



## **Goblin Thunder T**

Release 1.1 - March 2017

#### WORLD DISTRIBUTION

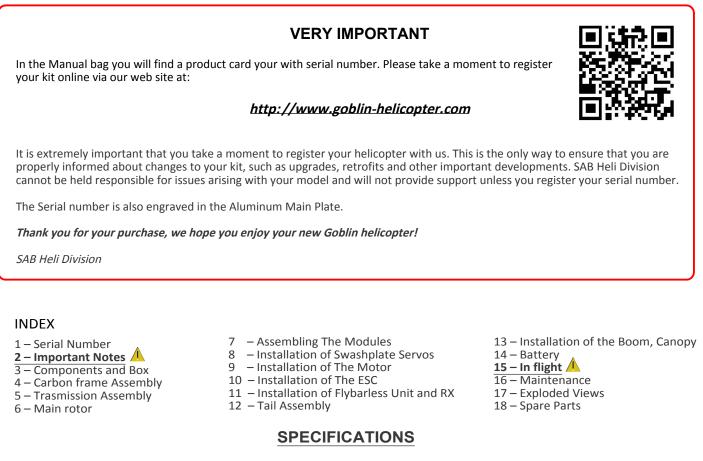
<u>www.goblin-helicopter.com</u> For sales inquiries, please email: <u>sales@goblin-helicopter.com</u> For info inquiries, please email: <u>support@goblin-helicopter.com</u> Attention: If you are a consumer and have questions or need of assistance, please contact in a first time the Goblin retailer where you made the purchase

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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.



[ SG715 ( 690mm Size Blades )

SG716 (710mm Size Blades )]



Main rotor diameter:

\*1548mm (with 690mm Blades): [SG715]. \*1588mm (with 710mm Blades): [SG716].

Tail rotor diameter:

\*305mm (with 115mm Tail Blades)

Weight including standard electronics:

\*3380g (excluding batteries)

Motor size: Maximum 64mm diameter, maximum height 64mm. Battery compartment: 60x54x350mm.



#### **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.

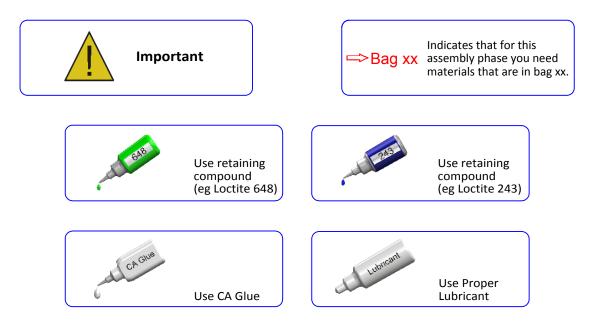
#### NOTES FOR ASSEMBLY

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.

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





#### ADDITIONAL COMPONENTS REQUIRED

- \*Electric Motor: 12S 480/600Kv Maximum diameter 64mm, Maximum height 64mm, Pinion shaft diameter 6/8mm
- \*Speed controller: minimum 120A.
- \*Batteries: 12S 4200/5500mAh
- \*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

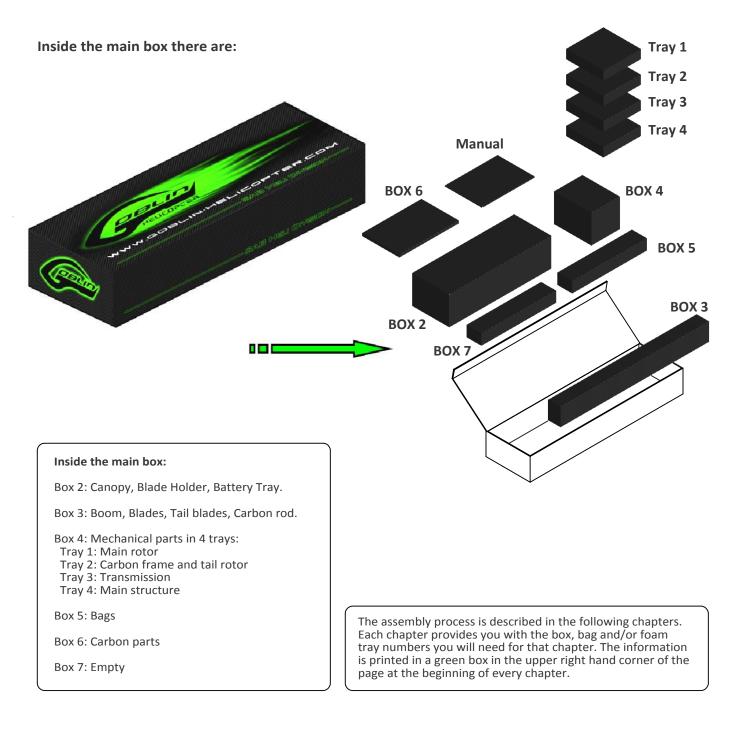
(See configuration examples on page 17)

#### **TOOLS, LUBRICANTS, ADHESIVES**

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

\*Medium threadlocker (eg. Loctite 243)

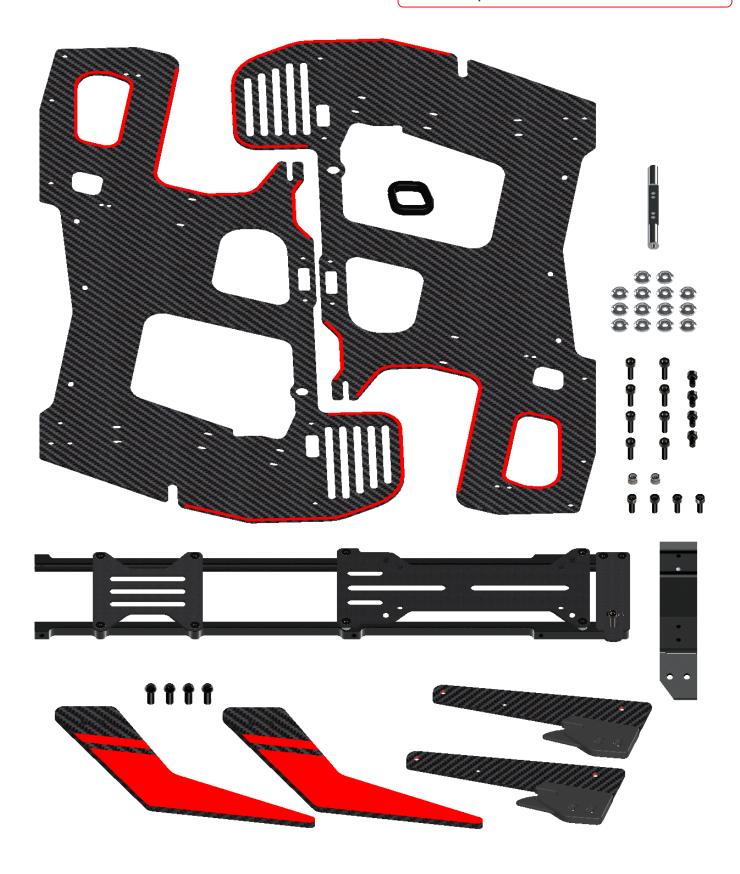
- \*Strong retaining compound (eg. Loctite 648)
- \*Spray lubricant (eg. Try-Flow Oil)
- \*Synthetic grease (eg. Tri-Flow Synthetic Grease)
- \*Grease ( eg. Vaseline grease )
- \*Cyanoacrylate adhesive
- \*Pitch Gauge (for set-up)
- \*Soldering equipment (for motor wiring)



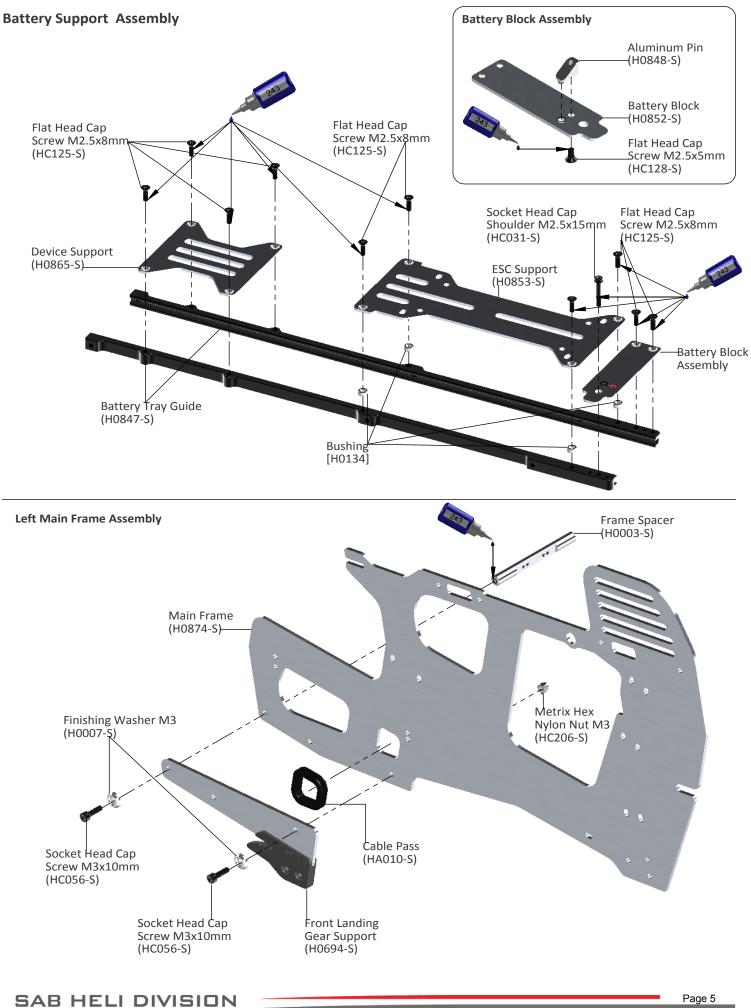


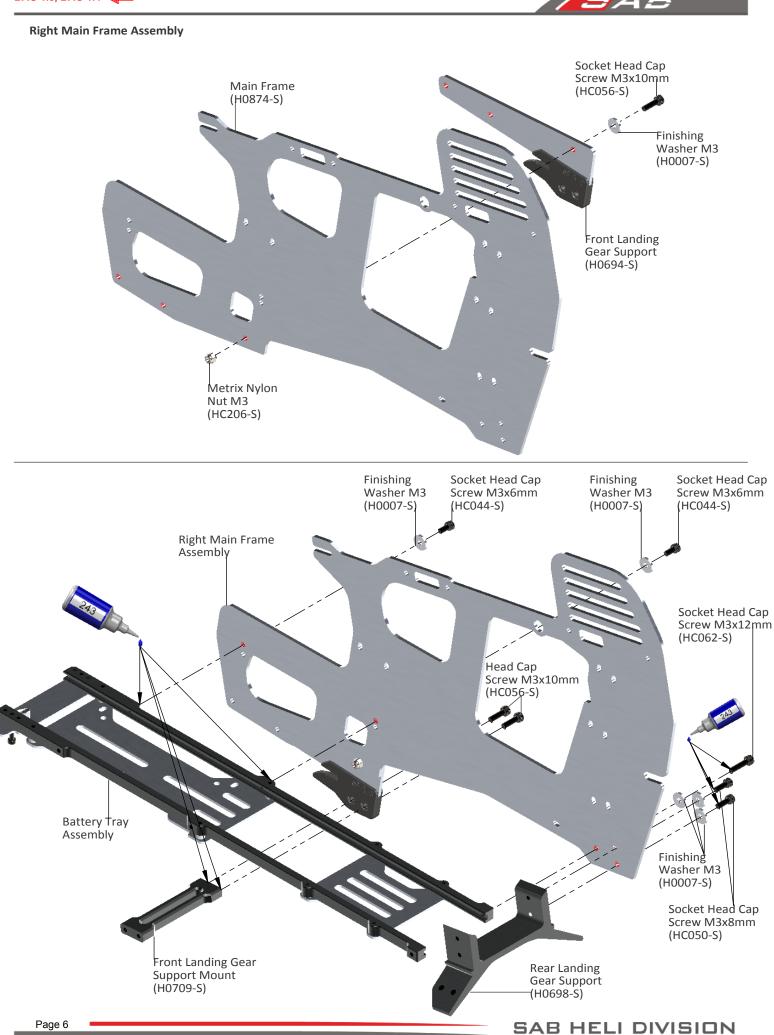


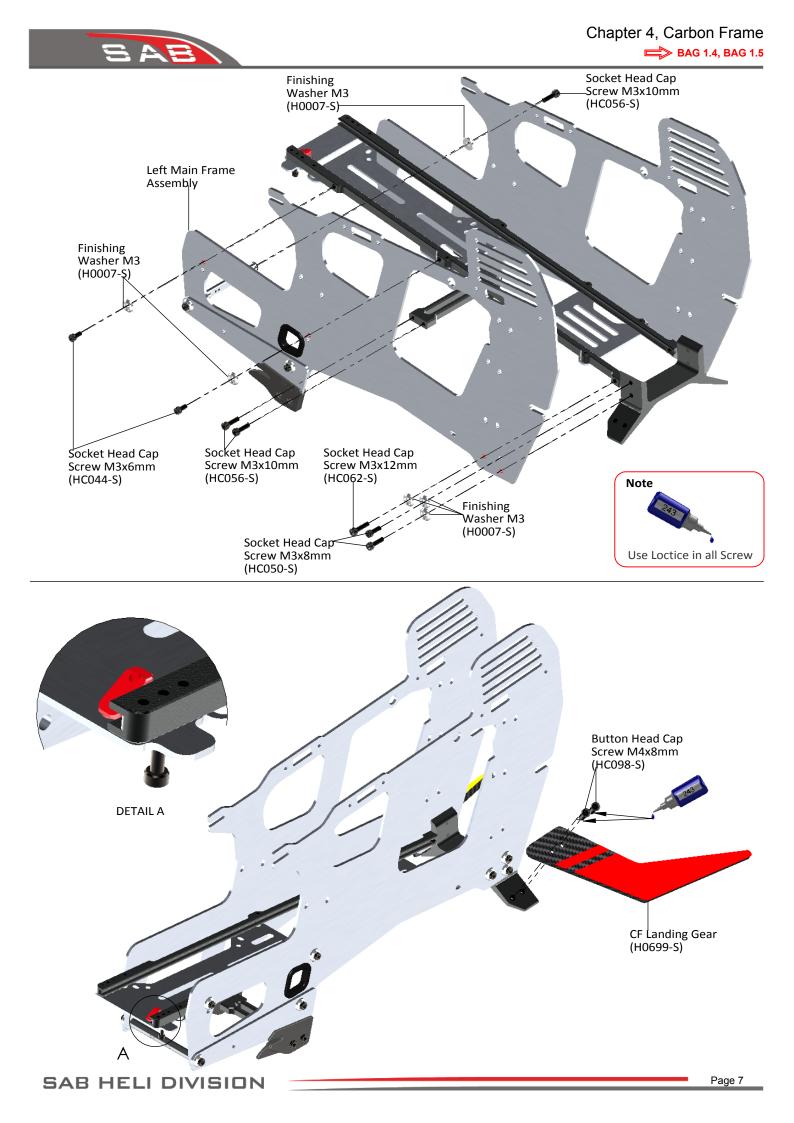
The manufacturing process of the carbon parts often leaves micro-burrs and sharp edges. We recommend de-burring the edges to minimize the risks of electrical wire cuts, etc. Very important in red line zone.



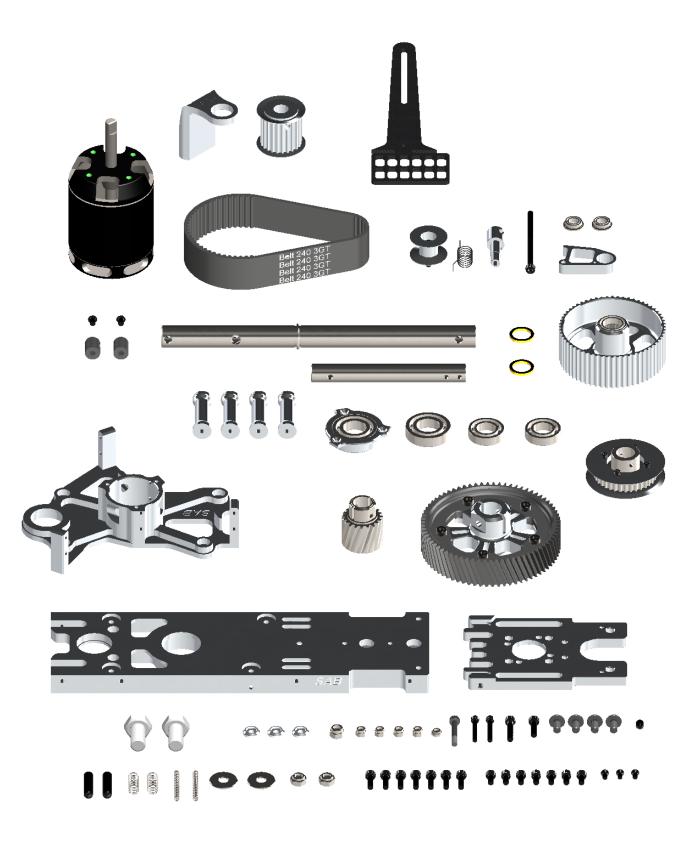


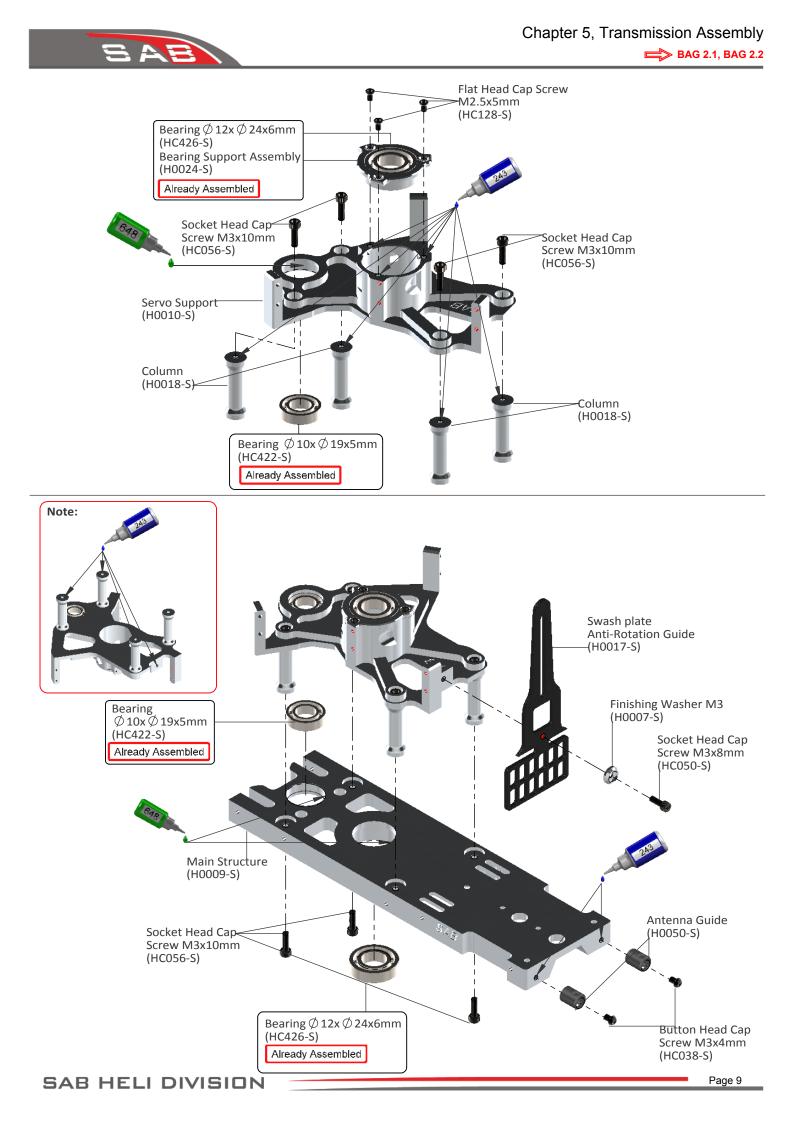






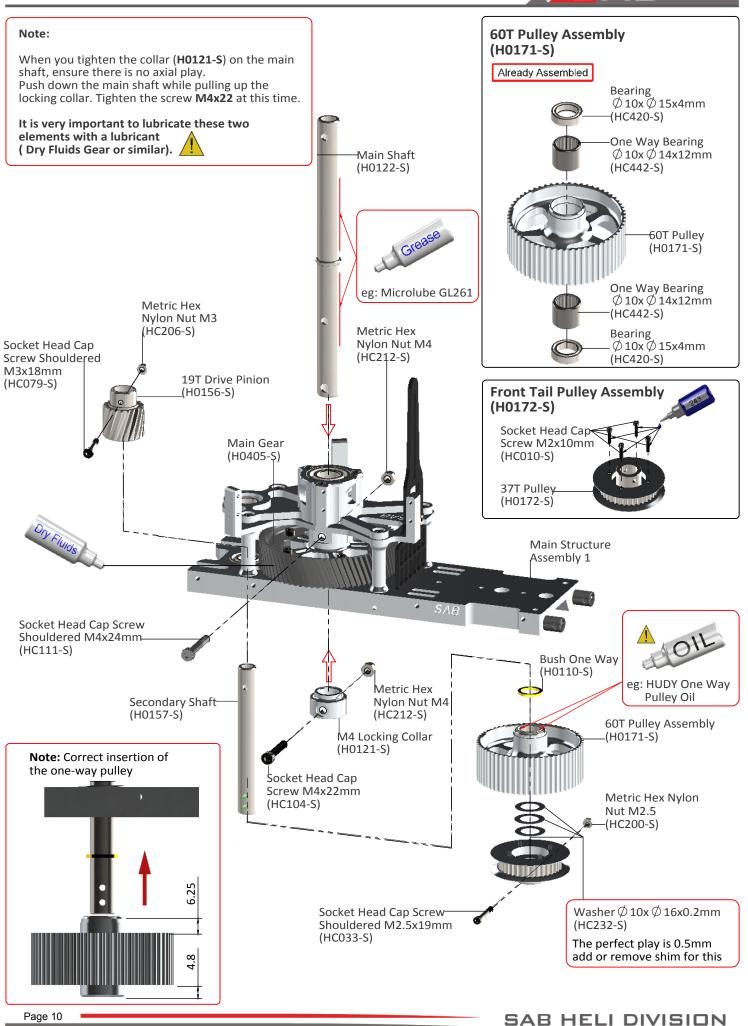




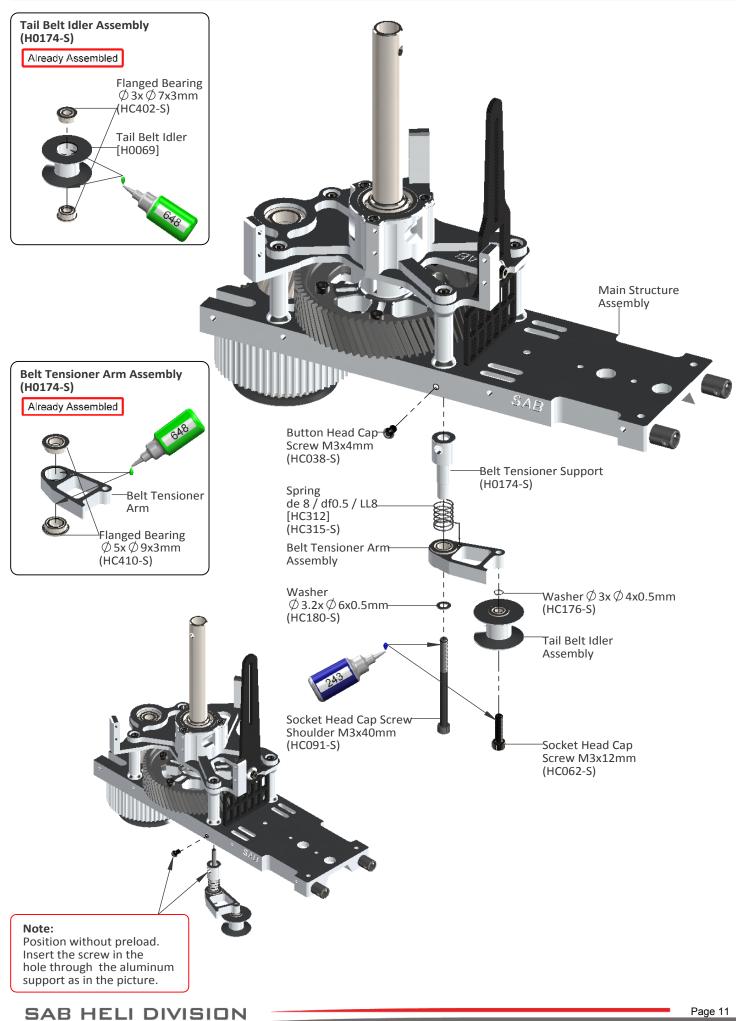


## Chapter 5, Transmission Assembly

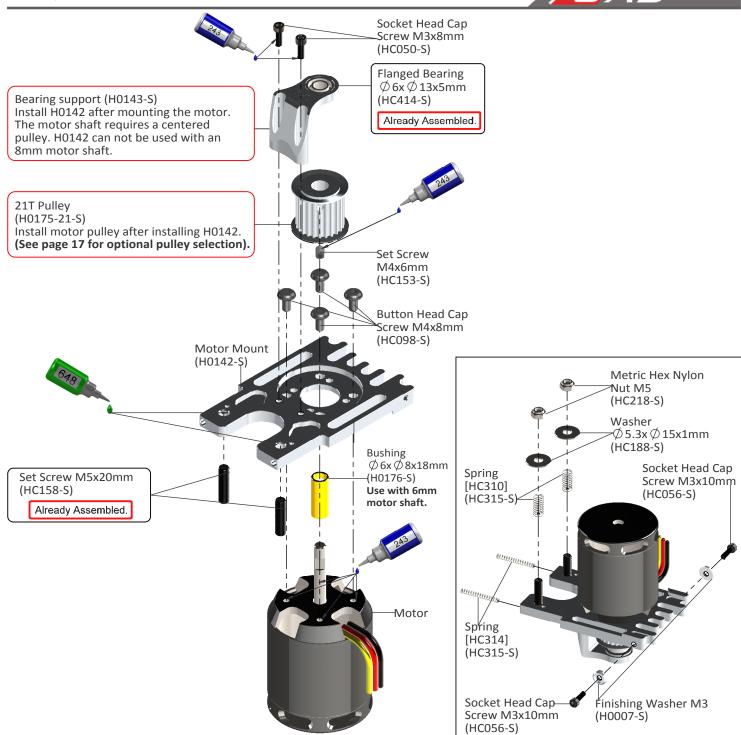
BAG 3.1, BAG 3.2 <



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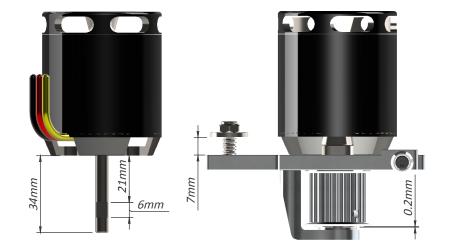
# Chapter 5, Transmission Assembly



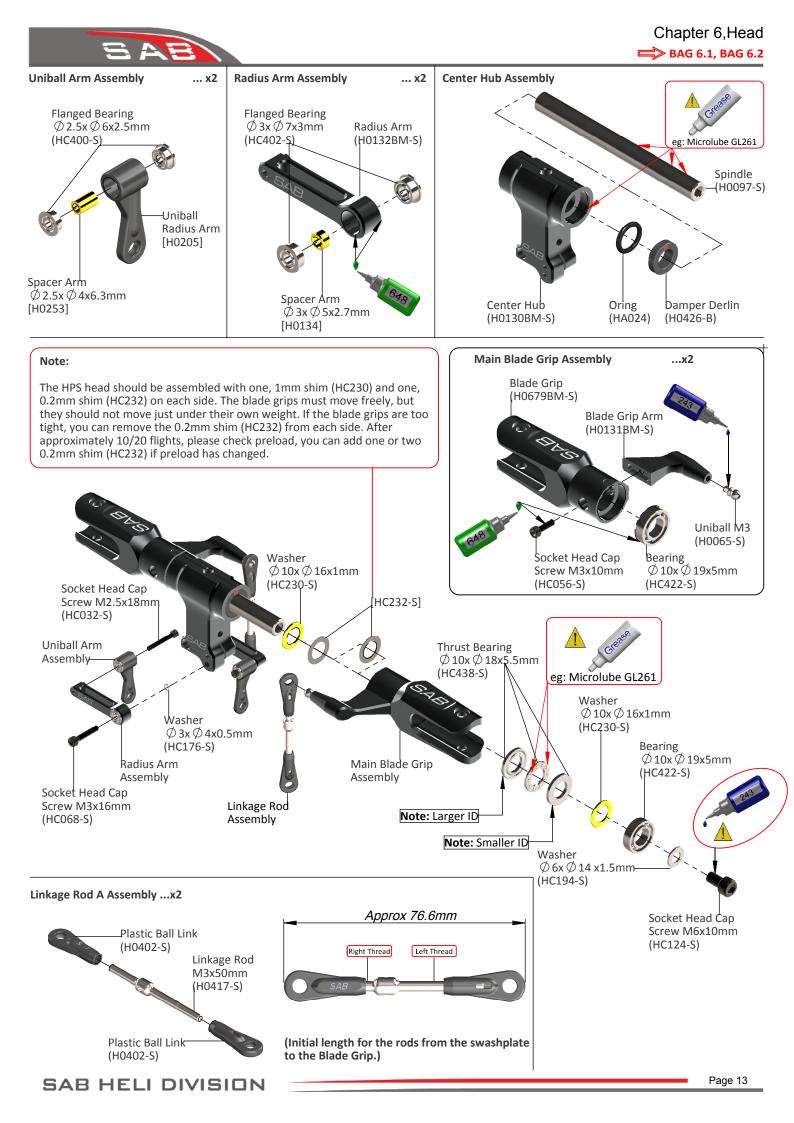
#### Note for 6mm motor shaft

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 cutoff disc.

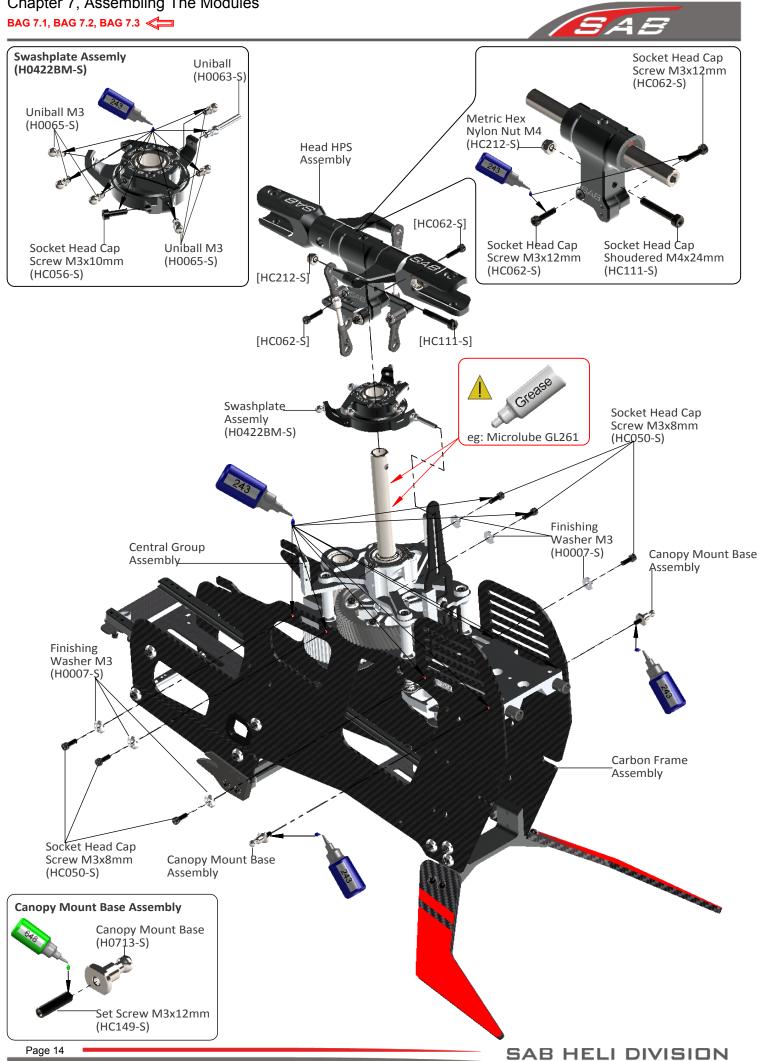
Additionally, ensure the motor shaft has an appropriate 'flat' for one of the set screws.



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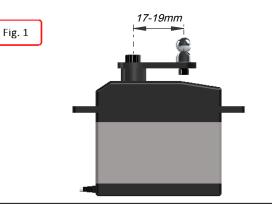
## Chapter 7, Assembling The Modules





#### INSTALLATION OF SWASHPLATE SERVOS

The linkage ball must be positioned between **17-19 mm** out on the servo arm (Figure 1), recommended servo arm SAB p/n [HA050/HA051]. 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. Proceed with installation following the instructions below. Figure 2 shows a completed installation.



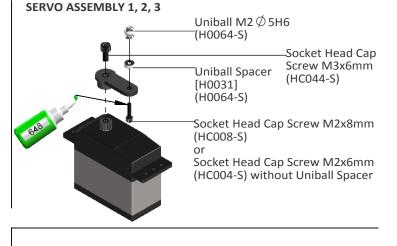
#### ASSEMBLY OF THE BALL ON THE HORN.

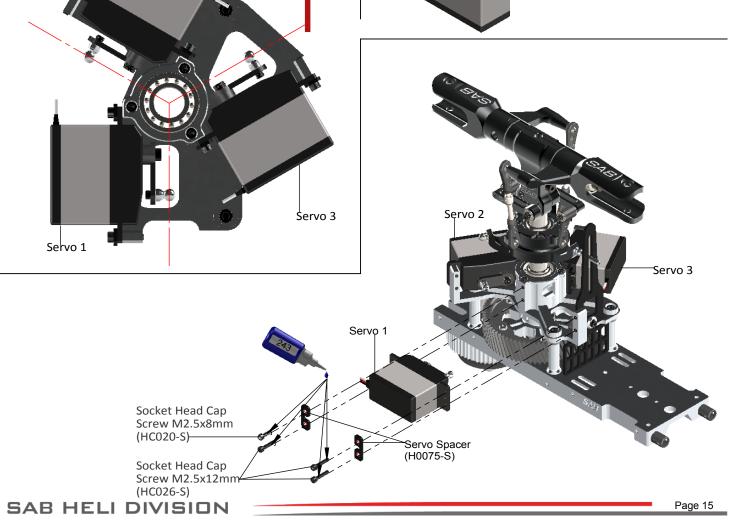
Fig. 3

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 3** illustrates this.

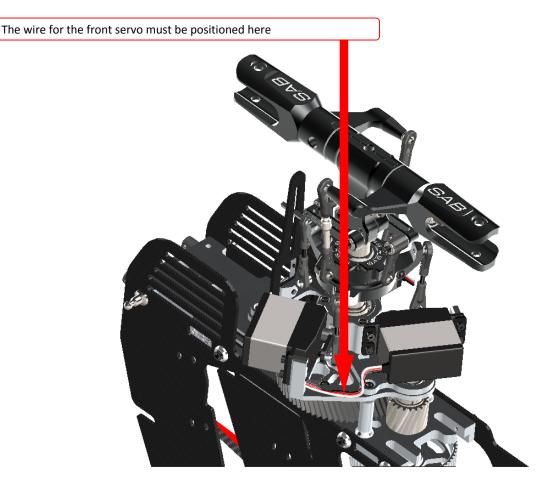
-Servo 2





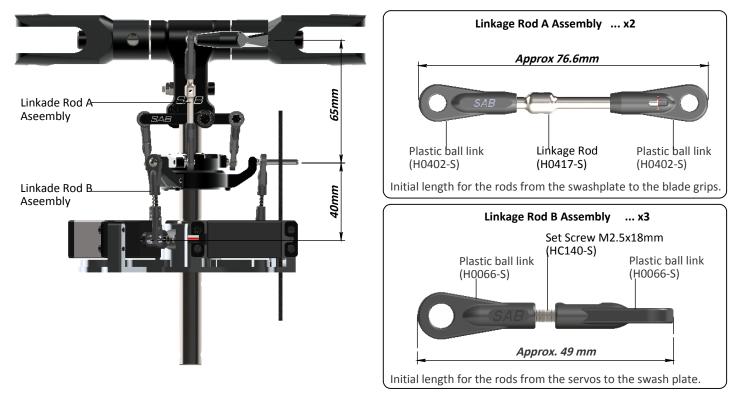






#### **Head HPS Version Preliminary Setup**

Adjust the linkage as shown. The linkage Rod A has thead right/left. Turning, you can change the tracking without disconnecting the plastic ball link.





#### 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 **214** 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:

H0175-18-S - 18T	Pinion = ratio	11.9:1	H0175-22-S - 22T	Pinion = ratio	9.8:1
H0175-19-S - 19T	Pinion = ratio	11.3:1	H0175-23-S - 23T	Pinion = ratio	9.3:1
H0175-20-S - 20T	Pinion = ratio	10.7:1	H0175-24-S - 24T	Pinion = ratio	8.9:1
H0175-21-S - 21T	Pinion = ratio	10.2:1	H0175-25-S - 25T	Pinion = ratio	8.6:1

#### Some example configurations:

## **GOBLIN THUNDER T CONFIGURATIONS**

Battery	Motor	ESC	Pinion ( a, b c )	RPM Max ( a, b, c )	
	X NOVA	CC Edge HV 120 HW-130A-V4	21T		
	4525-560	Jive 120 HV	20Т		
125	Kontronik	CC Edge HV 120 HW-130A-V4	21T	2100	+12
4200/5000 mAh	Pyro 750-560	Jive 120 HV	20Т		
	Scorpion	CC Edge HV 120 HW-130A-V4	22T		
	HKIII 4525-520	Jive 120 HV	21T		
	X NOVA	CC Edge HV 160 HW-160A-V4	21T / 22T	2100 / 2200	± 13
	4525-560	Kosmik 160	20T / 21T		
125	Kontronik Pyro 750-560	CC Edge HV 160 HW-160A-V4	21T / 22T		
4500/5500 mAh		Kosmik 160	20T / 21T		
	Scorpion HKIII 4525-520	CC Edge HV 160 HW-160A-V4	22T / 23T		
		Kosmik 160	21T / 22T		
	X NOVA	CC Edge HV 160 HW-160A-V4	22T / 23T / 24T	_	
	4530-525	Kosmik 160	21T / 22T / 23T		Rev:         Pitch         ±12         ±12         ±13
125	Scorpion	CC Edge HV 160 HW-160A-V4	21T / 22T / 23T	2100 / 2200 / 2300	+ 13
4200/5500 mAh	HKIII 4530-540	Kosmik 160	20T / 21T / 22T	-	± 13
	Kontronik	CC Edge HV 160 HW-160A-V4	24T / 25T		
	Pyro 800-480	Kosmik 160	23T / 24T		

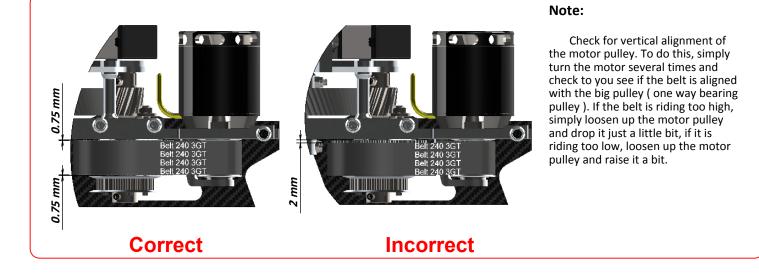
Note: For safety reasons we suggest to not exceed 2200 rpm.

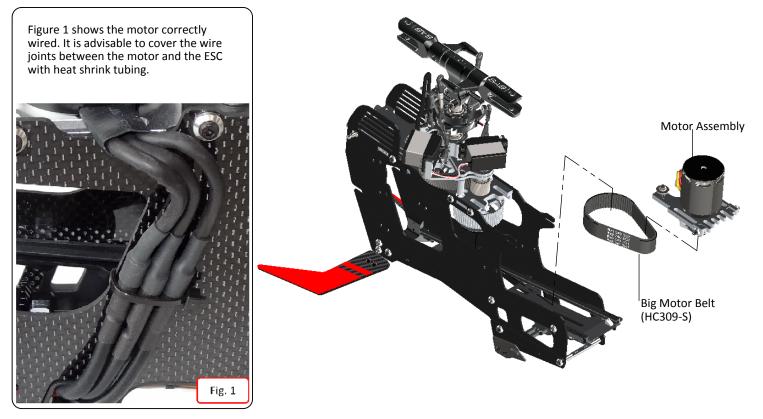


#### MOTOR BELT TENSION

\*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.
- \*The belt must be very tight.
- \*Lock all screws.





#### **DE-BURR THE SIDE FRAMES**

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

# <u>!</u>

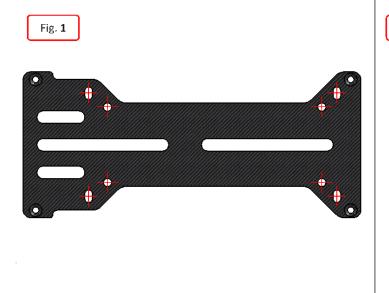
#### **ESC INSTALLATION**

The speed controller (ESC) is installed in the front of the helicopter.

Figure 1: Show the ESC support. You can use hole or slot in according with your ESC. You can use cable tie or the screws [Bag 9.0].

Figure 2: Show the installation of the ESC from HOBBY WING 130A V4.

If your ESC touch the spacer H0003, you can remove it and replace with M3x8mm screws + M3 NUT



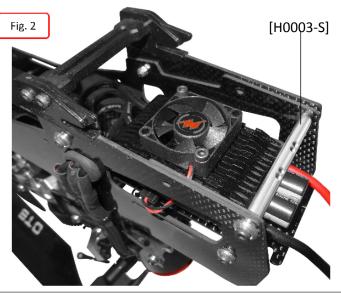
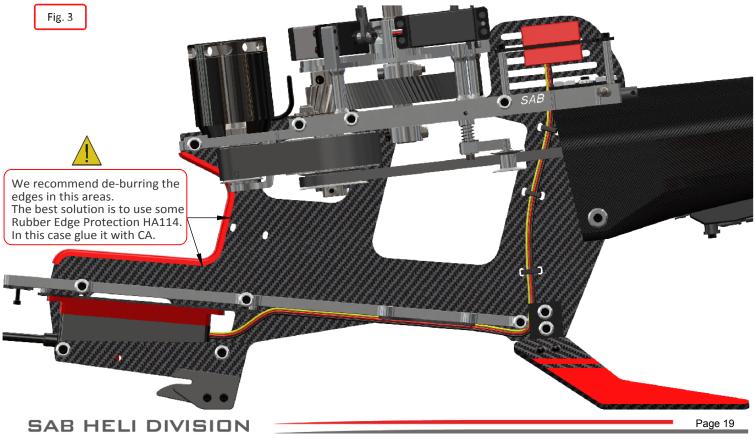


Figure 3: You can see the wiring for connecting the ESC to the central unit.

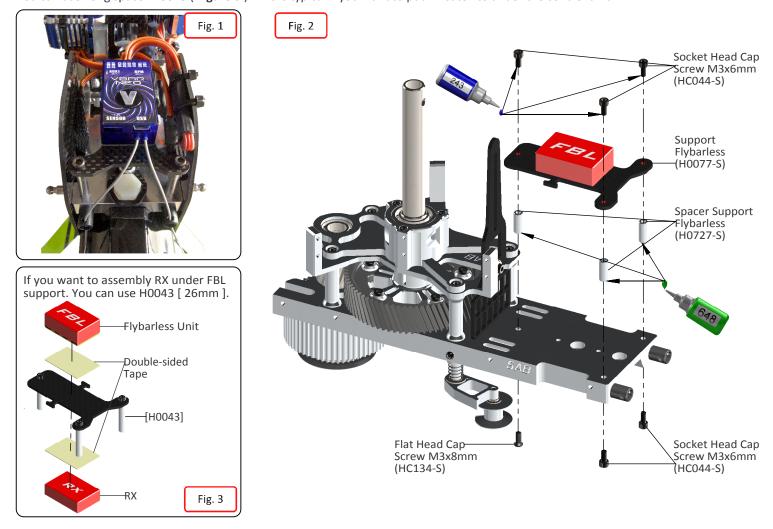
Route the ESC throttle wire as shown, It is reccomanded to ues cable ties to keep the wire in place. This is very important near the tail belt.





#### FLYBARLESS CONTROL UNIT AND RX INSTALLATION

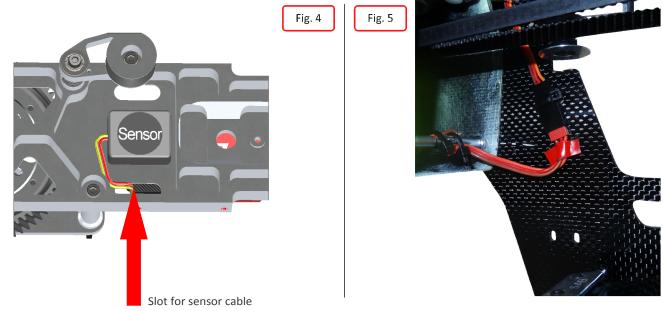
Figures 1 shows an example of installation of the flybarless control unit.You can use short spacer H0727 (Figure 2).You can use long spacer H0043 (Figure 3). This is typical if you want to put RX satellite under the control unit.

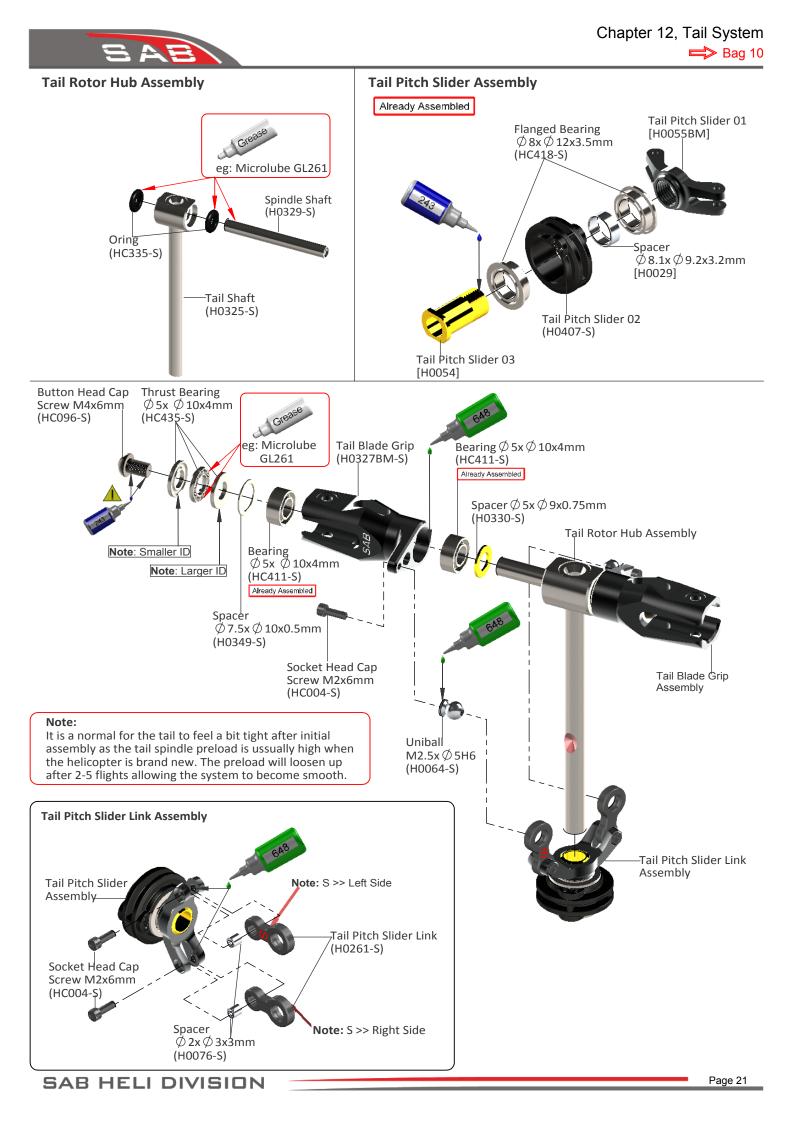


For Flybarless systems with a separate sensor, the sensor must be installed under the main plate (Figure 4).

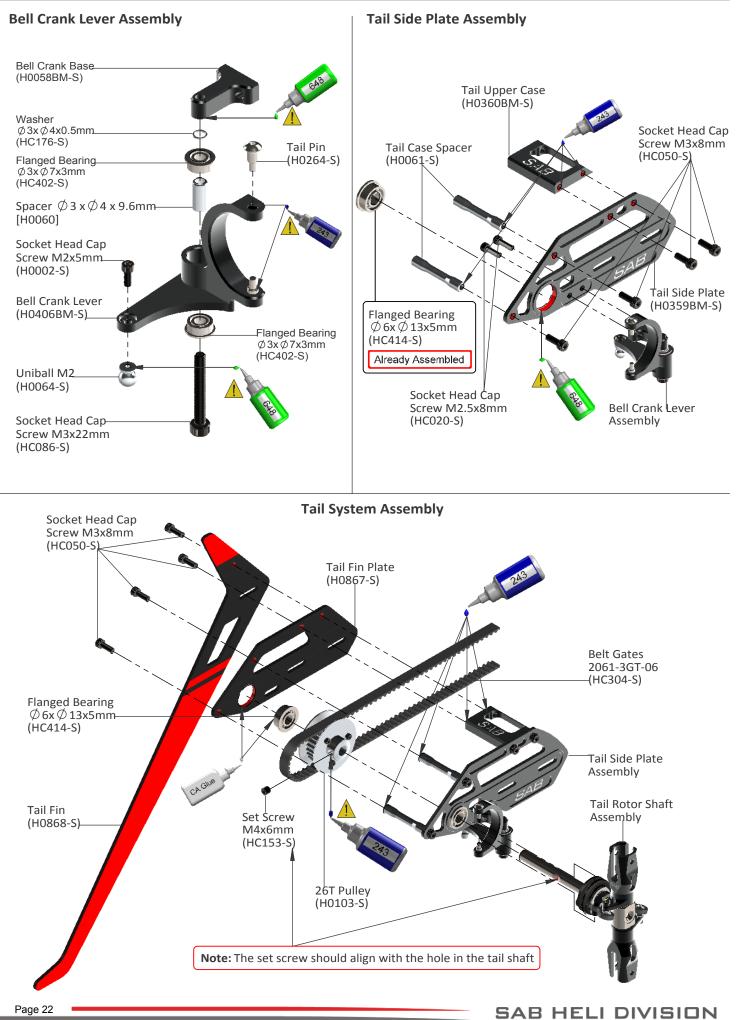
In **Figure 5** you can see the extension lead for the tail servo. It is very important to include a connector for fast disassembly of the boom module.

The connector will prevent servo damage in case of boom separation during a crash.











#### **Tail Boom Assembly**

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### **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.

#### 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.

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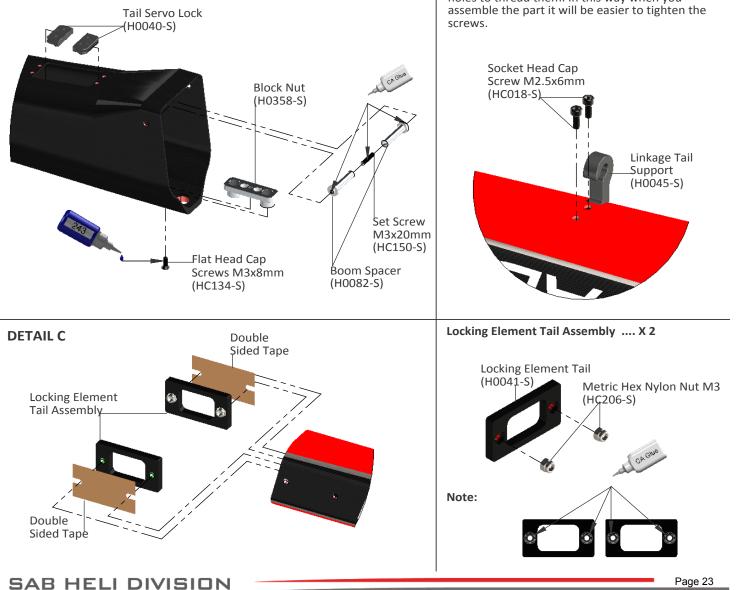
#### **DETAIL B**

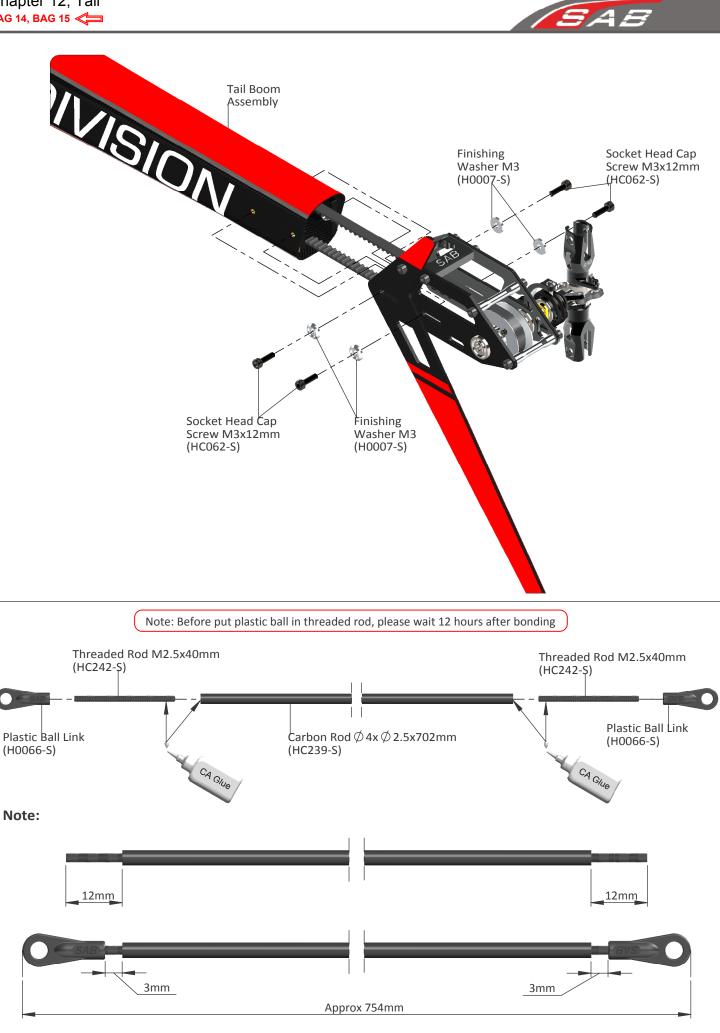
Red Boom Thunder T

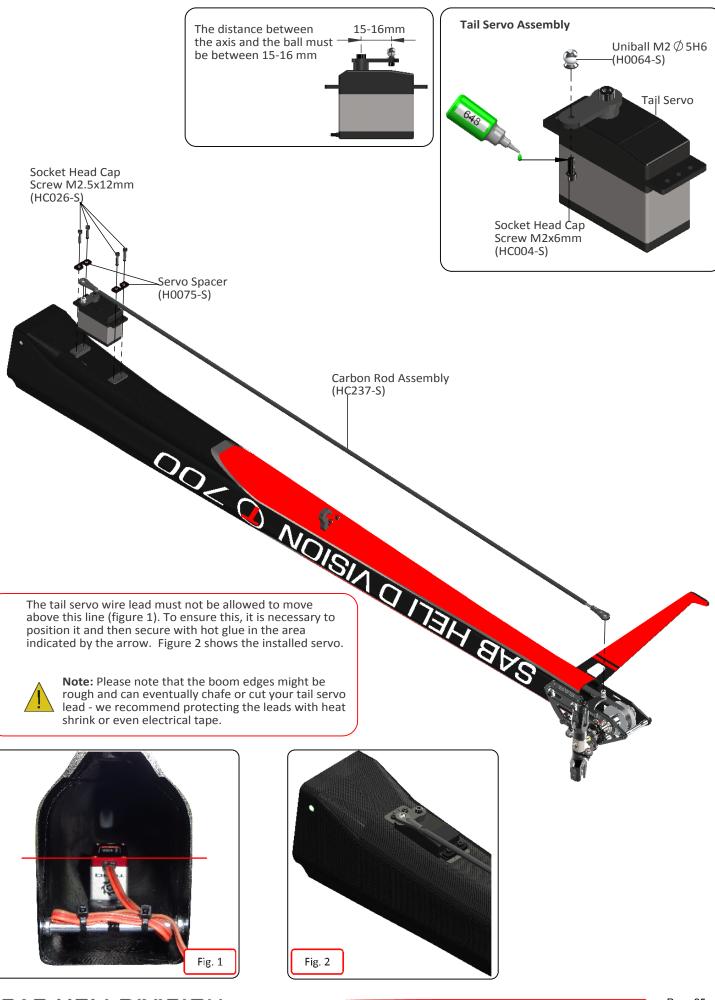
(H0845-S)

0002

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.



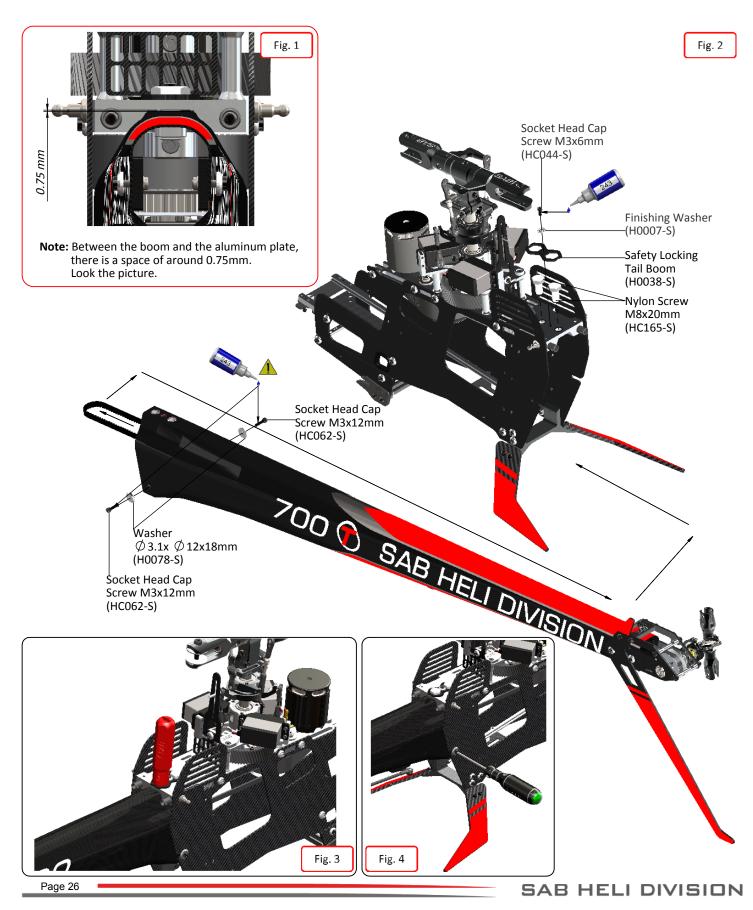






#### **BOOM ASSEMBLY**

- \*Insert the tail boom assembly .
- \*Lock the M8 nuts with the HA016 special tool supplied.
- \*Firmly lock the lateral srews M3x12mm. Use Loctile for this screw and make sure you remain tight.
- \*Assemble the H0038 carbon security plate .
- \*Connect the tail servo wire to the previously fitted extension lead.



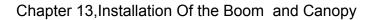
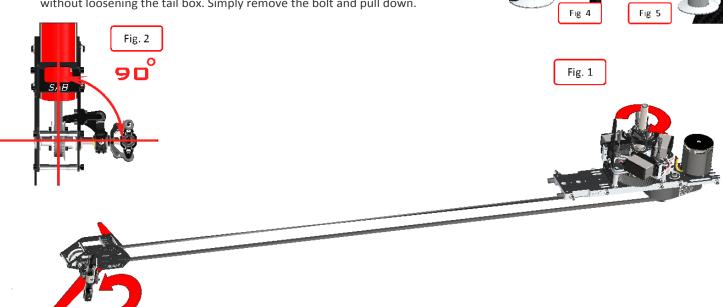


Fig 3



- \*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 a rotation of **270°** the tensioning arm (**clockwise**).
- \*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, you can remove the front pulley (H0172-S) without loosening the tail box. Simply remove the bolt and pull down.



#### CANOPY

Install the canopy following these step :

- Canopy edge protection, Adhesive foam tape, Canopy grommets. (Fig.6)(Fig.7).

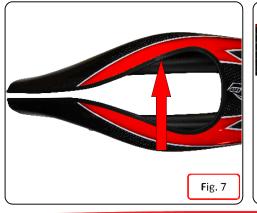
The canopy hole must be 12.5 mm in diameter. Initially is 9 mm. You can enlarge the hole slightly to optimize the vertical position of the canopy itself.

Install the quick release following Fig 9. Use special tool inside the bag.

To install the canopy:

- Insert the canopy from the front up to the area of the block shown in Fig.8.
- Use the quick release canopy mounts to properly mount the canopy.
- It is recommended a bit of lubricant on the quick release canopy mount system.







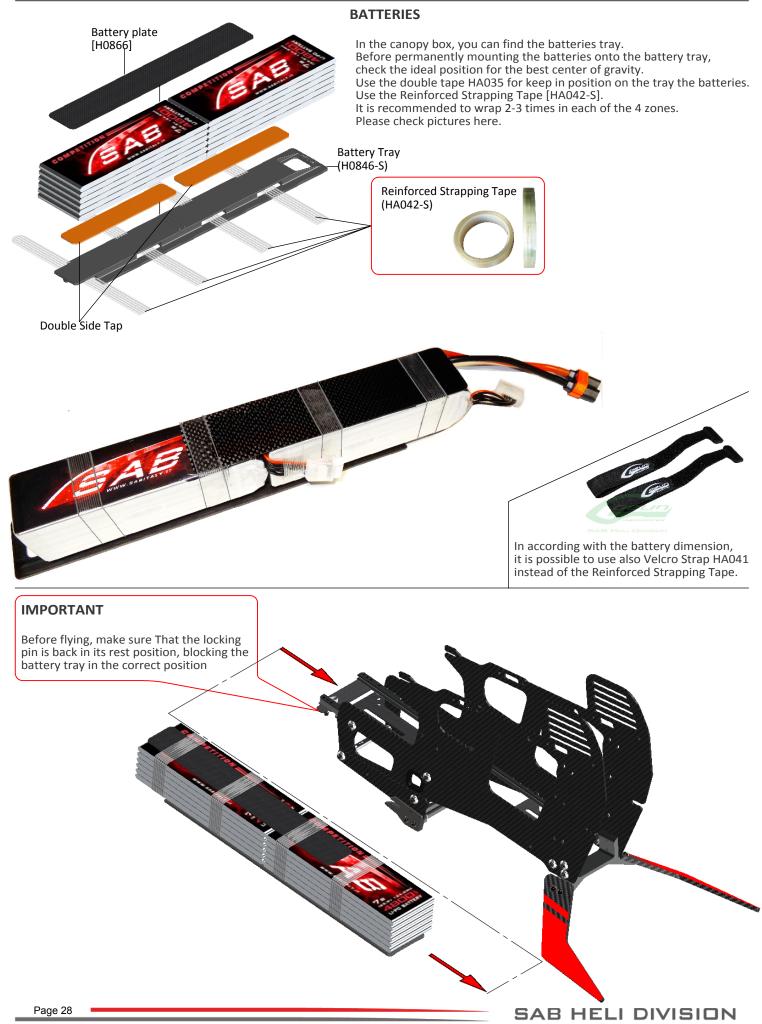
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Fig. 9

[HA111]



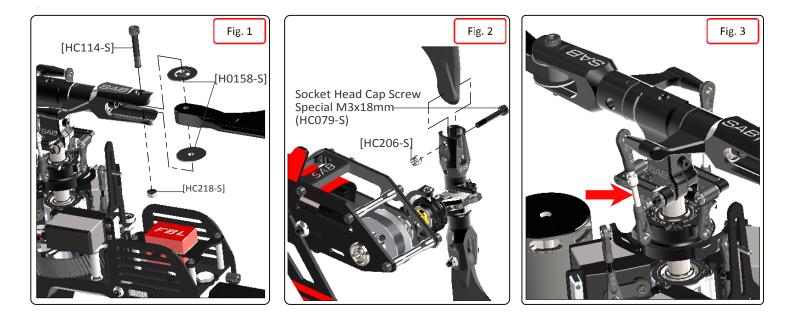




#### **OPERATIONS BEFORE FLIGHT**

\*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 2200rpm.
- \*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 +/-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 **Fig.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, 1600 1700 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 year first flights the model may exhibit a surging phenomena, particularly at low head speed

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 [H0155-S]

#### ABOUT HPS

The HPS head allows for a very broad range of dampening setups. The dampers are composed of an O-ring and a technopolymer damper that defines the maximum possible movement of the spindle.Using different dampers we can get different responses of the model.

- A = Soft for smooth response.
- B = Medium.
- C = Firm for direct and precise response.

In the kit, there is the damper H0426-C. (Other Setting >>p/n H0426-S ).

#### 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.

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

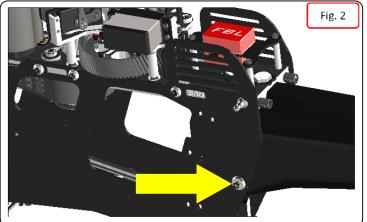
\*Periodically lubricate the tail slider and its linkages, as well as the swashplate and its linkages.

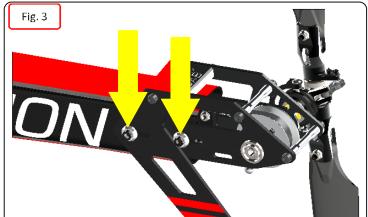
\*Lubricate the main gear with silicone and Tri-Flow Synthetic grease, even though the gear is made of technopolymer, a high mineral based filler, it still requires some lubrication.

\*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:

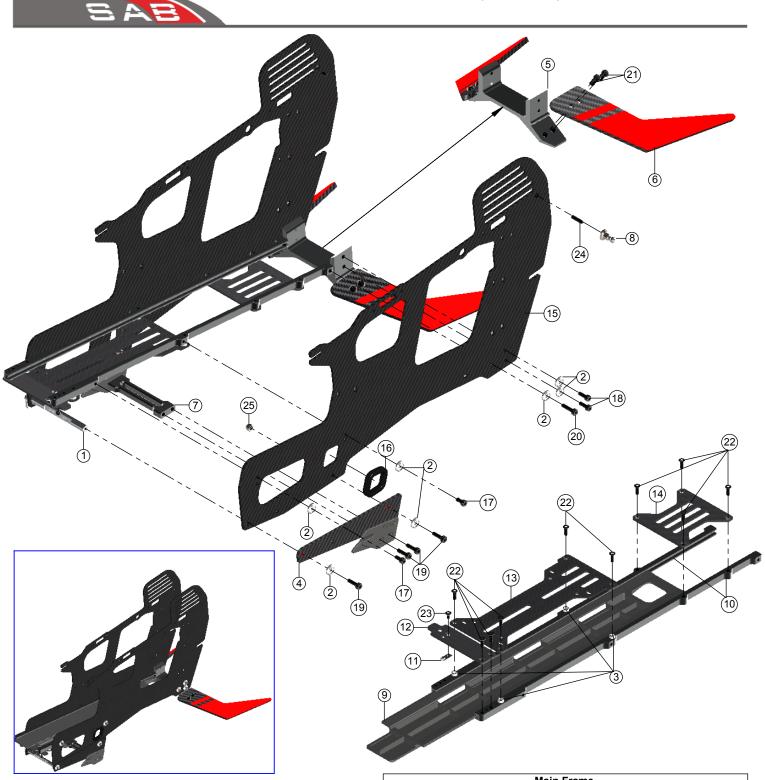
- \* The maintenance of proper belt tension.
- \* The proper isolation of wires from the carbon and aluminum parts.
- \* That all screws remain tight.





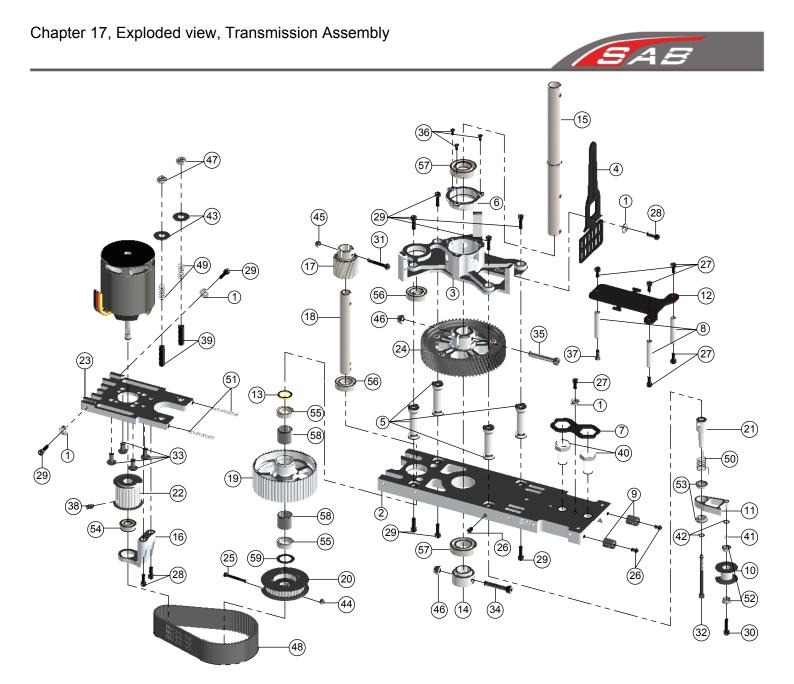


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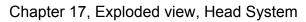
	Main Frame						
POS	COD	Name	Specification	Quantity			
1	H0003	Frame Spacer	Aluminum	1			
2	H0007	Finishing Washers M3	Aluminum	14			
3	H0134	Spacer Ø3xØ5x2.7	Aluminum	4			
4	H0694	Front Landing Support		2			
5	H0698	Rear Lading Support	Aluminum	1			
6	H0699	Red Lading Gear Speed		2			
7	H0709	Landing Support Mount	Aluminum	1			
8	H0713	Canopy Mouse Base	Inox	2			
9	H0846	Battery Tray	Plastic	1			
10	H0847	Battery Tray Guide	Aluminum	2			
11	H0848	Battery Block	Aluminum	1			
12	H0852	Battery Block Plate	Carbon Fiber	1			

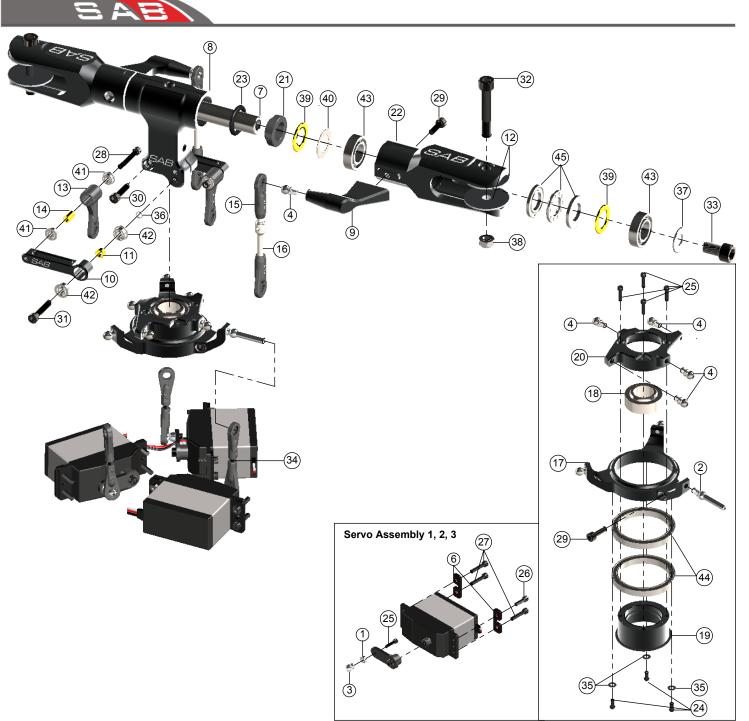
	Main Frame						
POS	COD	Name	Specification	Quantity			
13	H0853	ESC Support	Carbon fiber	1			
14	H0862	Divice Support	Carbon Fiber	1			
15	H0874	Main Frames	Carbon Fiber	2			
16	HA010	Cable Pass	Ø16 xØ24 x 2mm	1			
17	HC044	Socket Head Cap Screws	M3 x 6mm	4			
18	HC050	Socket Head Cap Screws	M3 x 8mm	4			
19	HC056	Socket Head Cap Screws	M3 x 10mm	8			
20	HC062	Socket Head Cap Screws	M3 x 12mm	2			
21	HC098	Button Head Cap Screws	M4 x 8mm	4			
22	HC125	Flat Head Cap Screws	M2.5 x 8mm	10			
23	HC125	Flat Head Cap Screws	M2.5 x 5mm	1			
24	HC149	Set Screws	M3 x 12mm	2			
25	HC206	Nylon Nuts	M3	4			
			P	age 31			



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	H0017	Swash plate Anti-Rotation Guide	Carbon Fiber	1		
5	H0018	Columns	Aluminum	4		
6	H0024	Main Shaft Bearing Support		1		
7	H0038	Safety Locking Tail Boom	Carbon Fiber	1		
8	H0043	Spacers Flybarless		3		
9	H0050	Antenna Guide	Plastic	2		
10	H0069	Tail Belt Idler		1		
11	H0071	Belt Tensioner Arm		1		
12	H0077	Flybarless Support	Carbon Fiber	1		
13	H0110	Bush-One Ways	Ø10 xØ13 x 1.4mm	1		
14	H0121	M4 Locking Collar		1		
15	H0122	Main Shaft		1		
16	H0142	Support Bearing	Aluminum	1		
17	H0156	Steel Pinion	19T	1		
18	H0157	Secondary Shaft		1		
19	H0171	One Way Double Bearing	60T	1		
20	H0172	Front Tail Pulley Low	37T	1		
21	H0174	Column Belt Tensioner		1		
22	H0175-21	Motor Pulley	21T	1		
23	H0143	Motor Support	Aluminum	1		
24	H0405	Main Gear CNC	68T M1	1		
25	HC033	Socket Head Cap Screw Shouldereds	M2.5 x 19mm	1		
26	HC038	Button Head Cap Screws	M3 x 4mm	3		
27	HC044	Socket Head Cap Screws	M3 x 6mm	6		
28	HC050	Socket Head Cap Screws	M3 x 8mm	3		
29	HC056	Socket Head Cap Screws	M3 x 10mm	9		
30	HC062	Socket Head Cap Screw	M3 x 12mm	1		

TRANSMISSION ASSEMBLY							
POS	POS COD Name		Specification	Quantity			
31	HC079	Socket Head Cap Screws	M3 x 18mm	1			
32	HC091	Socket Head Cap Shoudered	M3 x 40mm	1			
33	HC098	Button Head Cap Screws	M4 x 8mm	4			
34	HC104	Socket Head Cap Screw	M4 x 22mm	1			
35	HC111	Socket Head Cap Screw	M4 x 24mm	1			
36	HC128	Flat Head Cap Screws	M2.5 x 5mm	3			
37	HC134	Flat Head Cap Screw	M3 x 8mm	1			
38	HC153	Set Screws	M4 x 6mm	1			
39	HC158	Set Screws	M5 x 20mm	2			
40	HC165	Vite Nylon Esa	M8 x 20mm	2			
41	HC176	Washer	Ø3 x Ø4x0.5mm	1			
42	HC180	Washers	Ø3.2 xØ6 x 0.5mm	2			
43	HC188	Washers	Ø5.3 xØ15 x 1mm	2			
44	HC200	Metric Hex Nylon Nuts	M2.5 H3.5mm	1			
45	HC206	Metric Hex Nylon Nuts	M3 H4mm	1			
46	HC212	Metric Hex Nylon Nuts	M4 H5mm	2			
47	HC218	Metric Hex Nylon Nuts	M5 H4.8mm	2			
48	HC309	Big Motor Belt	240-3MGT	1			
49	HC310	Spring	de 5.8-df0.3-ll9	2			
50	HC312	Spring	de 8-df0.5-ll8	1			
51	HC314	Spring	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	HC414	Flanged Bearings	Ø6 x Ø13 x 5mm	1			
55	HC420	Bearings	Ø10 xØ15 x 4mm	2			
56	HC422	Bearings	Ø10 xØ19 x 5mm	2			
57	HC426	Bearings	Ø12 x Ø24 x 6mm	2			
58	HC442	One Way Bearing	Ø10 xØ14 x 12mm	2			
59	HC232	Washer	Ø10 xØ16 x 0.2mm	1			

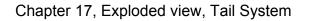


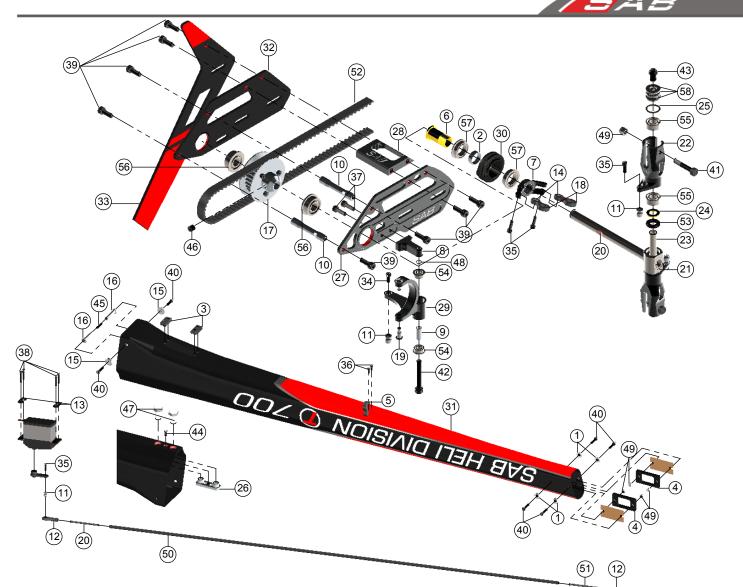


	Head System						
Pos	Code	Name	Specification	Quantity			
1	H0031	Uniball Spacers	Aluminum	3			
2	H0063	Uniballs	M3x4Ø5H18	1			
3	H0064	Uniballs	M2.5Ø5H6	3			
4	H0065	Uniball M3	Steel	8			
5	H0066	Plastic Ball Linkages	Plastic	6			
6	H0075	Servo Spacers	Carbon Fiber	6			
7	H0097	Spindle	Steel	1			
8	H0130BM	Center Hub	Aluminum Black Matte	1			
9	H0131BM	Blade Grip Arm	Aluminum Black Matte	2			
10	H0132BM	Radius Arm	Aluminum Black Matte	2			
11	H0134	Spacer Arm		2			
12	H0158	Blade Washers	Aluminum	4			
13	H0205	Uniball Radius Arm	Plastic	2			
14	H0253	Spacer Arm		2			
15	H0402	Uniball M3	Plastic	4			
16	H0417	Main Linkages	Steel	2			
17	H0420-01BM	Swashplate 01	Aluminum Black Matte	1			
18	H0420-03	Swashplate 03	Steel	1			
19	H0420-04BM	Swashplate 04	Aluminum Black Matte	1			
20	H0422-02BM	Swashplate 02	Aluminum Black Matte	1			
21	H0426-C	Damper derlin	Pom black	2			
22	H0679BM	Main Blade Grip	Aluminum Black Matte	2			
23	HA024	Oring		2			

Head System						
Quantity	Specification	Name	Code			
3	M2x5mm	Button Cap Screws	HC005	24		
7	M2 x 8mm	Head Cap Screws	HC008	25		
3	M2.5x10mm	Head Cap Screws	HC020	26		
9	M2.5x12mm	Head Cap Screws	HC026	27		
2	M2.5x18mm	Head Cap Screws	HC032	28		
3	M3x10mm	Head Cap Screws	HC056	29		
2	M3x12mm	Head Cap Screws	HC062	30		
2	M3x16mm	Head Cap Screws	HC068	31		
2	M5x30mm	Head Cap Shoulder	HC114	32		
2	M6x10mm	Head Cap Screws	HC124	33		
3	M2.5 x 18mm	Threaded Rods	HC140	34		
3	Ø2 x Ø5 x 0.5mm	Washers	HC170	35		
2	Ø3xØ4x0.5	Washers	HC176	36		
2	Ø6xØ14x1	Washers	HC194	37		
2	M5	Nylon Nut	HC218	38		
4	Ø10xØ16x1mm	Washers	HC230	39		
2	Ø10xØ16x0.2mm	Washers	HC232	40		
4	Ø2.5xØ6x2.5mm	Flanged Bearing	HC400	41		
4	Ø3xØ7x3mm	Flanged Bearing	HC402	42		
4	Ø10xØ19x5mm	Bearing	HC422	43		
2	Ø30 xØ37 x 4mm	Bearing Rads	HC430	44		
2	Ø10xØ18x5.5mm	Thrust Bearing	HC438	45		

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TAIL SYSTEM						
POS	COD	Name	Specification	Quantity		
1	H0007	Finishing Washer M3	Aluminum	4		
2	H0029	Spacer	Ø8.1 xØ9.2 x 3.2mm	1		
3	H0040	Tail Servo Locks	Plastic	2		
4	H0041	Locking Element Tails	Carbon Fiber	2		
5	H0045	Linkage Tail Support	Plastic	1		
6	H0054	Tail Pitch Slider 02	Aluminum	1		
7	H0055BM	Tail Pitch Slider Link	Aluminum Black Matte	1		
8	H0058BM	Bell Crank Base	Aluminum Black Matte	1		
9	H0060	Spacer	Ø3 x Ø4 x 9.6mm	1		
10	H0061	Tail Case Spacers	Aluminum	2		
11	H0064	Uniballs	M2.5Ø5H6	4		
12	H0066	plastic ball links	Plastic	2		
13	H0075	Servo Spacer	Carbon Fiber	2		
14	H0076	076 Spacer Ø2xØ2x3mm		3		
15	H0078	Washers	Ø3.1 xØ12 x 1.8mm	2		
16	H0082	Boom spacers	Aluminum	2		
17	H0103	Tail Pulley	26T	1		
18	H0261	Tail Pitch Slider Link		2		
19	H0264	Pin M3	Steel	2		
20	H0325	Tail Shaft	Steel	1		
21	H0326	Tail Hub	Steel	1		
22	H0327BM	Tail Blade Grip	Aluminum Black Matte	2		
23	H0329	Tail Spindle	Steel	1		
24	H0330	Spacer	Ø5xØ9x0.75mm	2		
25	H0349	Spacer	Ø7.5xØ10x0.5mm	2		
26	H0358	Block Nut	Aluminum	1		
27	H0359BM	Tail Side Plate	Aluminum Black Matte	1		
28	H0360BM	Tail Upper Case	Aluminum Black Matte	1		
29	H0406BM	Tail Bell Crank	Aluminum Black Matte	1		
30	H0407	Tail Pitch Slider 02	Plastic	1		
Page 35						

TAIL SYSTEM							
POS	COD	Name	Specification	Quantity			
31	H0845	Red Tail Boom		1			
32	H0867	Carbon Tail Plate	Carbon Fiber	1			
33	H0868	Red Vertical Fin	Carbon Fiber	1			
34	HC002	Socket Head Cap Screws	M2 x 5mm	1			
35	HC004	Socket Head Cap Screws	M2 x 6mm	4			
36	HC018	Socket Head Cap Screws	M2.5 x 6mm	2			
37	HC020	Socket Head Cap Screws	M2.5 x 8mm	2			
38	HC026	Socket Head Cap Screws	M2.5 x 12mm	4			
39	HC050	Socket Head Cap Screws	M3 x 8mm	8			
40	HC062	Socket Head Cap Screws	M3 x 12mm	6			
41	HC079	Socket Head Cap Screws Shoulder	M3 x 18mm	2			
42	HC086	Socket Head Cap Screws	M3 x 22mm	1			
43	HC096	Button Head Cap Screws	M4 x 6mm	2			
44	HC134	Flat Head Cap Screws	M3x8mm	1			
45	HC150	Set Screws	M3 x 20mm	1			
46	HC153	Set Screws	M4 x 6mm	1			
47	HC165	Nylon Screw	M8x20mm	2			
48	HC176	Washer	Ø3xØ4x0.5mm	1			
49	HC206	Nylon Nuts	M3	6			
50	HC239	Carbon Rod Ø2.5 xØ4 x 702mm		1			
51	HC242	Threaded Rods	m2.5 x 40mm	2			
52	HC304	Belt Gates 2061-3GT-06	SG712	1			
53	HC335	Tail Oring		2			
54	HC402	Flanged Bearings	Ø3 x Ø7 x 3mm	2			
55	HC411	Bearings	Ø5xØ10x4mm	4			
56	HC414	Flanged Bearings	Ø6 xØ13 x 5mm	2			
57	HC418	Flanged Bearings	Ø8 x Ø 12 x 3.5mm	2			
58	HC435	Thrust Bearings	Ø5x Ø10x4mm	2			

## **Chapter 18, Spare Parts**



## Chapter 18, Spare Parts



Chapter 18, Spare Parts

SAE			
18T Pulley [H0175-18-S]	19T Pulley [H0175-19-S]	20T Pulley [H0175-20-S]	21T Pulley [H0175-21-S]
- 1 x 18T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 19T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 20T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 21T Pulley. - 1 x Set Screws M4x4mm.
22T Pulley [H0175-22-S]	23T Pulley [H0175-23-S]	24T Pulley [H0175-24-S]	25T Pulley [H0175-25-S]
- 1 x 22T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 23T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 24T Pulley. - 1 x Set Screws M4x4mm.	- 1 x 25T Pulley. - 1 x Set Screws M4x4mm.
Uniball Radius Arm [H0205-S]	Plastic Tail Linkage [H0261-S]	Steel Tail Shaft [H0325-S]	Aluminum Tail Blade Grip [H0327BM-S]
- 2 x Uniball Radius Arm.	<ul> <li>- 2 x Plastic Tail Linkage.</li> <li>- 2 x Grip Link Bushing.</li> <li>- 2 x Head Cap Screws M2x6mm.</li> </ul>	<ul> <li>- 1 x Steel Tail Shaft.</li> <li>- 1 x Tail Hub.</li> <li>- 2 x Tail Oring Damperner.</li> <li>- 1 x Set Screws M4x6mm.</li> </ul>	<ul> <li>2 x Aluminum Tail Blade Grip.</li> <li>4 x Bearing Ø5xØ10x4mm.</li> <li>2 x Thrust bearing Ø5xØ10x4mm.</li> <li>2 x Button Head Cap M4x8mm.</li> <li>2 x Socket Head Cap M2x6mm.</li> <li>2 x Washer Ø5xØ8.9x0,75mm.</li> <li>2 x Washer Ø7.5xØ10x0,5mm.</li> </ul>
Tail Spindle [H0329-S]	Tail Boom Support [H0358-S]	Aluminum Tail Side Plate [H0359BM-S]	Aluminum Tail Case Spacer [H0360BM-S]
		102. BABI	
- 1 x Tail Spindle. - 2 x Button Head Cap M4x6mm.	- 1 x Tail Boom Support. - 1 x Nylon screw M8x20mm. - 1 x Flat Head Cap ScrewsM3x8.	<ul> <li>1 x Aluminum Tail Side Plate.</li> <li>1 x Flanged bearing Ø6xØ13x5mm.</li> </ul>	- 1 x Aluminum Tail Case Spacer. - 4 x Socket Head Cap M3x8mm.
Main Frame [H0874-S]	Plastic Ball Link [H0402-S]	CNC Derlin Main Gear [H0405-S]	Bell Crank Lever [H0406BM-S]
			<ul> <li>- 2 x Tail Pin.</li> <li>- 1 x Uniball M2.</li> <li>- 1 x Uniball Spacer.</li> <li>- 1 x Bell Crank Lever.</li> <li>- 2 x Flanged Bearing Ø3xØ7x3mm.</li> <li>- 1 x Head Cap Screws M3x22mm.</li> <li>- 1 x Head Cap Screws M2x8mm.</li> <li>- 1 x Head Cap Screws M2x8mm.</li> </ul>
- 1 x Main Frame.	- 5 x Plastic Ball Link.	- 1 x CNC Derlin Main Gear Set.	- 1 x Washer $\phi$ 3x $\phi$ 4x0.5mm. - 1 x Spacer $\phi$ 3x $\phi$ 4x9.6mm.

## Chapter 18, Spare Parts



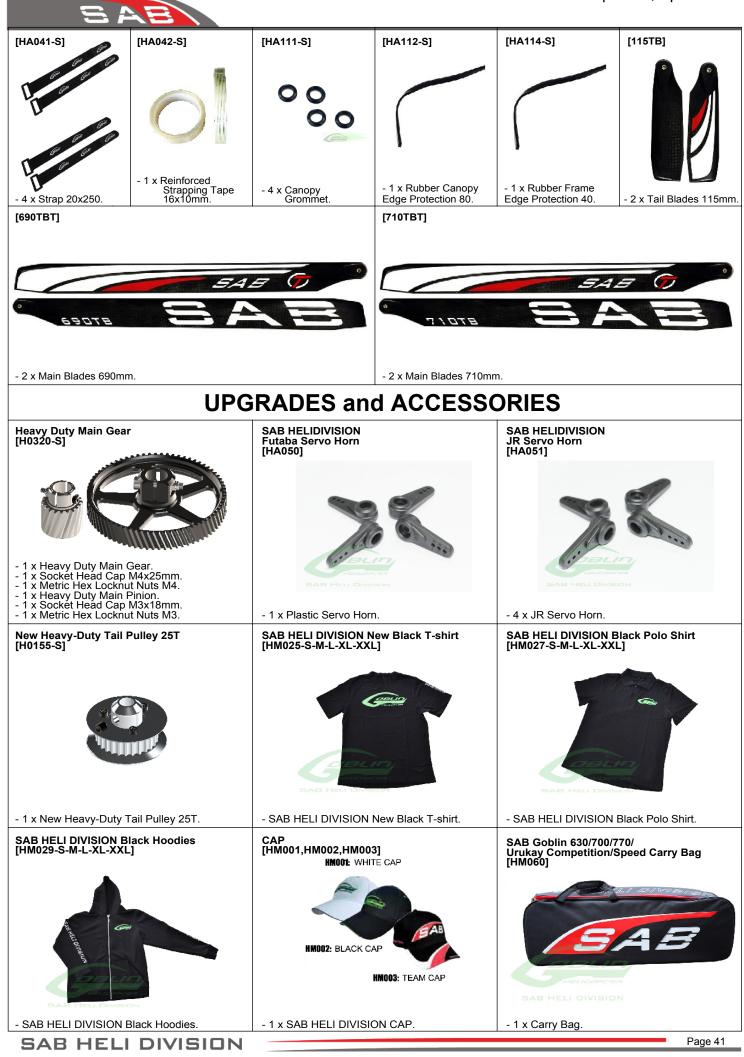
SAE							
[HC002-S]	[HC004-S]	[HC008-S]	[HC010-S]	[HC018-S]	[HC020-S]		
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- 8 x Socket Head Cap Screws M2x5mm.	- 8 x Socket Head Cap Screws M2x6mm.	- 8 x Socket Head Cap Screws M2x8mm.	- 8 x Socket Head Cap Screws M2x10mm.	- 8 x Socket Head Cap Screws M2.5x6mm.	- 8 x Socket Head Cap Screws M2.5x8mm.		
[HC026-S]	[HC033-S]	[HC038-S]	[HC044-S]	[HC050-S]	[HC056-S]		
ព្រៃ <sup>ព្</sup> ព្រ	<b>i i i i</b> e e e e	**** ****	1111 1111	e f f f F f f f	<b>tîîÎțîî</b>		
- 8 x Socket Head Cap Screw M2.5x12mm.	<ul> <li>4 x Socket Head Cap shouder M2.5x19mm.</li> <li>4 x Metrix Hex Nylon Nut M2.5.</li> </ul>	- 8 x Button Head Cap Screws M3x4mm.	- 8 x Socket Head Cap Screws M3x6mm.	- 8 x Socket Head Cap Screws M3x8mm.	- 8 x Socket Head Cap Screws M3x10mm.		
[HC062-S]	[HC068-S]	[HC079-S]	[HC086-S]	[HC091-S]	[HC096-S]		
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- 8 x Socket Head Cap Screws M3x12mm.	- 8 x Socket Head Cap Screws M3x16mm.	<ul> <li>2 x Socket Head Cap Shouder M3x18mm.</li> <li>2 x Metrix Hex Nylon Nut M3.</li> </ul>	- 8 x Socket Head Cap Screws M3x22mm.	- 4 x Socket Head Cap Shouldereds M3x40mm.	- 8 x Buttom Head Cap Screws M4x6mm.		
[HC098-S]	[HC100-S]	[HC104-S]	[HC111-S]	[HC114-S]	[HC124-S]		
	iii iiii	׀׀׀׀					
- 8 x Button Head Cap Screws M4x8mm.	- 8 x Button Head Cap Screws M4x10mm.	- 8 x Socket Head Cap Screws M4x22mm.	- 8 x Socket Head Cap Shouder M5x30mm.	<ul> <li>2 x Socket Head Cap Shouder M5x30mm</li> <li>2 x Metrix Hex Nut M5.</li> </ul>	- 8 x Socket Head Cap Screws M6x10mm.		
[HC128-S]	[HC134-S]	[HC140-S]	[HC150-S]	[HC152-S]	[HC153-S]		
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- 8 x Flat Head Cap Screws M2.5x5mm.	- 8 x Flat Head Cap Screws M3x8mm.	- 8 x Set Screws M2.5x20mm.	- 8 x Cup Poin Set Screws M3x20mm.	- 8 x Cup Poin Set Screws M4x4mm.	- 8 x Cup Poin Set Screws M4x6mm.		
[HC158-S]	[HC165-S]	[HC170-S]	[HC176-S]	[HC180-S]			
- 8 x Cup Poin Set Screws M5x20mm.	- 4 x Nylon Screw M8x20mm.	- 10 x Washer Ø2,2xØ5x0,3mm.	- 5 x Washer Ø3xØ4x0,5mm.	- 10 x Washer Ø3.3xØ6x0,5mm.	- 5 x Washer Ø5.3xØ15x1mm.		

## Chapter 18, Spare Parts

Chapter 18, Spare Parts					
[HC194-S]	[HC200-S]	[HC206-S]	[HC212-S]	[HC218-S]	[HC230-S]
0000	8888 8888 8888	e e e e e e e e e e e e e e e e e e e			ංදිරි
- 8 x Washer Ø6.3xØ15x1mm.	- 8 x Metric Hex Nylon Nuts M2,5H3,5.	- 8 x Metric Hex Nylon Nuts M3H4.	- 8 x Metric Hex Nylon Nuts M4H5.	- 8 x Metric Hex Nylon Nuts M5H4.5.	- 5 x Shims Ø10xØ16x1mm.
[HC232-S]	[HC239-S]	/	[HC242-S]	[HC304-S]	[HC309-S]
660	- 1 x Carbon Rod Ø4xØ2	,5x702mm.		$\bigcirc$	
- 5 x Shims Ø10xØ16x0.2mm.	- 2 x Plastic Ball Linkage - 2 x Thread Rod M2.5x4	Omm.	- 3 X Thread Rods M2.5 x 40mm.	- 1 x Belt Gates 2061-3GT-06mm.	- 1 x Motor Belt 240-3MGT 19mm.
[HC315-S]	[HC335-S]	[HC400-S]	[HC402-S]	[HC410-S]	[HC411-S]
- 2 x Spring 5 8/df 0.3		9 <mark>9</mark> 6			
- 2 x Spring 5,8/df 0,3. - 1 x Spring 8 /df 0,5. - 2 x Spring 3 /df 5.	- 4 x Tail Oring Damper.	- 4 x Flanged Bearings Ø2.5xØ6x2.6mm.	- 4 x Flanged Bearings Ø3xØ7x3mm.	<ul> <li>4 x Flanged Bearings</li> <li>Ø 5x Ø 9x3mm.</li> </ul>	- 4 x Bearings Ø5xØ10x4mm.
[HC414-S]	[HC418-S]	[HC420-S]	[HC422-S]	[HC426-S]	[HC430-S]
0					(0)
- 2 x Flanged Bearings Ø 6x Ø 13x4mm.	- 2 x Flanged Bearings Ø8xØ12x3.5mm.	- 2 x Bearings Ø10xØ15x4mm.	- 4 x Bearings Ø10xØ19x5mm.	- 2 x Bearings Ø12xØ24x6mm.	- 2 x Rad Bearings Ø30xØ37x4mm.
[HC435-S]	[HC438-S]	[HC442-S]	[HC447-S]	[HA001-S]	[HA006-S]
0000	000		0		
- 2 x Thrust Bearings $\phi$ 5x $\phi$ 10x4mm.	- 2 x Thrust Bearings ∅10x∅18x5.5mm.	- 1 x One Way Bearings Ø10xØ14x12mm.	- 1 x Spherical Bearing $\phi$ 12x $\phi$ 22x7mm.	- 1 x Foam Blade Holder.	- 1 x Canopy Mousse.
[HA010-S]	[HA015-S]	[HA016-S]	[HA024-S]	[HA025-S]	[HA026-S]
00		1-01 240	000	1.0000	38
- 2 x Cable Pass.	- 2 x Double-sided Tape.	- 1 x Wrench Nuts M8.	- 4 x OR 3050.	- 2 x Big Straps.	- 4 x Heats Sink.

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Chapter 18, Spare Parts





- Carefully check your model before each flight to ensure it is airworthy.
- Consider flying only in areas dedicated to the use of model helicopters.
- Check and inspect the flying area to ensure it is clear of people orbstacles.
- Rotor blades can rotate at very high speeds! Be aware of the danger they pose.
- Always keep the model at a safe distance from other pilots and spectators.
- Avoid maneuvers with trajectories towards a crowd.
- Always maintain a safe distance from the model.





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