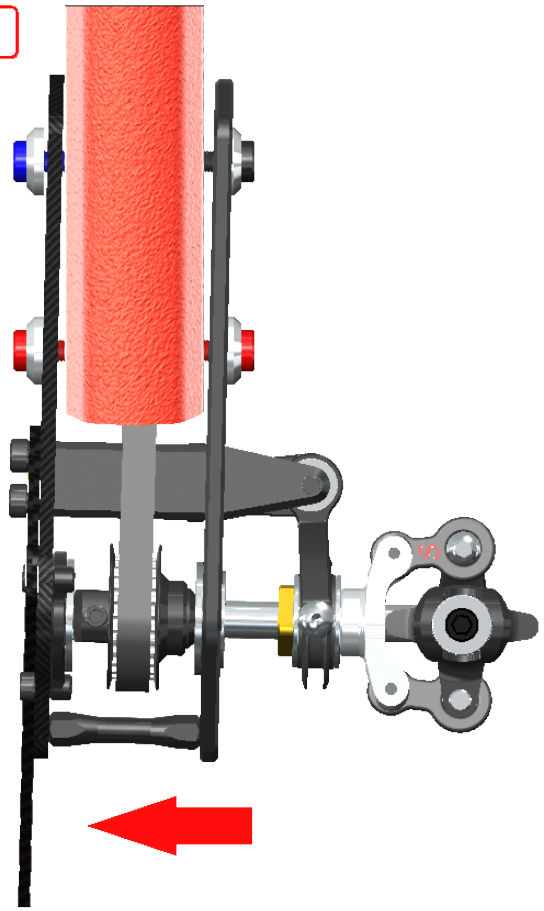


Fig. 2

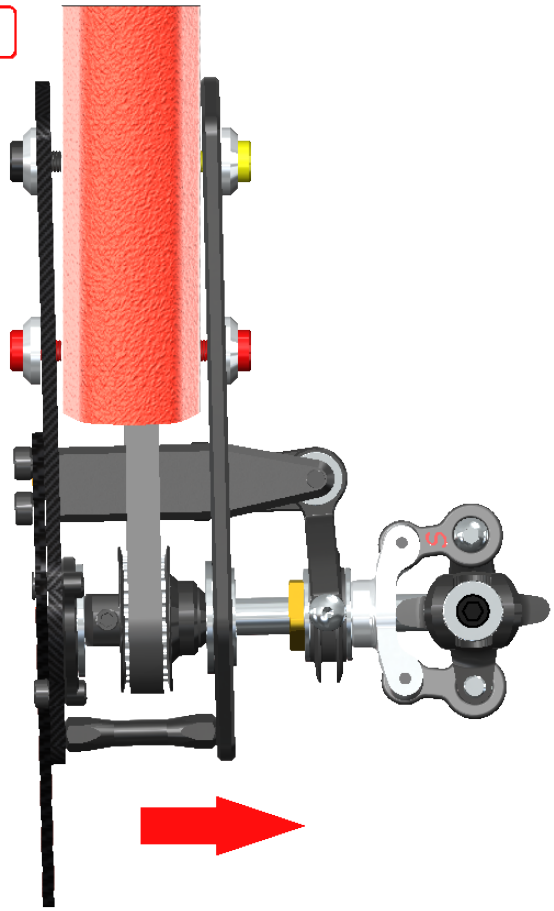
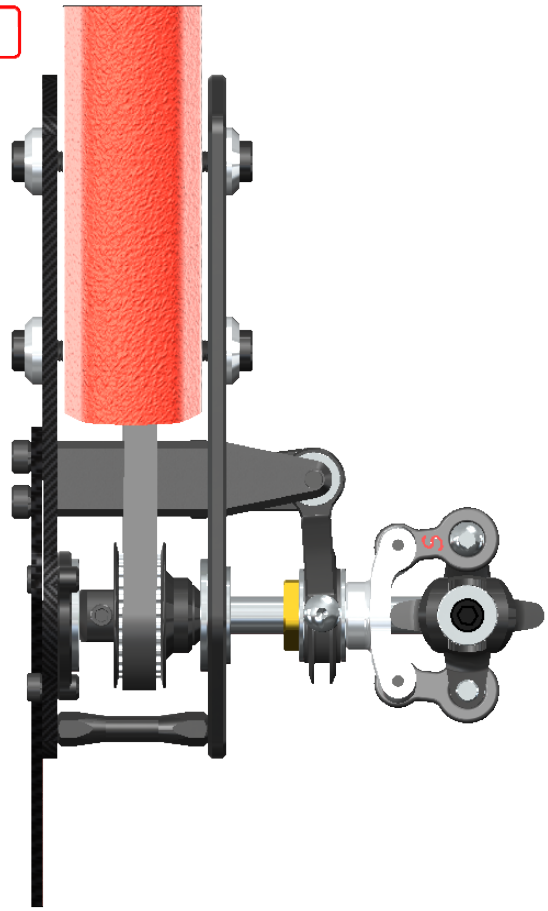
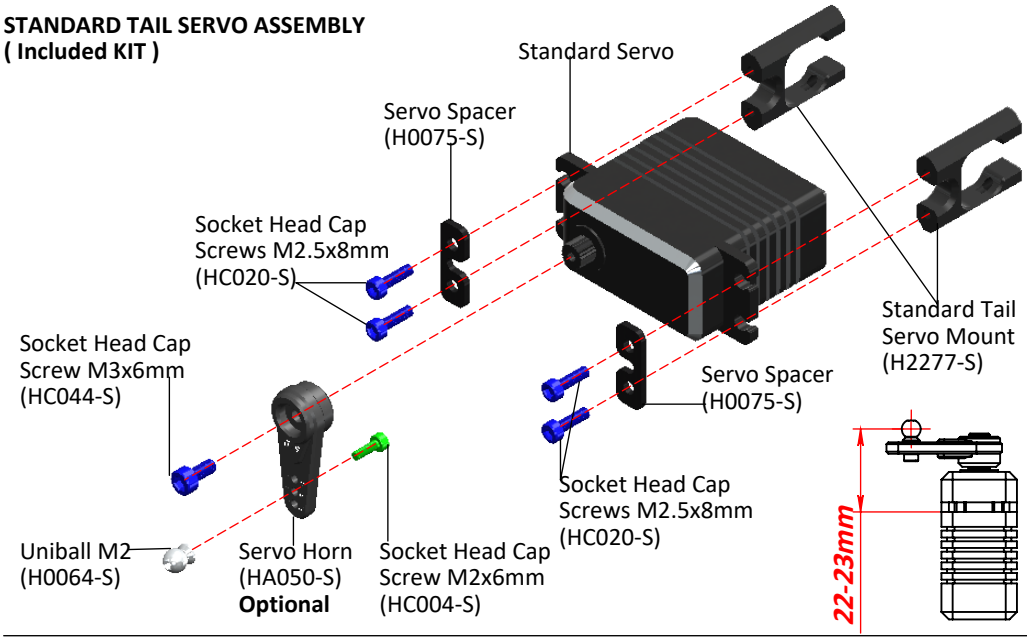


Fig. 3

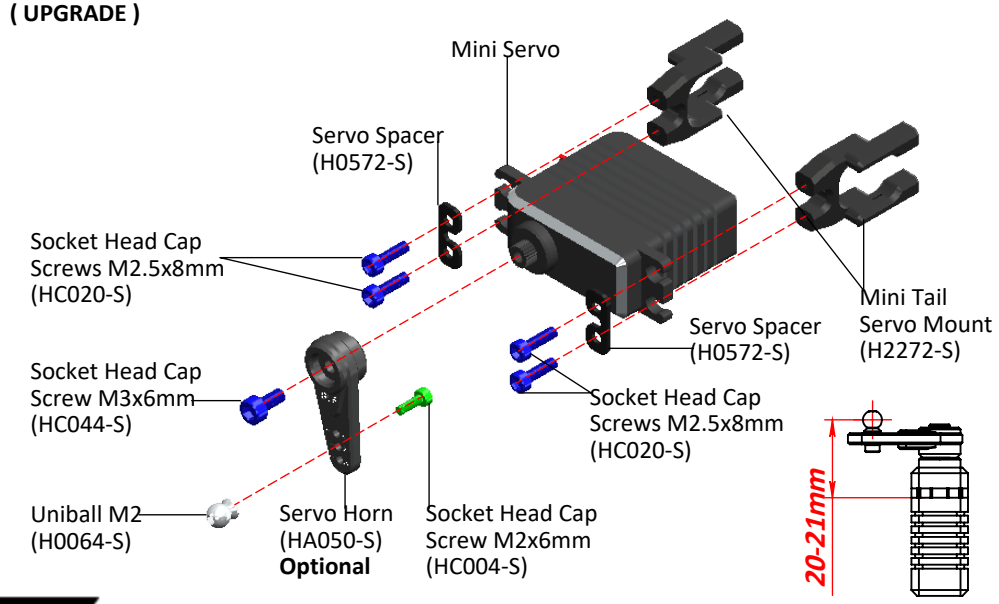


BOX 1, BAG FOR PAGE 27

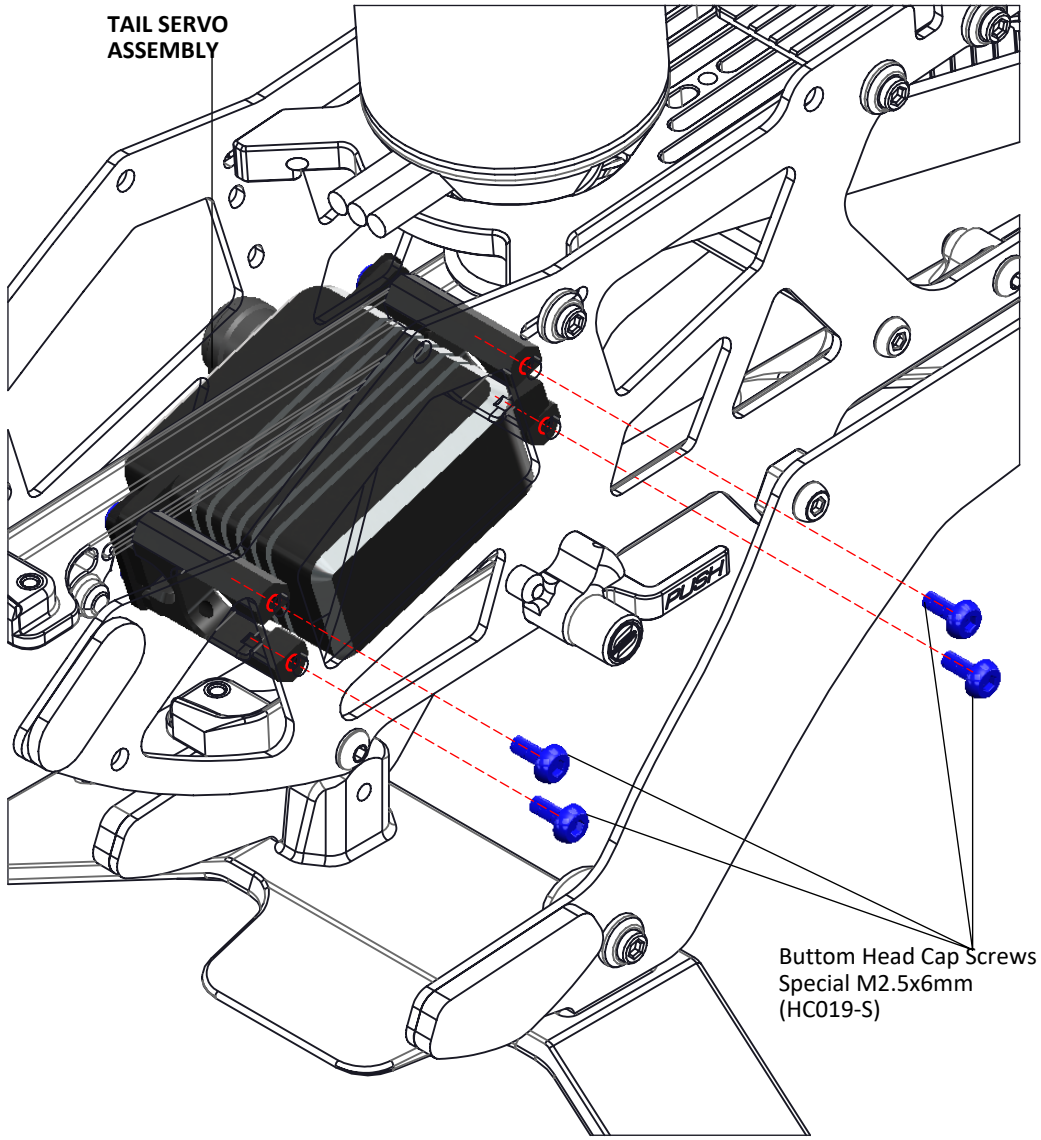
STANDARD TAIL SERVO ASSEMBLY
(Included KIT)



MINI TAIL SERVO ASSEMBLY
(H2272-S)
(UPGRADE)

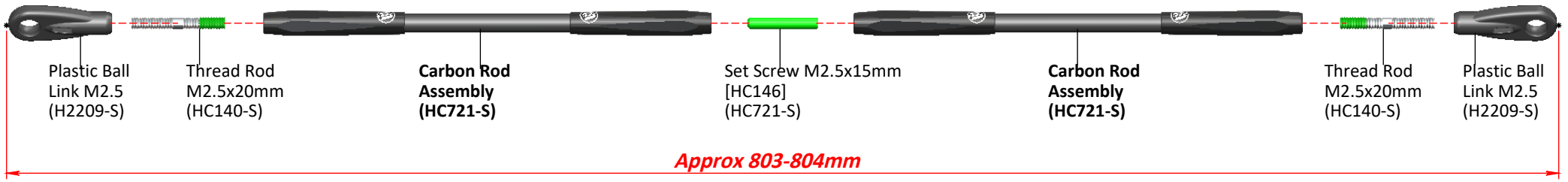


TAIL SERVO ASSEMBLY

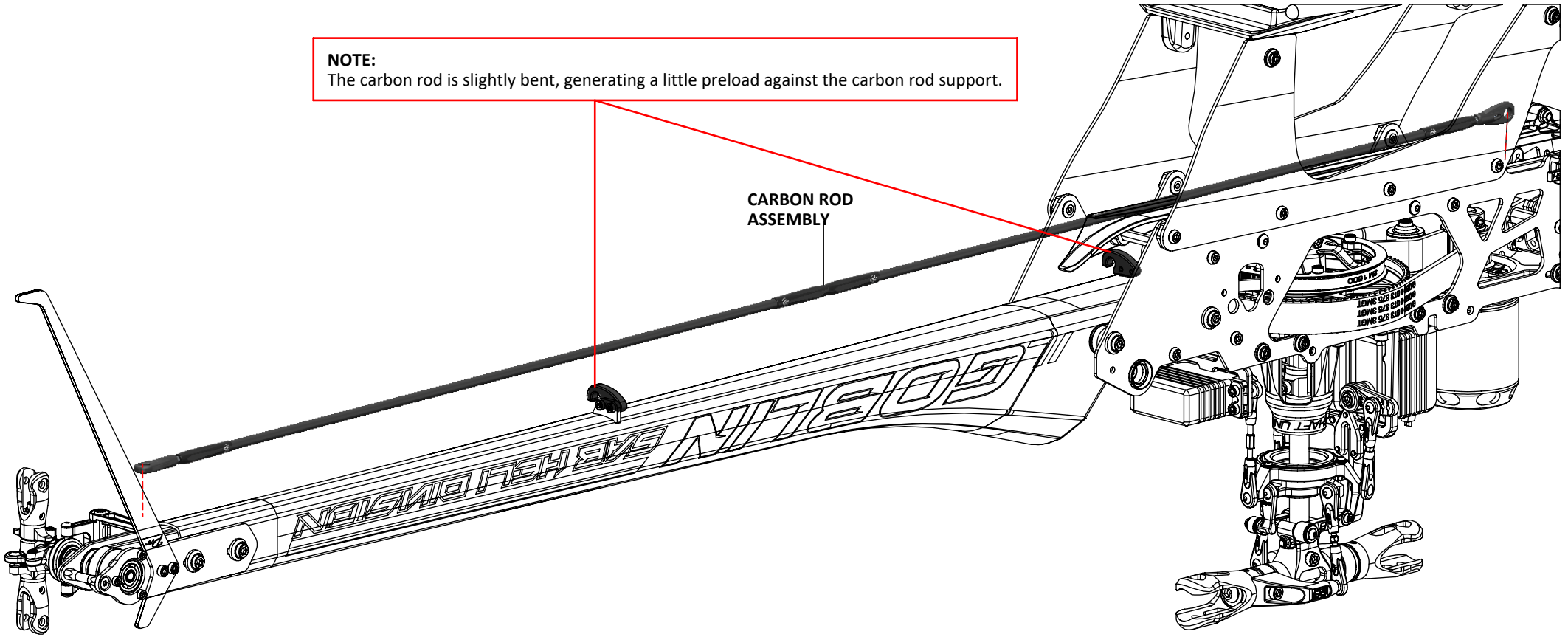


BOX 1, BAG FOR PAGE 28

CARBON ROD ASSEMBLY

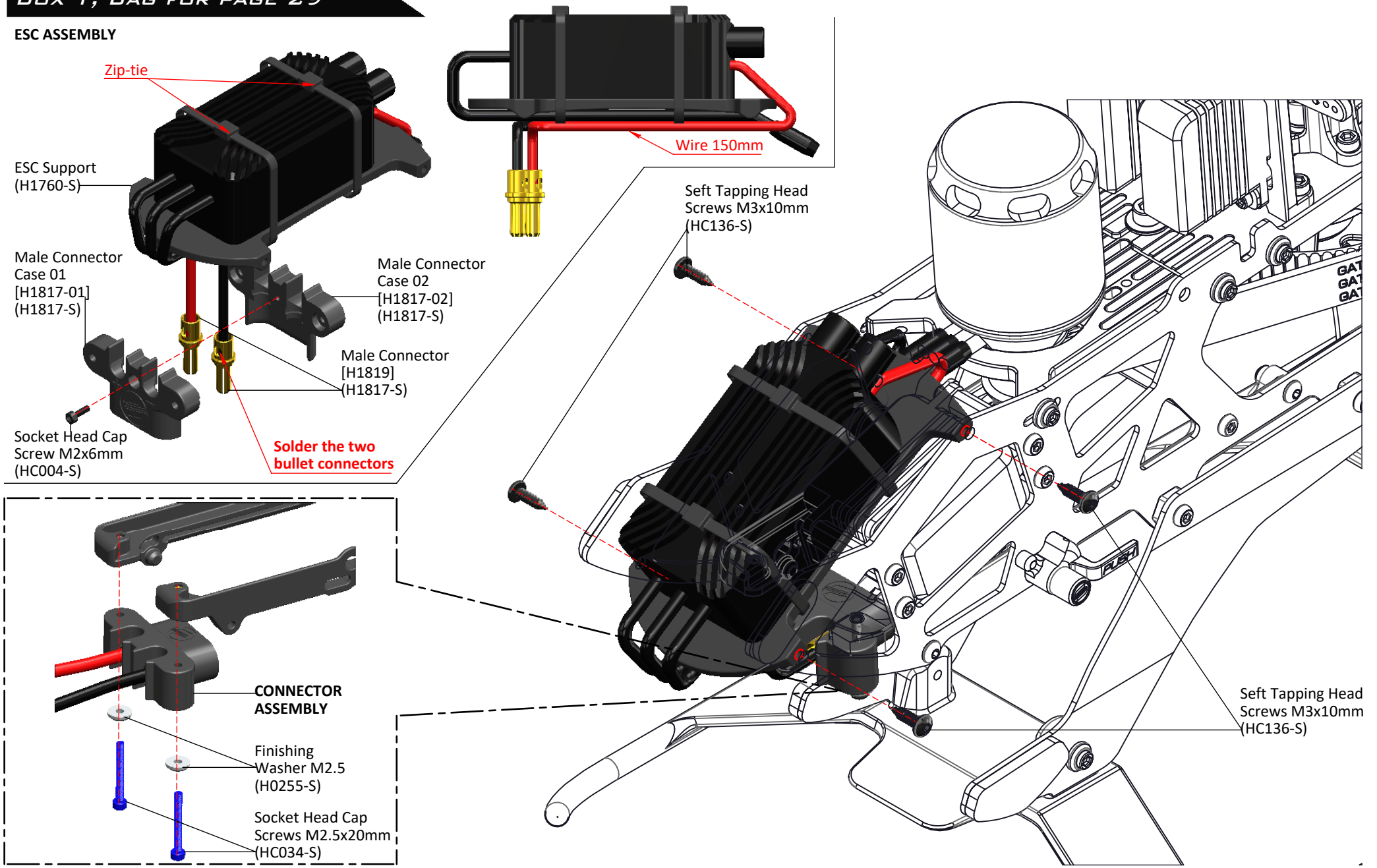


NOTE:
The carbon rod is slightly bent, generating a little preload against the carbon rod support.

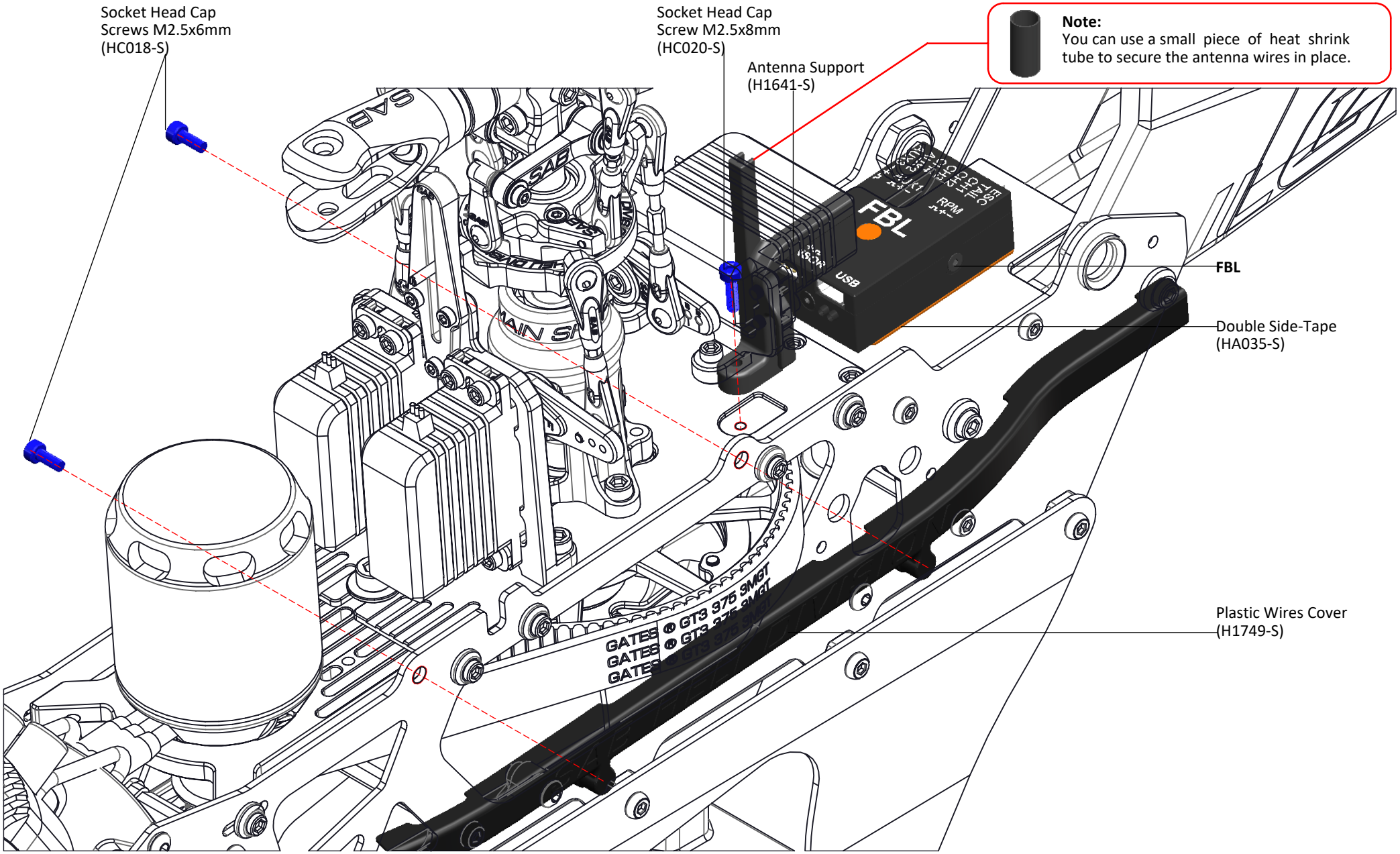


Box 1, Bag for page 29

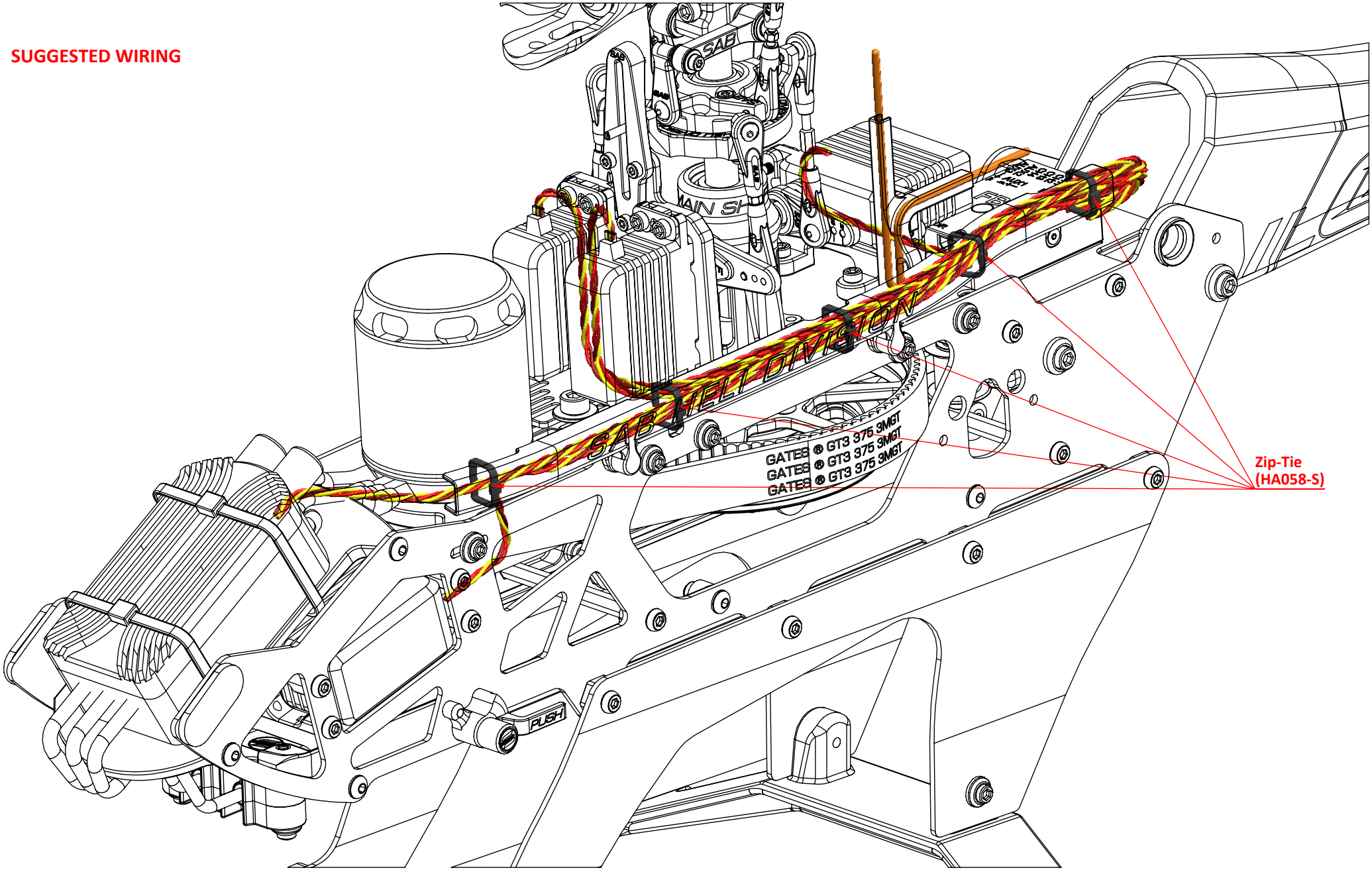
ESC ASSEMBLY



BOX 1, BAG FOR PAGE 30



SUGGESTED WIRING



BOX 1, BAG FOR PAGE 32

CANOPY

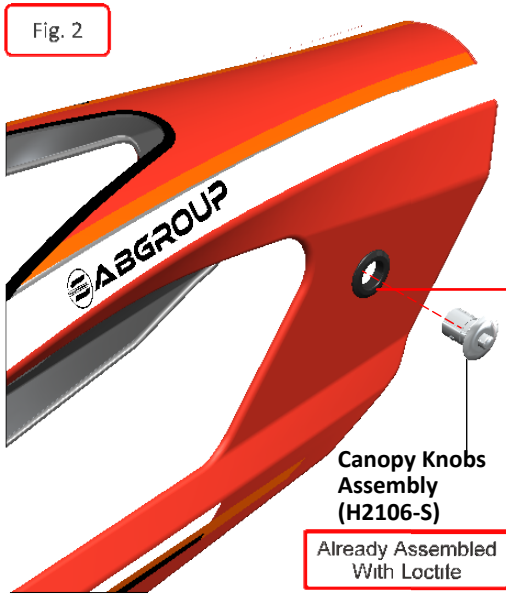
*Install Canopy grommets **(Figure.1)** and the two Quick release canopy mount **(Figure.2).**

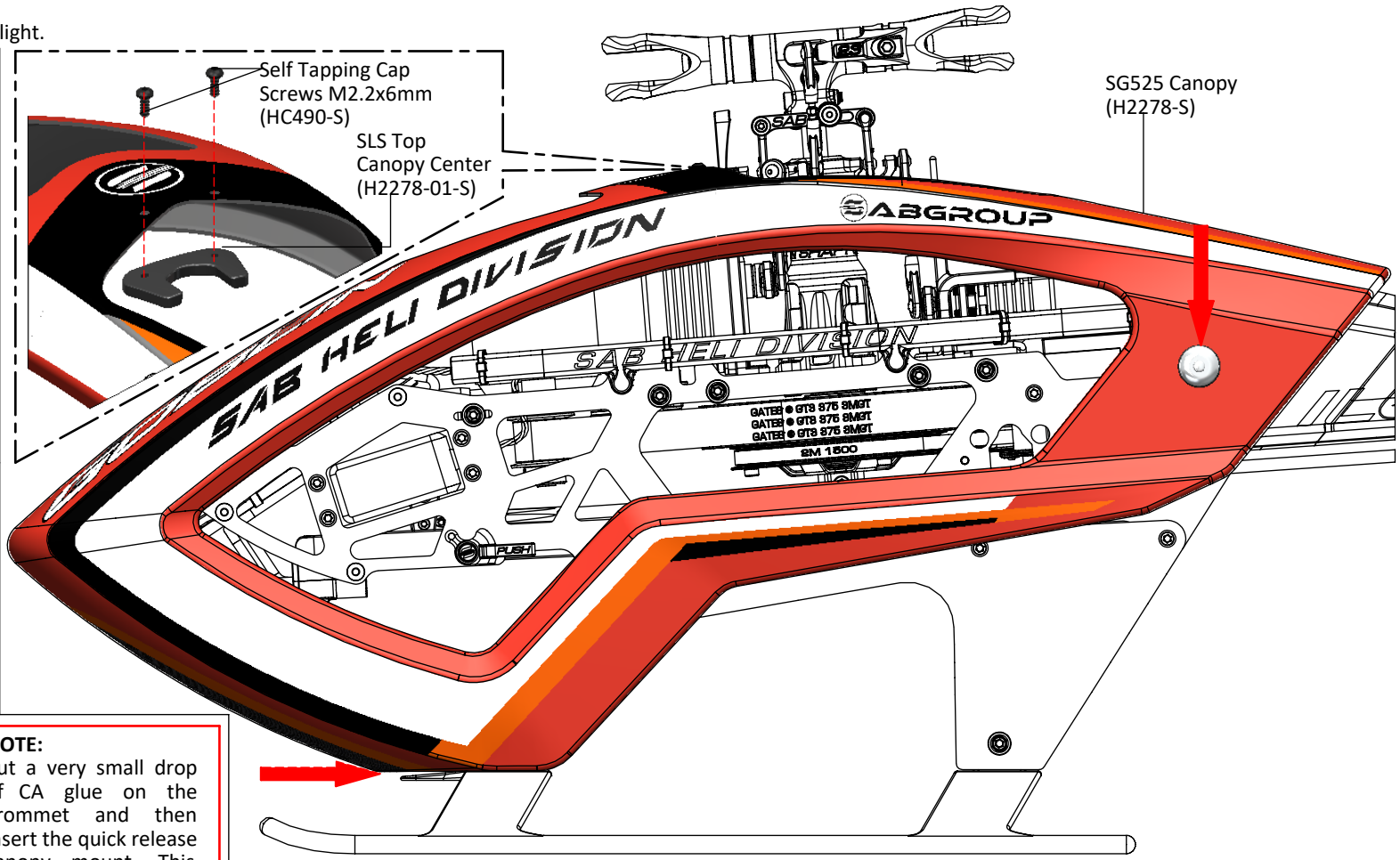
*Fit the canopy ensuring it's correctly located in the areas as shown by the red arrows in **Fig 1**.
Insert the quick release canopy mounts into the canopy base.

*Confirm the canopy is secure prior to each flight.

Fig. 1

Fig. 2





NOTE:
Put a very small drop of CA glue on the grommet and then insert the quick release canopy mount. This way when you remove the canopy, the mounts can not come off. Be careful not to block the quick release mechanism with glue.

Box 1, Bag for page 33

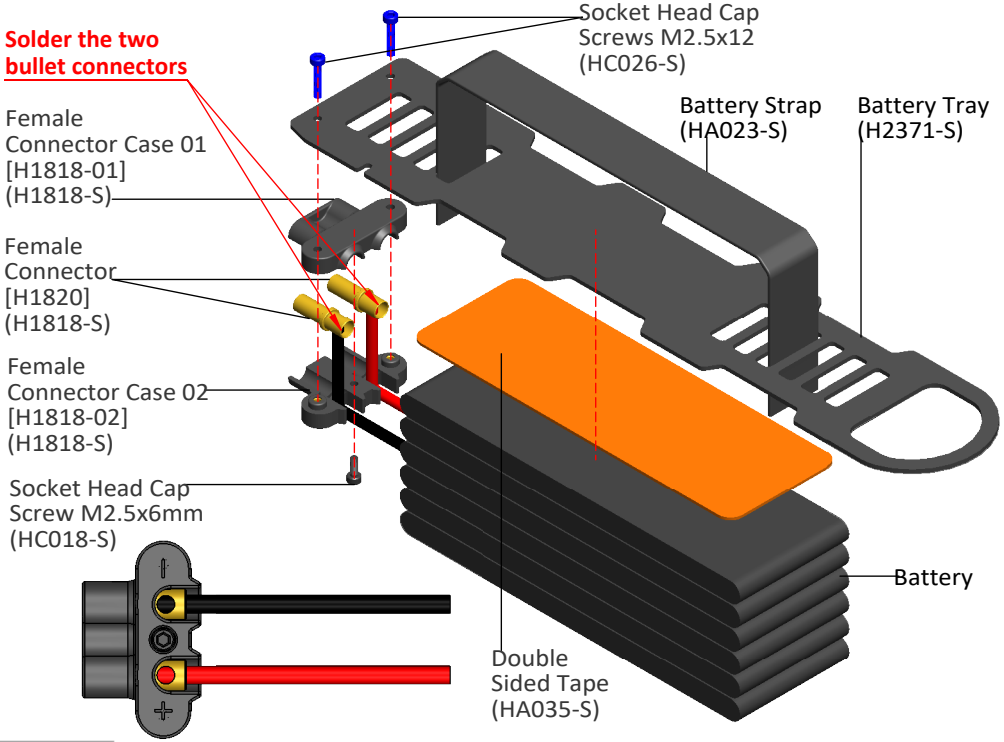
Before permanently mounting the battery on the battery tray, check the ideal position for the best center of gravity.

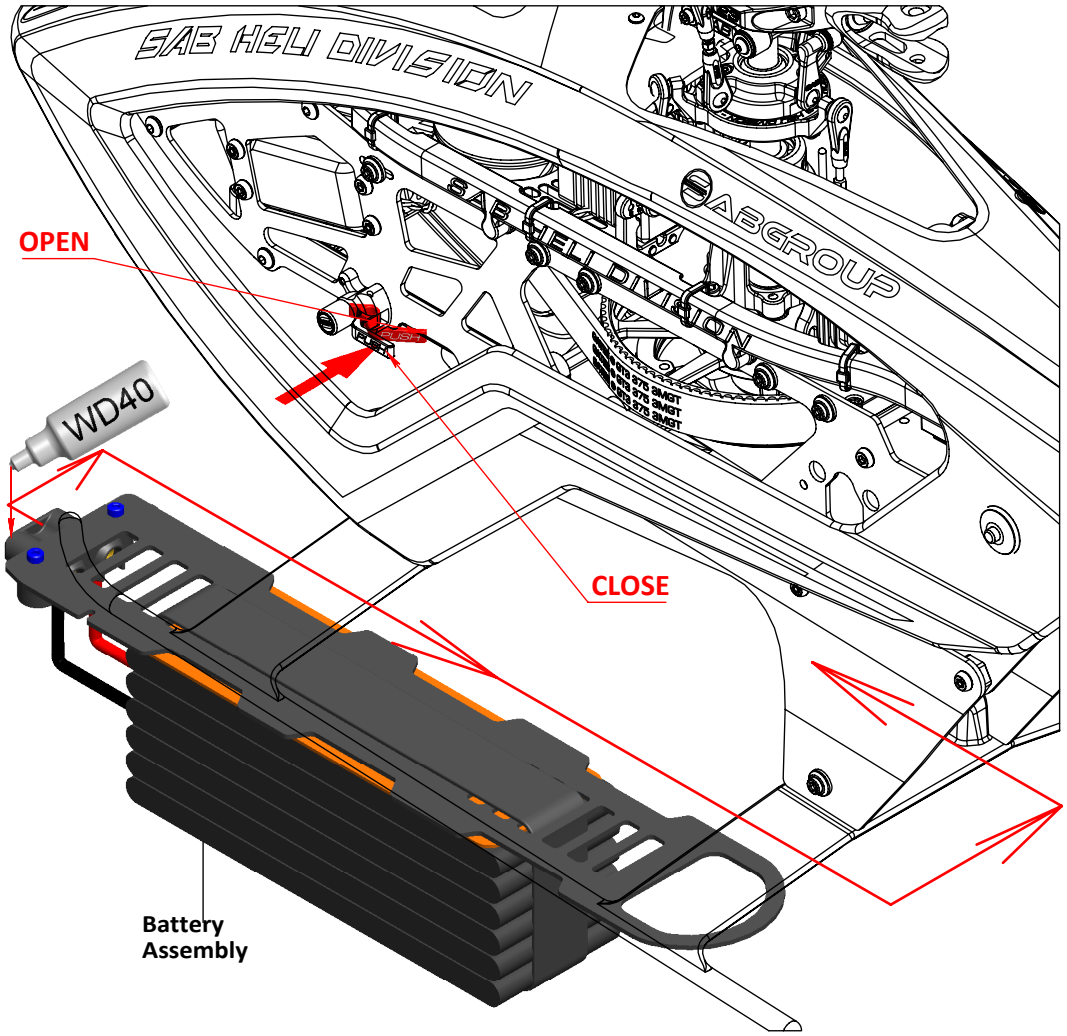
BATTERY ASSEMBLY

Use the included double sided tape to secure the battery to the tray.
Use the Velcro Strap [HA023-S].

CAUTION:

Please be extremely careful when soldering and installing the female connectors to the battery and installing them on the connector case. Lack of diligence and carefulness during this step could cause the connectors to make contact causing severe injury or death.





* Lubricate the ESC and battery connectors with WD40. (If needed)
* The locking lever has 2 positions, Open and Closed.
* **The battery must be inserted with the lever in the closed position until a "click" is heard.**
* To remove the battery, rotate the lever 180 degrees to the open position and pull the tray out. We highly recommend to immediately turn the lever back to the closed position to avoid forgetting to lock the battery on the next flight.
* Always check that the battery is securely locked before each flight. You can check this by pulling on the battery, it should not come off if the lever is in the correct position and the battery tray is locked.

BOX 1, BAG FOR PAGE 34

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 increase of rpm. Although the Goblin can fly at high rpm, for safety reasons we suggest to not exceed 3300rpm.**

*Fit the main blades and tail blades. (**Figure.1** and **Figure.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 +/-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. 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.

*Confirm the canopy is secure prior to each flight.
*Make sure that the battery locking pin is back in its resting position, blocking in correct way the battery tray.

***Perform the first flight at a low headspeed, 2400 RPM.**

After this first flight, do a general check of the helicopter. Verify that all screws are correctly tightened.

Fig. 1

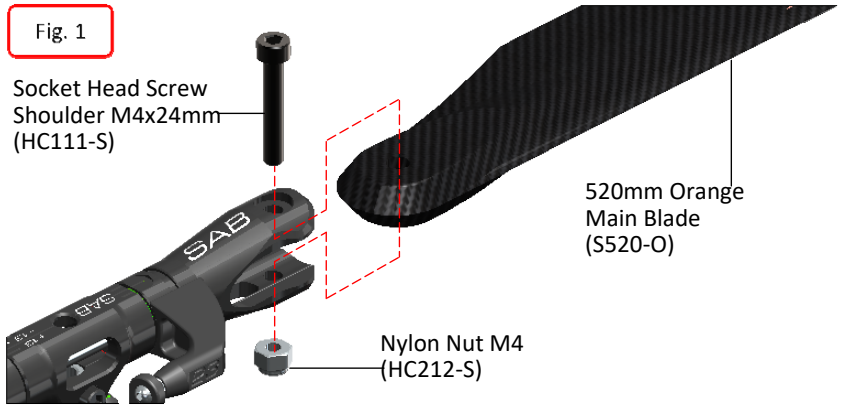
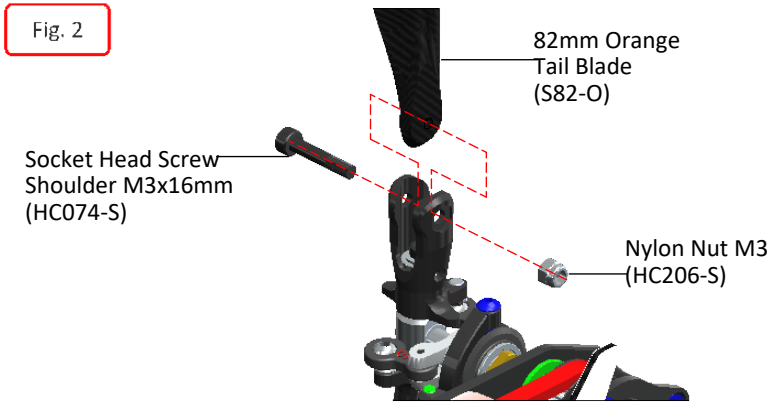


Fig. 2



IN FLIGHT

ABOUT HEAD

The dampers are composed of 2 O-ring (that defines the rigidity) and a technopolymer damper (that defines the maximum possible movement of the spindle).
Using different Oring and dampers you can get different responses of the model.

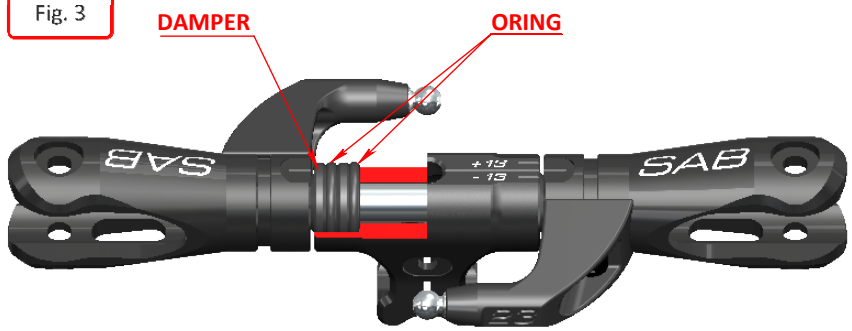
H1822-A = Max movement of the spindle, feeling more elastic.

H1822-B = Medium.

H1822-C = Min movement of the spindle, feeling more direct.

Inside the Spare parts H1822-S you can get all options.

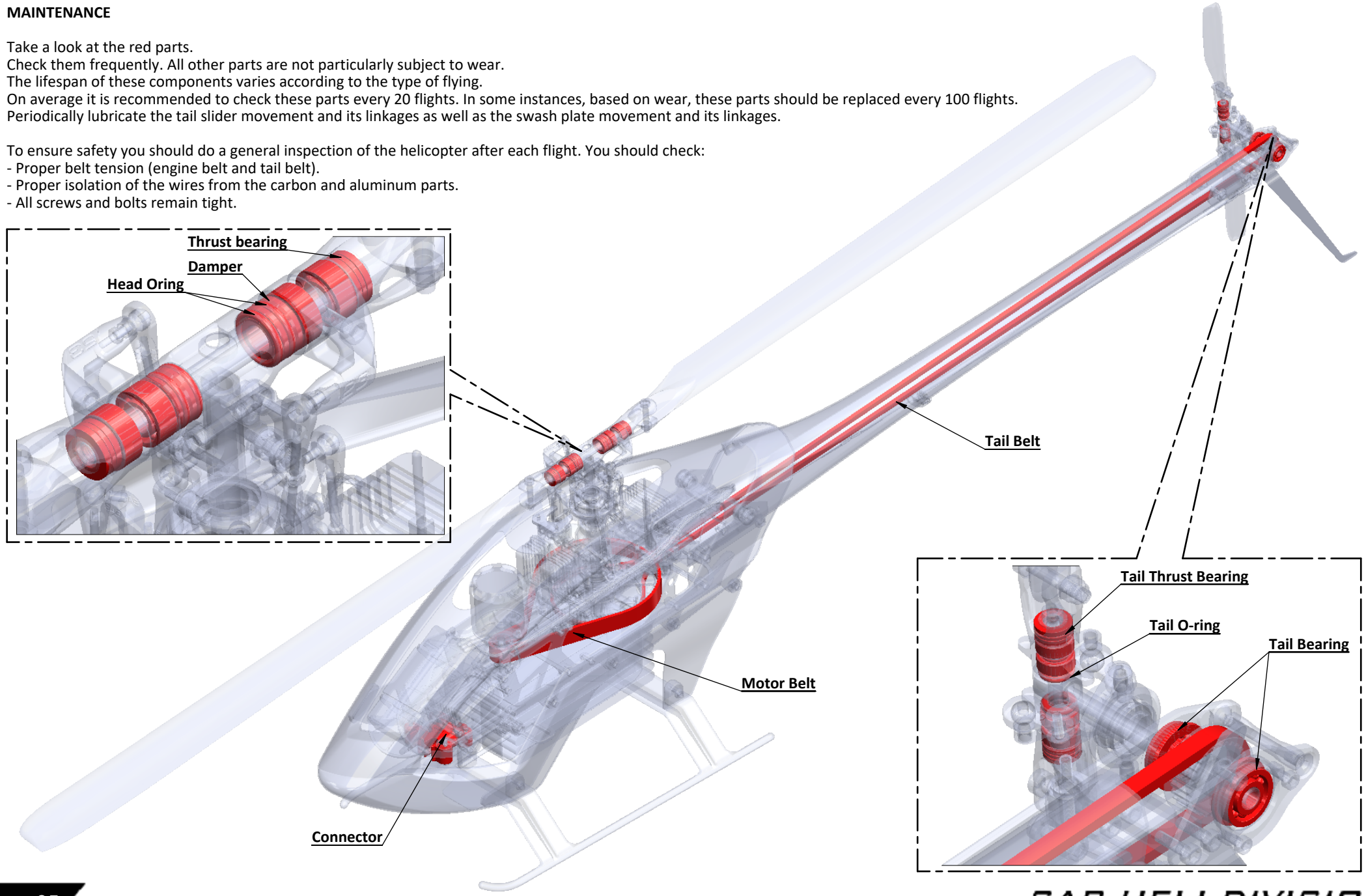
Fig. 3



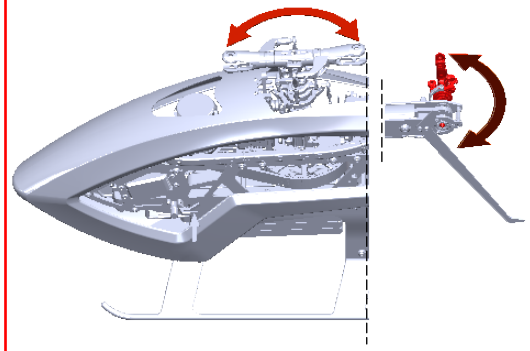
MAINTENANCE

Take a look at the red parts.
Check them frequently. All other parts are not particularly subject to wear.
The lifespan of these components varies according to the type of flying.
On average it is recommended to check these parts every 20 flights. In some instances, based on wear, these parts should be replaced every 100 flights.
Periodically lubricate the tail slider movement and its linkages as well as the swash plate movement and its linkages.

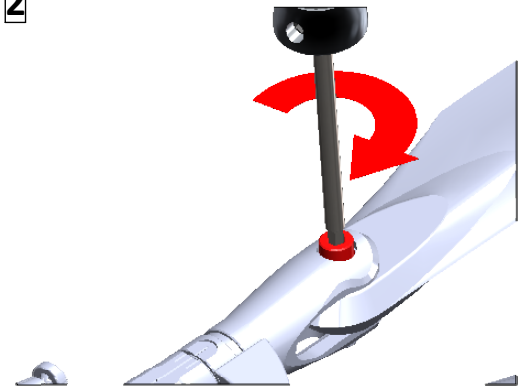
To ensure safety you should do a general inspection of the helicopter after each flight. You should check:
- Proper belt tension (engine belt and tail belt).
- Proper isolation of the wires from the carbon and aluminum parts.
- All screws and bolts remain tight.



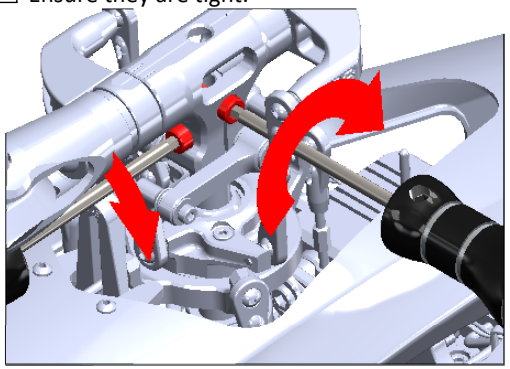
1 **Check the dampening on the main and tail rotor to be the same as always.**



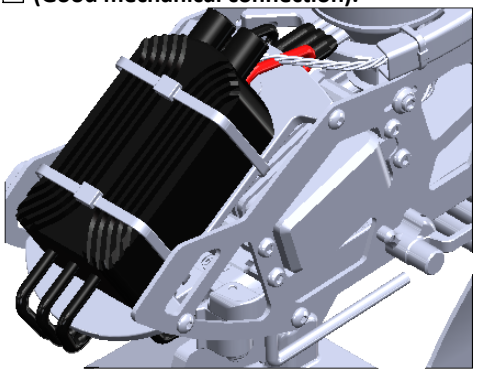
2 **Tighten the main blades before flight.**



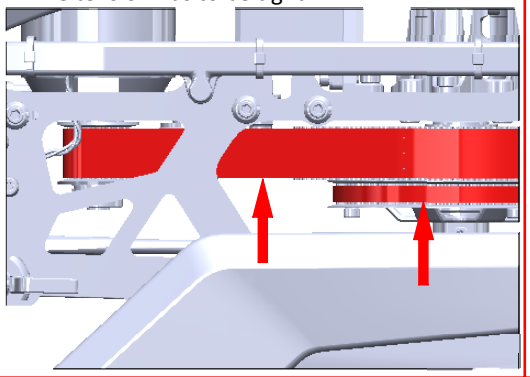
3 **Check main hub screws M3**
Ensure they are tight.



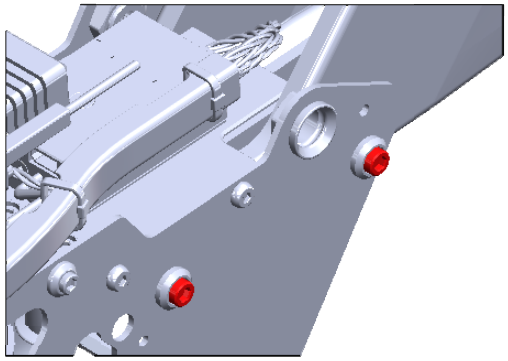
4 **Check all power connectors (Good mechanical connection).**



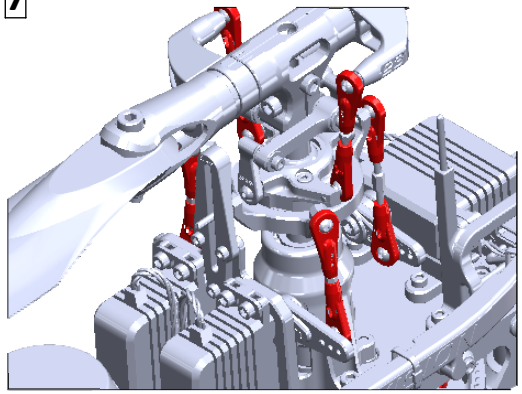
5 **Check Belt tension.**
The tension has to be tight.



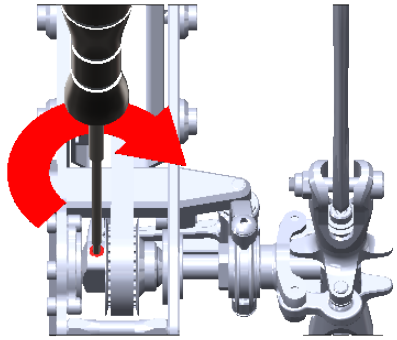
6 **Check the 4 M3 screws.**
Ensure they are tight.



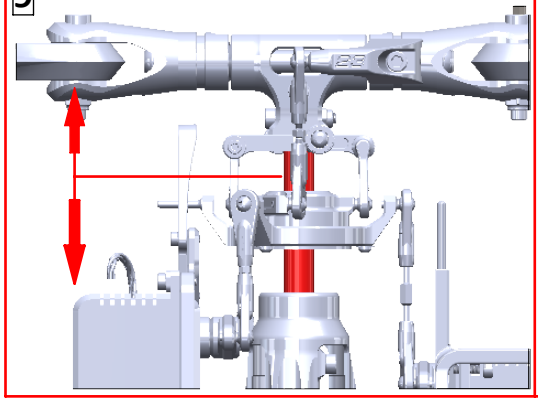
7 **Check the Main Linkages & Servo Linkages**



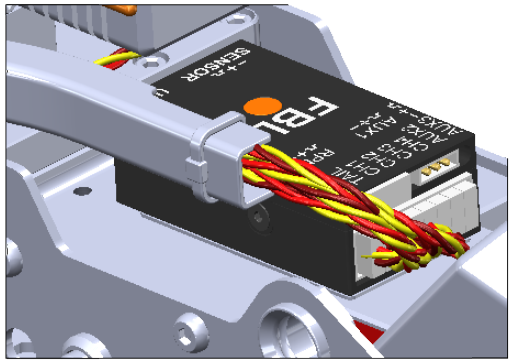
8 **Check tail pulley set screw:**
Ensure it is tight.
(It is suggested use a bit of Green Loctite.)



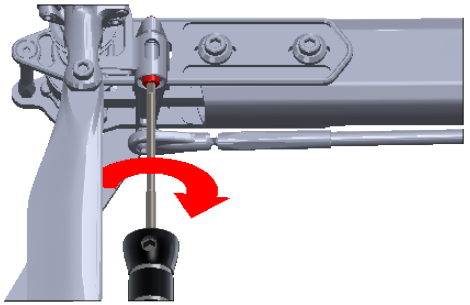
9 **Check for vertical play of the main shaft.**



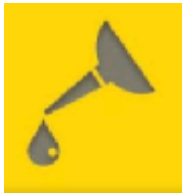
10 **Check if the FBL-RX connectors are OK (hot glue is recommended).**



11 **Check the M2.5 bell crank:**
Belt crank movement must be smooth and the screw locked.
(It is suggested use a bit of Green Loctite.)



12 **Be sure the following parts are properly lubricated**
*Main shaft/swashplate
*Tail slider/tail shaft
*Carbon rod/carbon rod support
*All thrust bearings
*All plastic balls connections



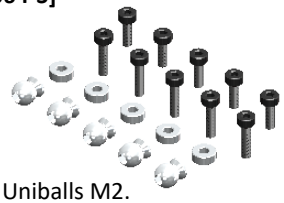
Finishing Washer M3
[H0007-S]

- 10 x Finishing Washer M3.

Motor Pulley Z18/Z26
[H0015-18/26-S]

- 1 x Motor Pulley Z18/Z26.
- 2 x Set Screws M4x4.

Uniball M2
[H0064-S]

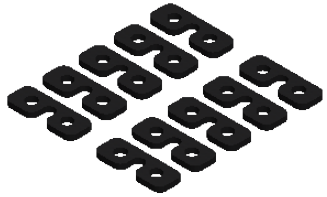


- 5 x Uniballs M2.
- 5 x Uniball Spacers.
- 5 x Socket Head Cap Screws M2x8.
- 5 x Socket Head Cap Screws M2x6.

Uniball M3
[H0065-S]

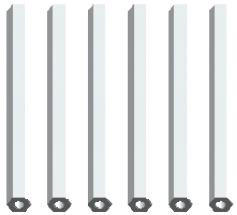
- 5 x Uniball M3.

40mm Servo Spacer
[H0075-S]



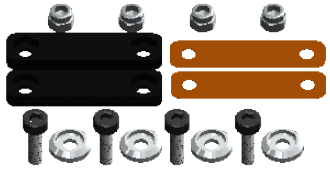
- 10 x 40mm Servo Spacer.

HEX Spacer 54mm
[H0239-S]



- 6 x HEX Spacer 54mm.

Locking Element Tail
[H0249-S]



- 2 x Lockking Element Tail.
- 2 x Double Side Tape.
- 4 x Socket Head Cap Screws M3x10.
- 4 x Nylon Nut M3

Finishing Washer M2.5
[H0255-S]

- 10 x Finishing Washer M2.5.

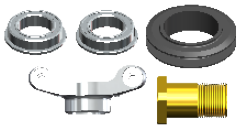
Plastic Linkage
[H0261-S]

- 2 x Plastic Linkage.
- 2 x Spacers.
- 2 x Socket Head Cap Screws M2x6.

Plastic Ball Linkage M2
[H0403-S]

- 5 x Plastic Ball Linkage M2.

Tail Spitch Slider
[H0512-S]



- 1 x Tail Spitch Slider 01.
- 1 x Tail Spitch Slider 02.
- 1 x Tail Spitch Slider 03.
- 2 x F.Bearing ∅ 7x ∅ 11x2.5.

Radius Plastic Arm
[H0525-S]

- 2 x Radius Plastic Arm.
- 2 x Washer ∅ 2,2x ∅ 5 x 0,3mm.

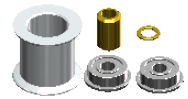
Uniball M2
[H0538-S]

- 5 x Uniball M2.

35mm Servo Spacer
[H0572-S]

- 4 x 35mm Servo Spacer.

Tail Belt Idle Pulley
[H1066-S]



- 1 x Tail Belt Idle Pulley SET.

Serial Number
[H1212-S]

- 1 x Serial Number.
- 1 x Flat Head Cap Screw M2.5x5.

Lock Nut M3
[H1386-S]

- 10 x Lock Nut M3.
- 10 x Nylon Nut M3.

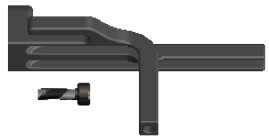
Bell Crank Clever
[H1458-S]

- 1 x Bell Crank Clever SET.

Swashplate
[H1566-S]

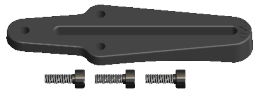
- 7 x Uniball M2.
- 1 x Reference Pin.
- 1 x Swashplate ASM.

Antenna Support
[H1641-S]



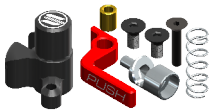
- 1 x Antenna Support.
- 1 x Socket Head Cap Screw M2.5x8.

Anti-rotation
[H1687-S]



- 1 x Anti-Rotation.
- 3 x Head Cap Screws M2x6.

Battery Lock
[H2172-S]



- 1 x Battery Lock Base.
- 1 x Battery Lock Push.
- 1 x Battery Lock Pin.
- 1 x Battery Lock Spring.
- 1 x Bushing.
- 2 x Flat Head Cap Screws M2.5x5mm.
- 1 x Flat Head Cap Screw M2x8mm.

Rear Servo Mount
[H1700-S]

- 1 x Rear Servo Mount.
- 2 x Head Cap Screws M2.5x8.

Center Hub
[H1737-S]

- 1 x Center Hub.
- 2 x Head Cap Screws Shoulder M3x16.
- 2 x Nylon Nut M3.

Main Blade Grip
[H1738-S]

- 1 x Main Blade Grip.
- 2 x Bearing ∅ 6x ∅ 13x5.
- 1 x Washer ∅ 10x ∅ 12.9x0,5.
- 1 x Thrust Bearing ∅ 6x ∅ 12x4.5.
- 1 x Button Head Screw M5x8.

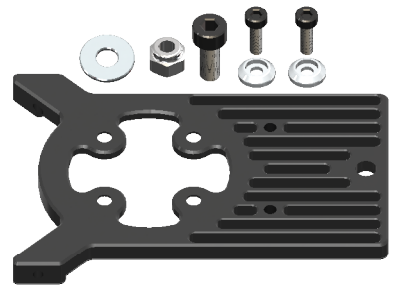
Radius Arm
[H1739-S]

- 2 x Swashplate Arm.
- 2 x Button Cap Screws M2.5x12mm.
- 2 x Washer ∅ 2x ∅ 3.25 x 0,3mm.
- 2 x Spacer ∅ 2.5x ∅ 4 x2.65mm.
- 4 x F.Bearing ∅ 2x ∅ 5x2.5mm.
- 4 x F.Bearing ∅ 2.5x ∅ 6x2.6mm.

Wire Cover
[H1749-S]

- 1 x Wire Cover.
- 2 x Head Cap Screw M2.5x6.

Motor Mount
[H1751-S]

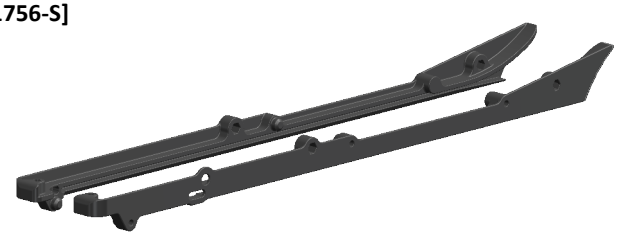


- 1 x Motor Mount.
- 1 x Nylon Nuts M4.
- 2 x Finishing Washer M2.5.
- 1 x Head Cap Screw M4x10mm.
- 1 x Washer ∅ 4.1 x ∅ 11 x 1mm.
- 2 x Head Cap Screws M2.5x8mm.

Plastic Landing Gear
[H1755-S]

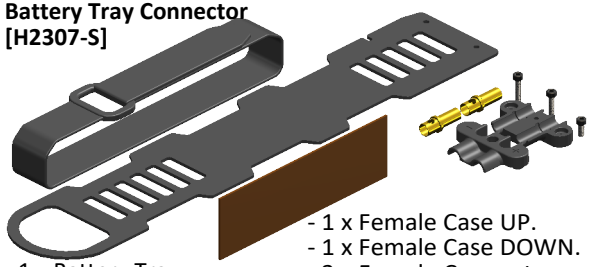
- 1 x Plastic Landing Gear.

Battery Guide
[H1756-S]



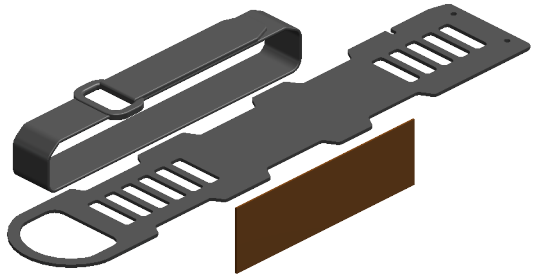
- 1 x Right Battery Guide.
- 1 x Left Battery Guide.

Battery Tray Connector
[H2307-S]



- 1 x Battery Tray.
- 1 x Battery Strap.
- 1 x Double Side Tape.
- 1 x Female Case UP.
- 1 x Female Case DOWN.
- 2 x Female Connector.
- 1 x Head Cap Screw M2.5x6mm.
- 2 x Head Cap Screws M2.5x12mm.

Battery Tray
[H2371-S]

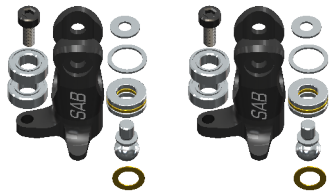


- 1 x Battery Tray.
- 1 x Battery Strap.
- 1 x Double Side Tape.

ESC Mount
[H1760-S]

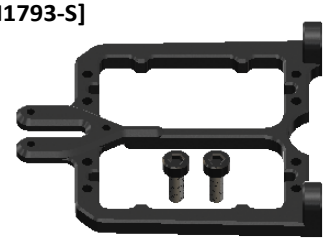
- 1 x ESC Mount.

Tail Blade Grip
[H1770-S]



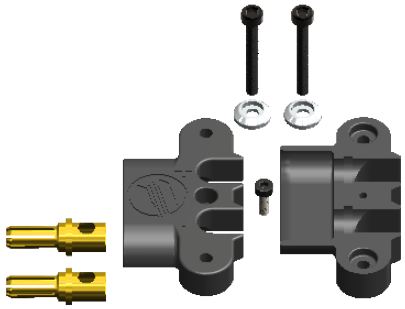
- 2 x Uniball M3.
- 2 x Tail Blade Grip.
- 2 x Washer ∅ 2.6x ∅ 6x0.5mm.
- 2 x Washer ∅ 6.1x ∅ 7.9x0.5mm.
- 2 x Washer ∅ 4.05x ∅ 6.5x0.3mm.
- 2 x Thrust Bearing ∅ 4x ∅ 8x3.5mm.
- 4 x Ball Bearing ∅ 3x ∅ 8x3mm.
- 2 x Head Cap Screws M2.5x6mm.

Front Servo Mount
[H1793-S]



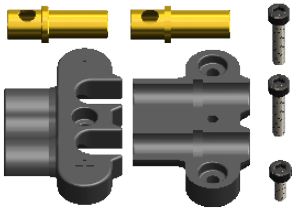
- 1 x Front Servo Mount.
- 2 x Head Cap Screws M3x8mm.

Male Connector Case (ESC Side)
[H1817-S]



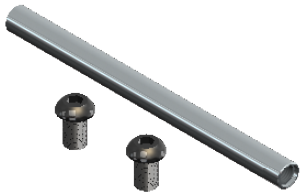
- 1 x Male Connector Case UP.
- 1 x Male Connector Case DOWN.
- 2 x Male Connector.
- 2 x Finishing Washer M2.5.
- 1 x Head Cap Screw M2x6mm.
- 2 x Head Cap Screws M2.5x20mm.

Female Connector Case (Battery Side)
[H1818-S]



- 1 x Female Connector Case UP.
- 1 x Female Connector Case DOWN.
- 2 x Female Connector.
- 1 x Head Cap Screw M2.5x6mm.
- 2 x Head Cap Screws M2.5x12mm.

Main Spindle
[H1821-S]



- 1 x Main Spindle.
- 2 x Buttom Cap Screws M5x8mm.

Damper Hard
[H1822-S]

- 2 x Damper Hard A.
- 2 x Damper Hard B.
- 2 x Damper Hard C.
- 4 x Oring 9.52x1.78 70 Shore.
- 2 x Oring 9.52x1.78 90 Shore.

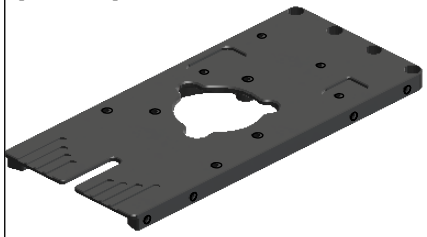
Tail Shaft
[H1824-S]

-1 x Tail Shaft.
-1 x Tail Hub.
-2 x Oring 3.98x1.78 Shore 90˚.

Tail Spindle
[H1826-S]

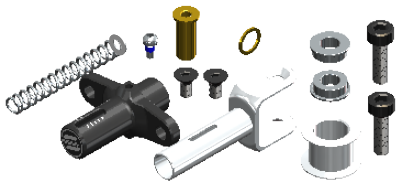
- 1 x Tail Spindle.
- 2 x Head Cap Screw M2.5x6mm.
- 2 x Washer ∅ 2.6x ∅ 6x0.5mm.

Main Plate
[H1842-S]



- 1 x Main Plate.

Tail Belt Tensioner
[H1834-S]



- 1 x Pin M2.
- 1 x Tensioner Ilder.
- 1 x Push Tensioner 01.
- 1 x Push Tensioner 02.
- 1 x Push Tensioner Spring.
- 1 x Ilder Collar.
- 2 x Head Cap Screws M3x10mm.
- 2 x Flat Cap Screw M2.5x5mm.
- 1 x Washer ∅ 4.5x ∅ 5.9x0.5mm.
- 2 x Flanged Bearing ∅ 4x ∅ 7x2.5mm.

TOP Bearing Support
[H1844-S]

- 1 x TOP Bearing Support.
- 1 x Ball Bearing ∅ 8x ∅ 19x6mm.

Main Shaft Lock
[H1845-S]

- 1 x Main Shaft Lock.
- 2 x Head Cap Screws Shoulder M3x18.
- 2 x Shim ∅ 8.1x ∅ 10x0.1mm.

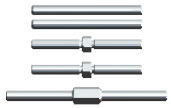
BUTTOM Bearing Support
[H1871-S]

- 1 x BUTTOM Bearing Support.
- 1 x Ball Bearing ∅ 8x ∅ 19x6 .

Main Grip Washer Shim
[H1882-S]

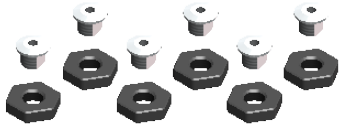
- 2 x Washers ∅ 10x ∅ 12.9x0.5mm.
- 2 x Shims ∅ 6.1x ∅ 9.9x0.1mm.

RAW500 Linkage Rod
[H1883-S]



- 2 x Thread Rod HEX M2x22.
- 2 x Thread Rod M2x22.
- 1 x Thread Rod HEX M2x32.

Insert M2.5
[H1890-S]



- 6 x Insert M2.5.
- 6 x Derlin Spacer ∅ 4x ∅ 12x2.8mm.

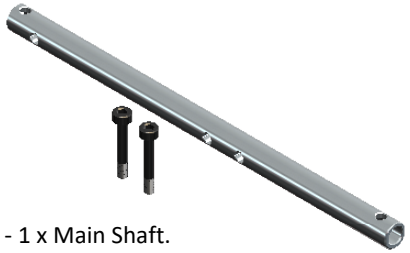
Tail Pulley
[H1912-S]

- 1 x Tail Pulley.
- 1 x Set Screw M3x4mm.

Quick Release Canopy
[H2106-S]

- 2 x Quick Release Canopy SET.

Main Shaft
[H2129-S]



- 1 x Main Shaft.
- 2 x Head Cap Screws Shoulder M3x16.

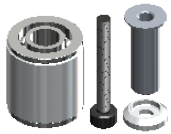
One Way Bearing Bushing
[H2130-S]

- 1 x One Way Bearing Bushing.

One Way Bearing Pulley
[H2132-S]

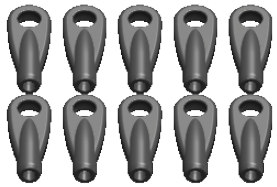
- 1 x Main Pulley.
- 4 x Head Cap Screws M3x6mm.

Idler ∅ 13x ∅ 16.5x14.5
[H2133-S]



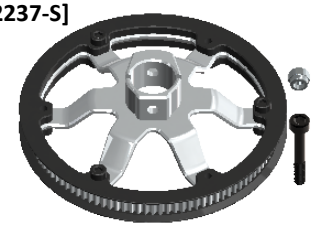
- 1 x Finishing Washer M3.
- 1 x Idler ∅ 13x ∅ 16.5x14.5mm.
- 1 x Bushing ∅ 3x ∅ 6x16.7mm.
- 1 x Head Cap Screw M3x22mm.
- 2 x Flanged Bearing ∅ 6x ∅ 13x5mm.

Plastic Ball Linkage M2.5
[H2209-S]



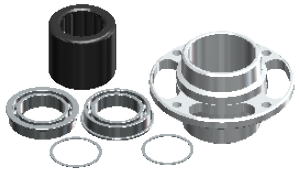
- 10 x Plastic Ball Linkage M2.5.

Front Tail Pulley
[H2237-S]



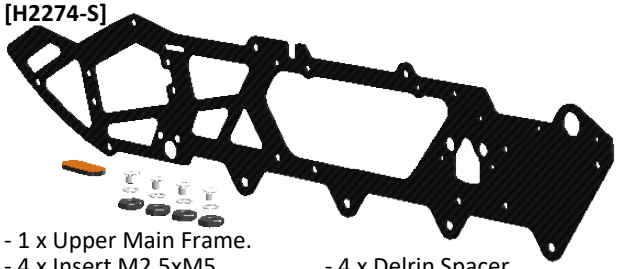
- 1 x Front Tail Pulley SET.
- 1 x Head Cap Screw Shoulder M3x20.
- 1 x Nylon Nut M3.

One Way Bearing Mount
[H2238-S]



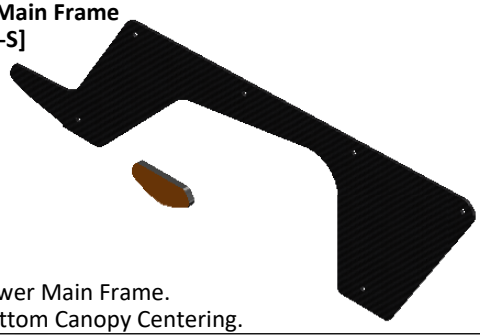
- 1 x One Way Bearing Mount.
- 1 x OWB ∅ 12x ∅ 18x16mm.
- 2 x Shims ∅ 12.1x ∅ 14x0.2mm.
- 2 x Flanged Bearing ∅ 12x ∅ 18x4mm.

Upper Main Frame
[H2274-S]



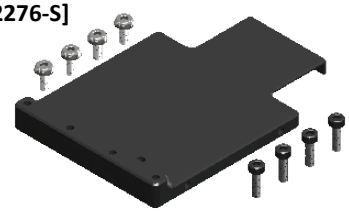
- 1 x Upper Main Frame.
- 4 x Insert M2.5xM5.
- 1 x Front Canopy Centering.
- 4 x Delrin Spacer.
- 4 x Washer ∅ 5x ∅ 7.5x0.5.

Lower Main Frame
[H2275-S]



- 1 x Lower Main Frame.
- 1 x Bottom Canopy Centering.

FBL Support
[H2276-S]

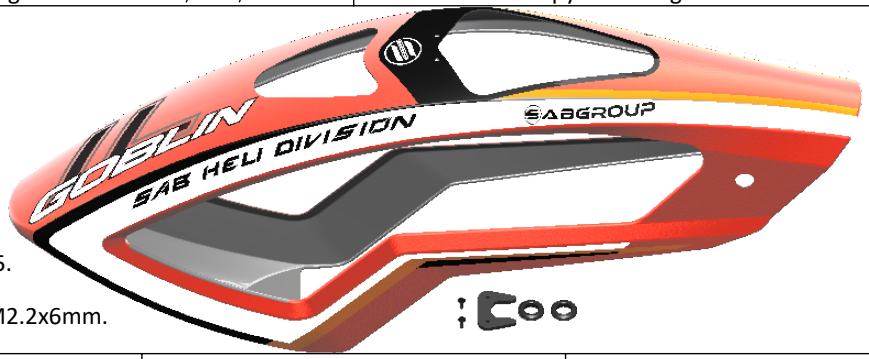


- 1 x FBL Support.
- 4 x Buttom Special Screws M2.5x6mm.
- 4 x Head Cap Screws M2.5x6mm.

Tail Servo Mount
[H2277-S]

- 2 x Tail Servo Mount.
- 4 x Button Special Screws M2.5x6mm.

Orange Canopy SG525
[H2278-S]



- 1 x Orange Canopy SG525.
- 1 x Top Centering.
- 2 x Self Tapping Screws M2.2x6mm.
- 2 x Canopy Grommet.

Orange Tail Boom SG525
[H2279-S]

- 2 x Locking element Tail.
- 1 x Orange Tail Boom SG525.
- 2 x Spacer Tail Boom SG525.
- 2 x Spacer Tail Boom TAPE.
- 2 x CF Space Lock Nut.
- 2 x Double-sided Tape 10x30.
- 8 x Nylon Nut M3.
- 4 x Self Tapping Screws M2.2x6mm.

Canopy SG525 Centering SET
[H2278-01-S]

- 1 x Top Centering Canopy SG525.
- 2 x Front Centering Canopy SG525.
- 2 x Bottom Centering Canopy SG525.
- 2 x Self Tapping Screws M2.2x6mm.

Aluminum Tail Side Case
[H2280-S]

- 1 x Alu Tail Side Case SG525.
- 1 x Flanged Bearing ∅ 5x ∅ 13x4mm.

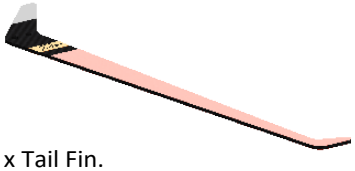
Carbon Fiber Tail Side Case
[H2281-S]

- 1 x Carbon Fiber Tail Side Case.

Tail Bearing Mount
[H2282-S]

- 1 x Tail Bearing Mount.
- 3 x Head Cap Screws M2x5mm.
- 1 x Flanged Bearing ∅ 5x ∅ 13x4mm.

Tail Fin
[H2283-S]



- 1 x Tail Fin.
- 2 x Tail Fin SG525 Sitkcer SET.

Tail Case Spacer
[H2284-S]

- 1 x Tail Case Spacer.
- 2 x Flat Cap Screws M2.5x5mm.

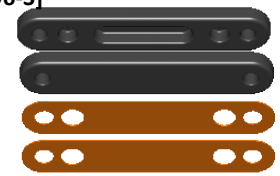
Bell Crank Support
[H2285-S]

- 1 x Bell Crank Support.
- 2 x Head Cap Screws M2,5x6mm.
- 2 x Head Cap Screws M2,5x8mm.

Carbon Rod Support
[H2295-S]

- 2 x Carbon Rod Support.
- 4 x Head Cap Screws M2x6mm.

SLS Tail Boom Spacer
[H2296-S]



- 2 x SLS Tail Boom Spacer.
- 2 x Double Side Tape.

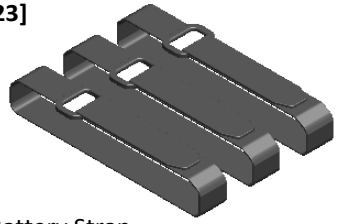
CF Tail Boom Lock Nut
[H2297-S]

- 2 x CF Tail Boom Lock Nut.
- 4 x Nylon Nut M3.
- 2 x Double Side Tape.

Canopy Grommet
[HA021]

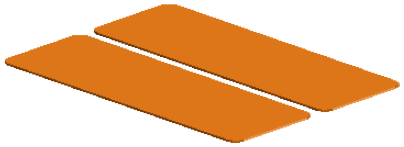
- 5 x Canopy Grommet.

Battery Strap
[HA023]



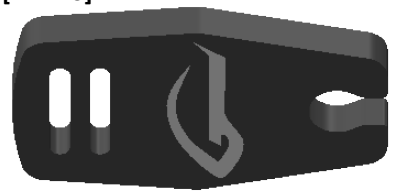
- 3 x Battery Strap.

Double Sided Tape
[HA035]



- 2 x Double Sided Tape.

Blade Holder
[HA120]

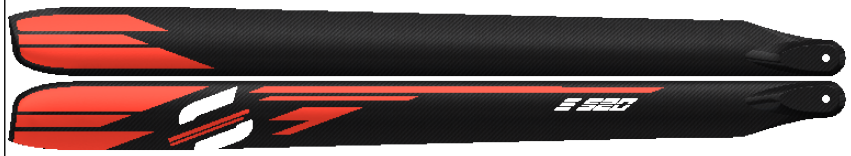


- 1 x Blade Holder.

Orange Tail Blade 82mm
[S82-O]

- 1 x Orange Tail Blade 82mm.

Orange Main Blade 520mm
[S520-O]



- 1 x Orange Main Blade 520mm.

[HC002-S]

- 10 x Socket Head Cap Screws M2x5mm.

[HC004-S]

- 10 x Socket Head Cap Screws M2x6mm.

[HC010-S]

- 10 x Socket Head Cap Screws M2x10mm.

[HC018-S]

- 10 x Socket Head Cap Screws M2.5x6mm.

[HC019-S]

- 10 x Button Head Cap Special Screws M2.5x6mm.

[HC020-S]

- 10 x Socket Head Cap Screws M2.5x8mm.

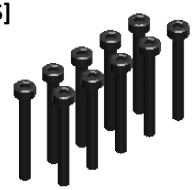
[HC026-S]

- 10 x Socket Head Cap Screws M2.5x12mm.

[HC032-S]

- 10 x Socket Head Cap Screws M2.5x18mm.

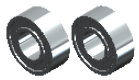
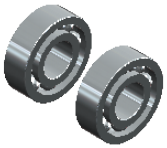
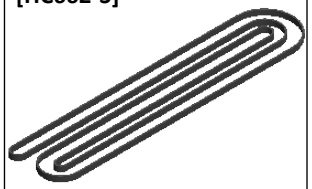
[HC034-S]



- 10 x Socket Head Cap Screws M2.5x20mm.

[HC044-S]

- 10 x Socket Head Cap Screws M3x6mm.

[HC050-S]  - 10 x Socket Head Cap Screws M3x8mm.	**[HC056-S]**  - 10 x Socket Head Cap Screws M3x10mm.	**[HC068-S]**  - 10 x Socket Head Cap Screws M3x16mm.	**[HC074-S]**  - 2 x Socket Head Shoulder Screws M3x16mm. - 2 x Nylon Nut M3.	**[HC082-S]**  - 10 x Socket Head Shoulder Screws M3x20mm.	**[HC086-S]**  - 10 x Socket Head Cap Screws M3x22mm.	**[HC102-S]**  - 10 x Socket Head Cap Screws M4x10mm.
[HC111-S]  - 10 x Socket Head Shoulder Screws M4x24mm.	**[HC128-S]**  - 10 x Flat Head Cap Screws M2.5x5mm.	**[HC132-S]**  - 10 x Flat Head Cap Screws M3x5mm.	**[HC136-S]**  - 10 x Self Tapping Head Cap Screws M3x10mm.	**[HC140-S]**  - 10 x Thread Rod M2.5x20.	**[HC152-S]**  - 10 x Set Screws M4x4mm.	**[HC184-S]**  - 10 x Washer ∅4.1x∅11 x 1mm.
[HC206-S]  - 10 x Nylon Nut M3.	**[HC212-S]**  - 10 x Nylon Nut M4.	**[HC400-S]**  - 4 x Flanged Bearing ∅2.5x∅6x2.6mm.	**[HC412-S]**  - 4 x Flanged Bearing ∅5x∅13x4mm.	**[HC456-S]**  - 4 x Flanged Bearing ∅2x∅5x2.5mm.	**[HC486-S]**  - 4 x Flanged Bearing ∅4x∅7x2.5mm.	**[HC490-S]**  - 10 x Self Tapping Head Cap Screws M2.2x6mm.
[HC500-S]  - 10 x Set Screws M3x4mm.	**[HC536-S]**  - 2 x Ball Bearing ∅6x∅13x5mm.	**[HC626-S]**  - 10 x Set Screws M2x18mm.	**[HC633-S]**  - 2 x Thrust Bearing ∅6x∅12x4.5mm.	**[HC634-S]**  - 4 x Oring ID9.52x CS1.78. - 2 x Oring ID3.98x CS1.78.	**[HC638-S]**  - 2 Tail Grip Hardware SET.	**[HC639-S]**  - 2 x Ball Bearing ∅8x∅19x6mm.
[HC641-S]  - 4 x Ball Bearing ∅4x∅8x3mm.	**[HC642-S]**  - 10 x Button Head Cap Screws M5x8mm.	**[HC656-S]**  - 10 x Button Head Cap Screws M2.5x12mm.	**[HC662-S]**  - 1 x Tail Belt 1500.	**[HC719-S]**  - 2 x Flanged Bearing ∅12x∅18x4mm.	**[HC721-S]**  - 1 x Carbon Rod SET.	**[HC722-S]**  - 1 x Motor Belt 375-13.

The manual can be downloaded here

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