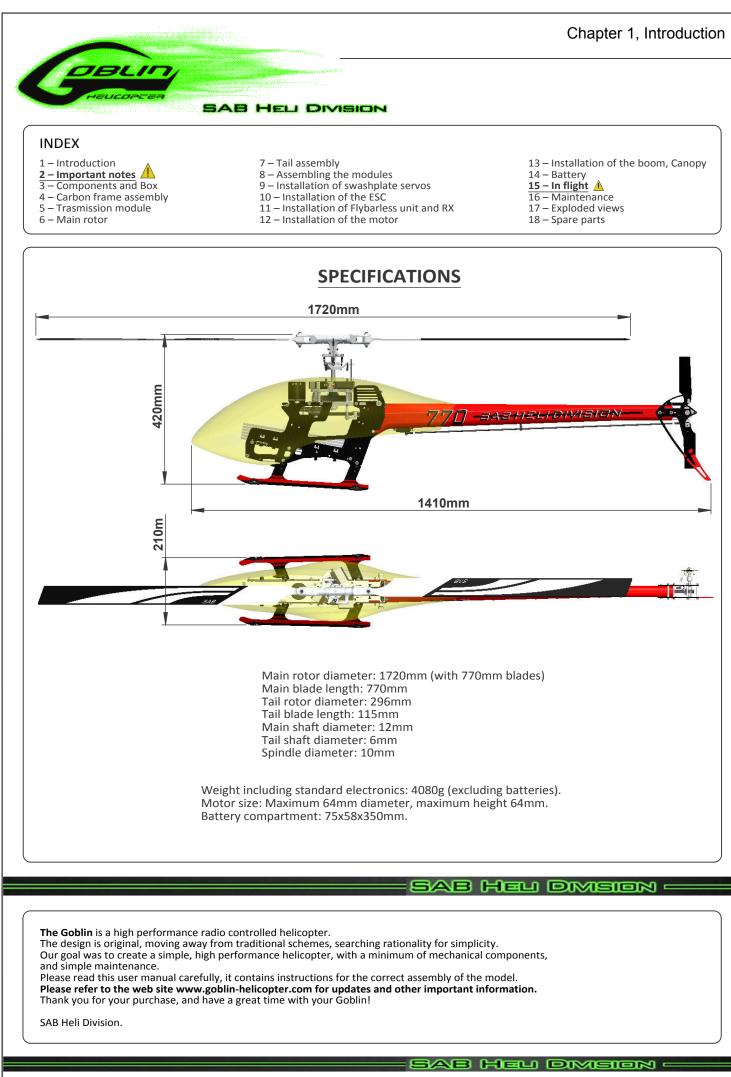


Goblin 770 Manual

SAB Heli Dimision -

Goblin 770 Manual Release 1.0 - December 2012

SAB HELI DIVISION S.R.L. Via San Crispino, 47 47030 San Mauro Pascoli (FC) - ITALY



Chapter 2, Important Notes



IMPORTANT NOTES

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

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

SAFETY GUIDELINES

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

NOTES FOR ASSEMBLY

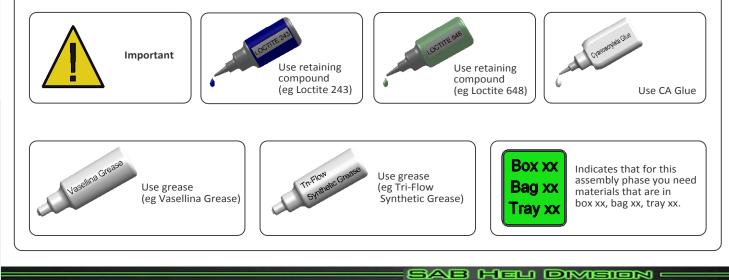
Please refer to this manual for assembly instructions for this model.

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

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

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

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





*Electric Motor:

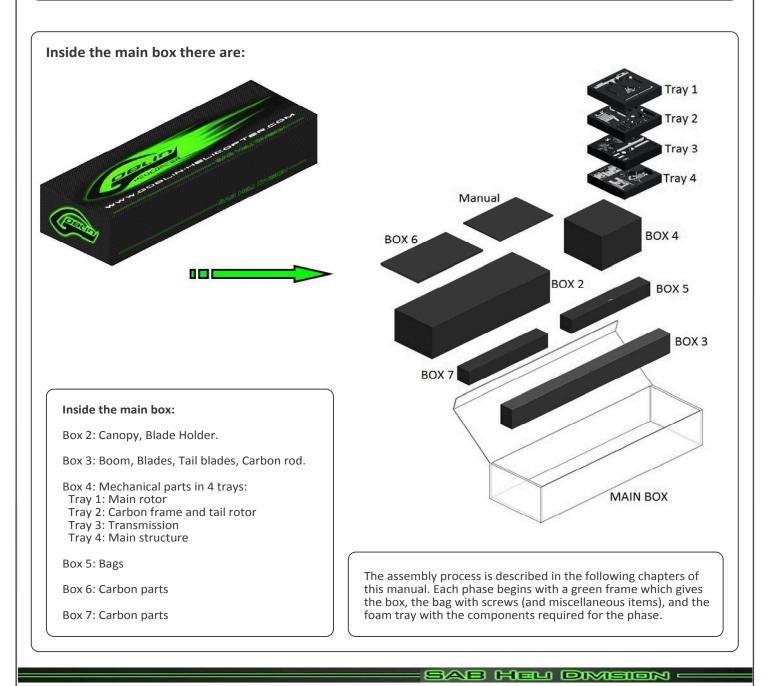
- 12S-14S 380-520Kv Maximum diameter 64mm, Maximum height 64mm, pinion shaft diameter 6 *Speed controller: minimum 120A, suggest 160A
- *Batteries: 12-14S 4500-6000mAh
- *1 flybarless 3 axis control unit
- *Radio power system, if not integrated with the ESC
- *3 cyclic servos
- *1 tail rotor servo
- *6 channel radio control system on 2.4 GHz

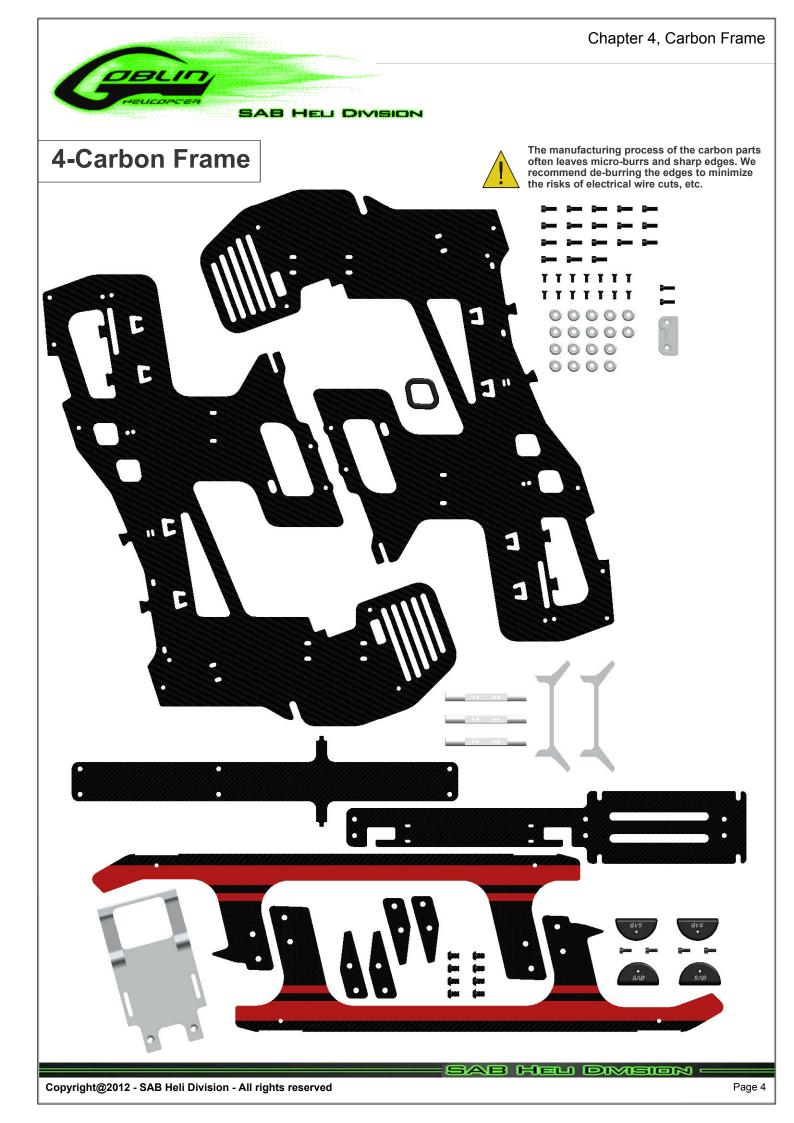
(See configuration examples on page 28)

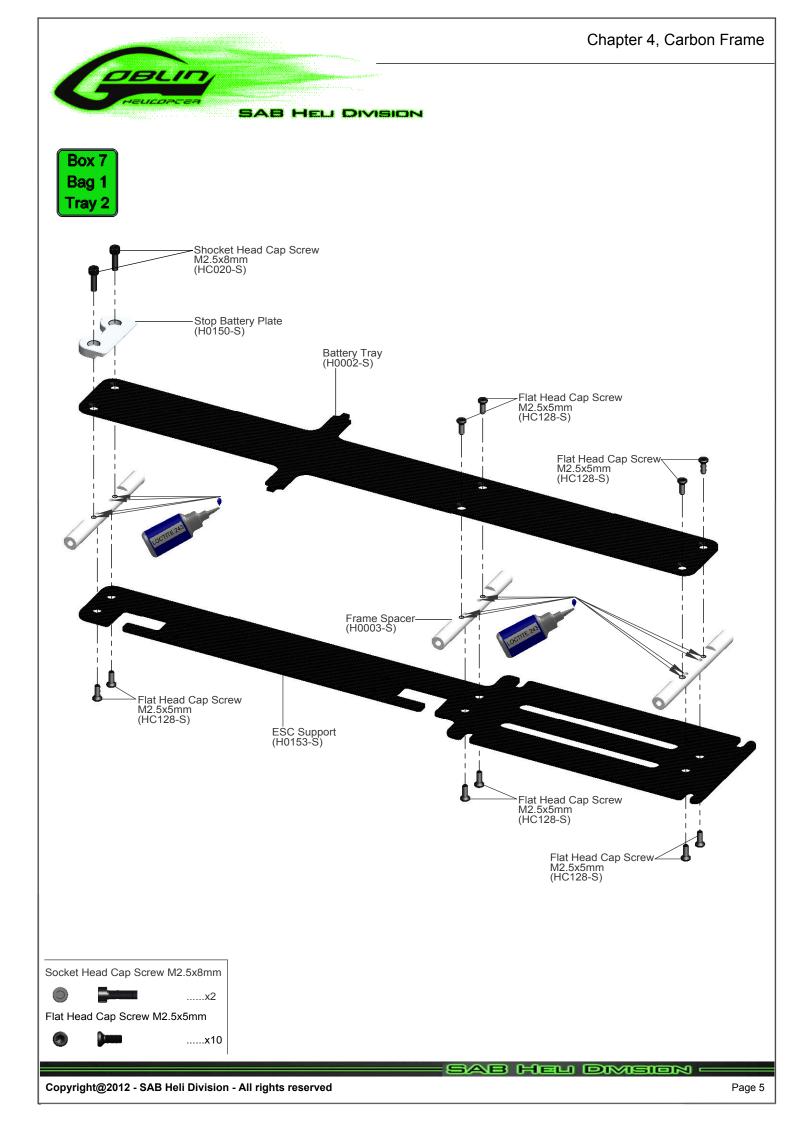
TOOLS, LUBRICANTS, ADHESIVES

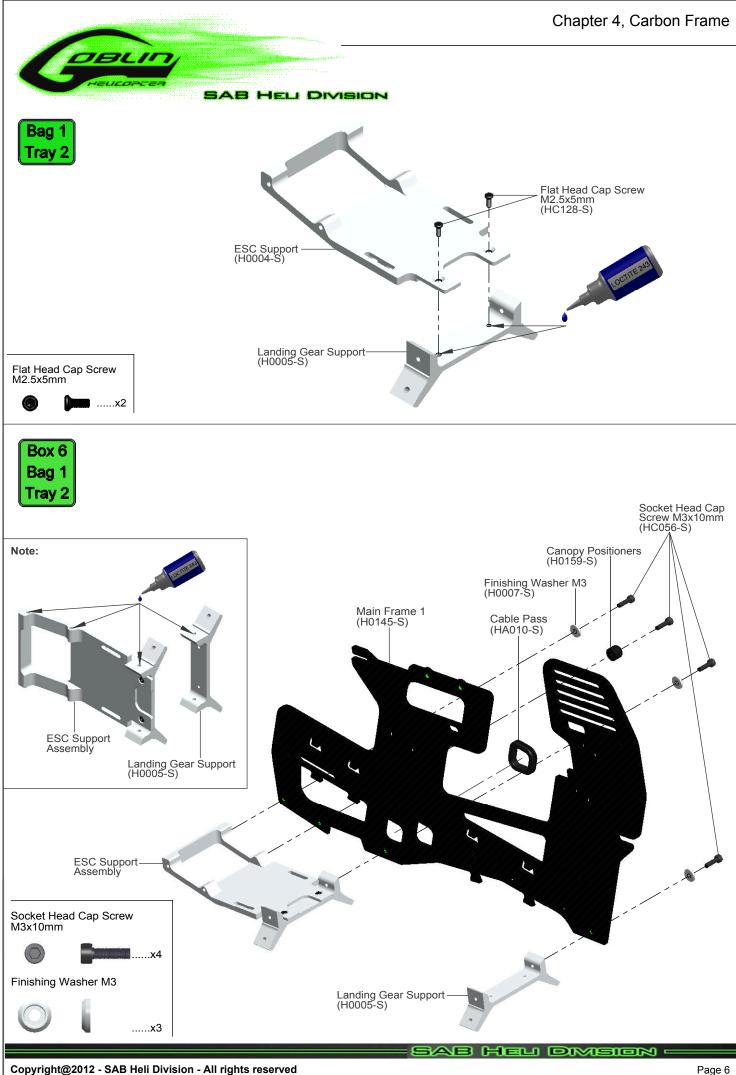
Chapter 3, Components and Box

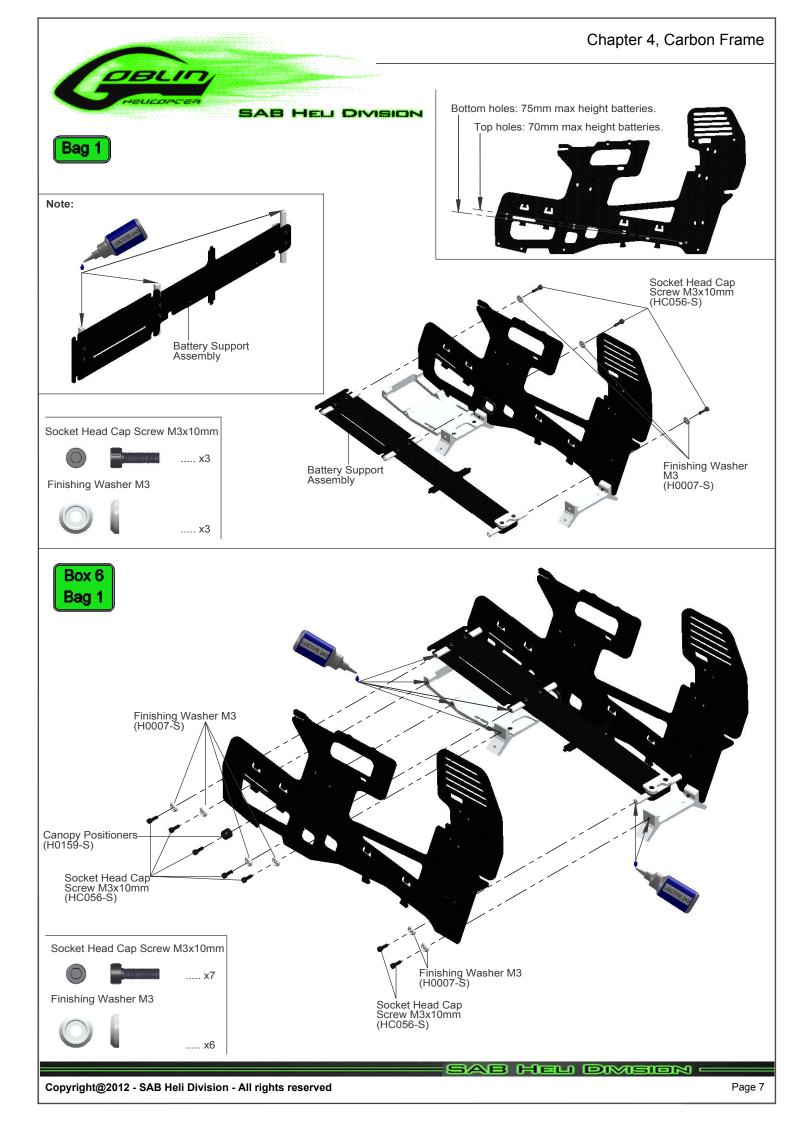
- *Generic pliers *Hexagonal driver, size 1.5,2,2.5,3,4mm
- *4mm^T-Wrench *5.5mm Socket wrench (for M3 nuts)
- *8mm Hex fork wrench (for M5 nuts)
- *Medium threadlocker (eg. Loctite 243)
- *Strong retaining compound (eg. Loctite 648)
- *Spray lubricant (eg. Try-Flow Oil)
- *Synthetic grease (eg. Tri-Flow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

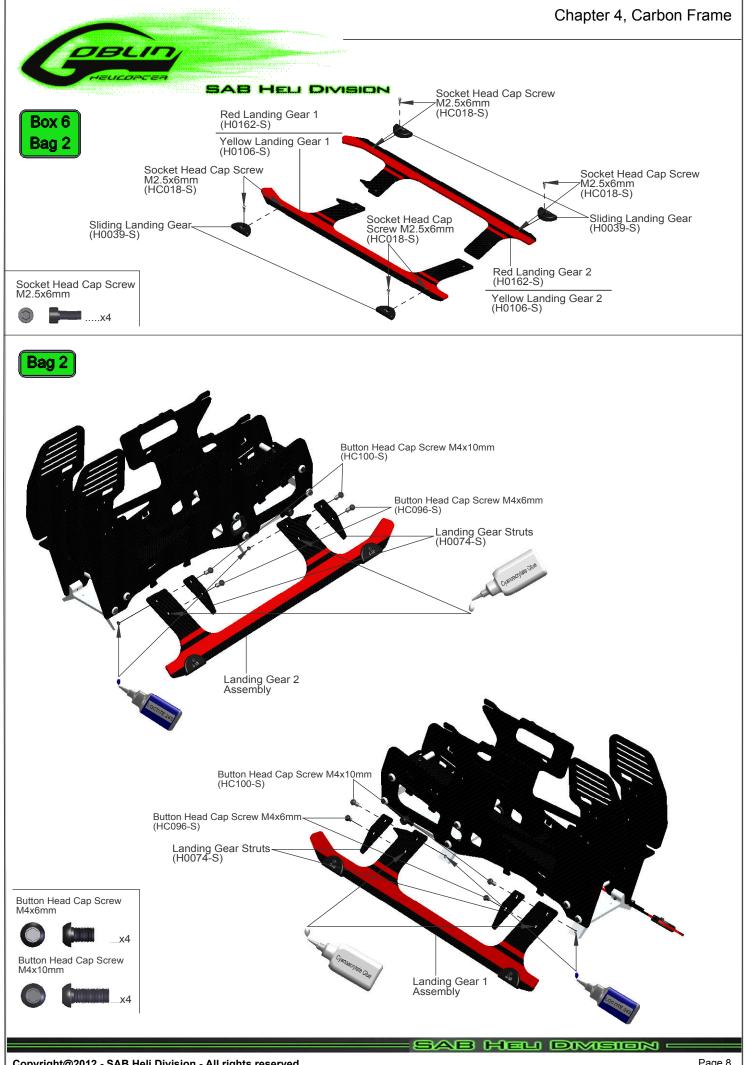


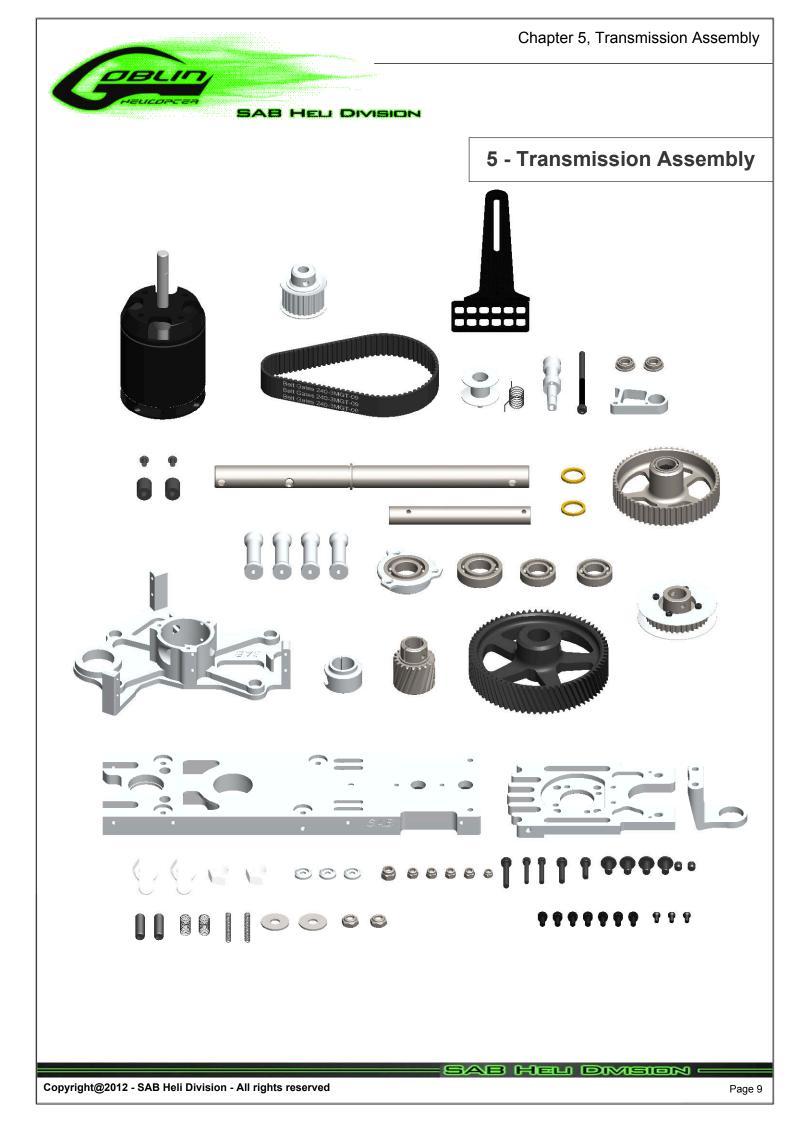


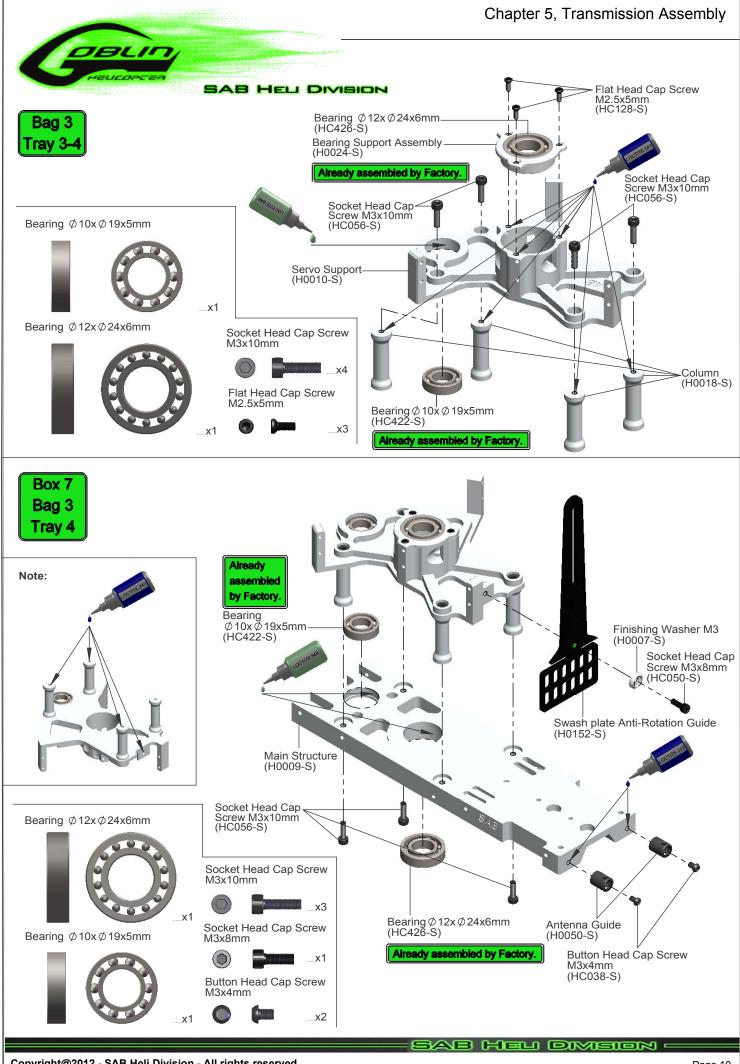


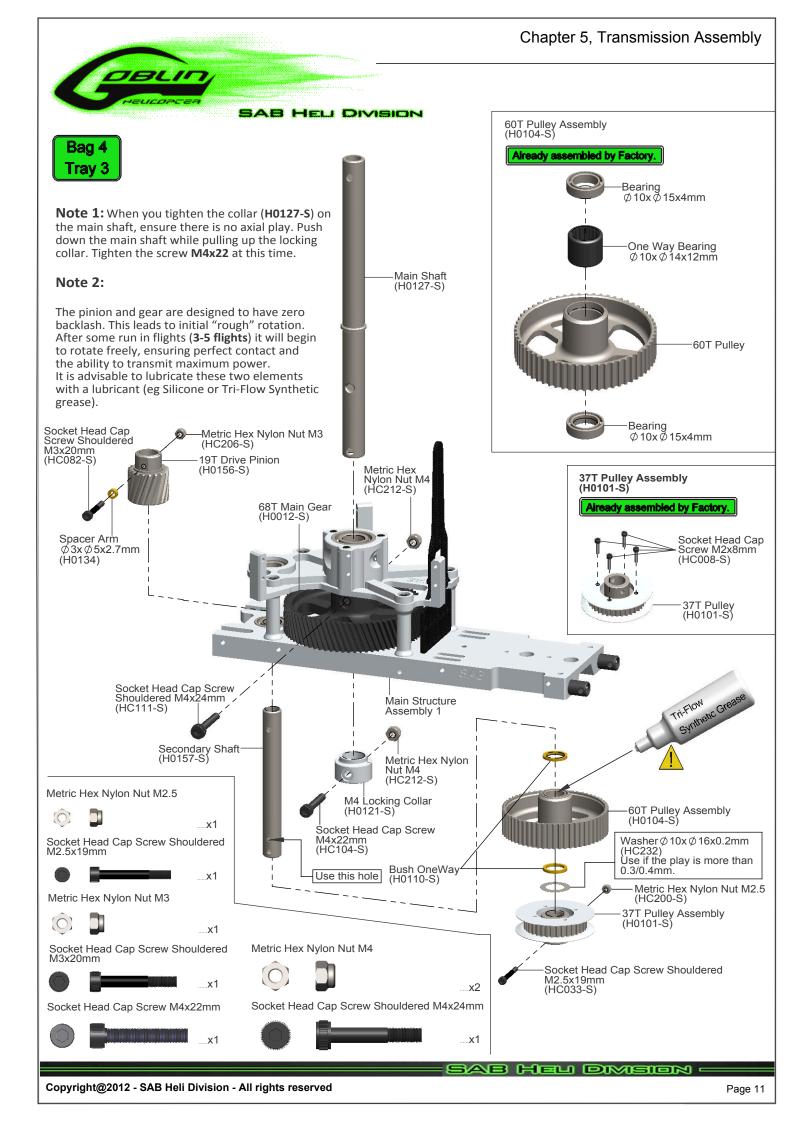


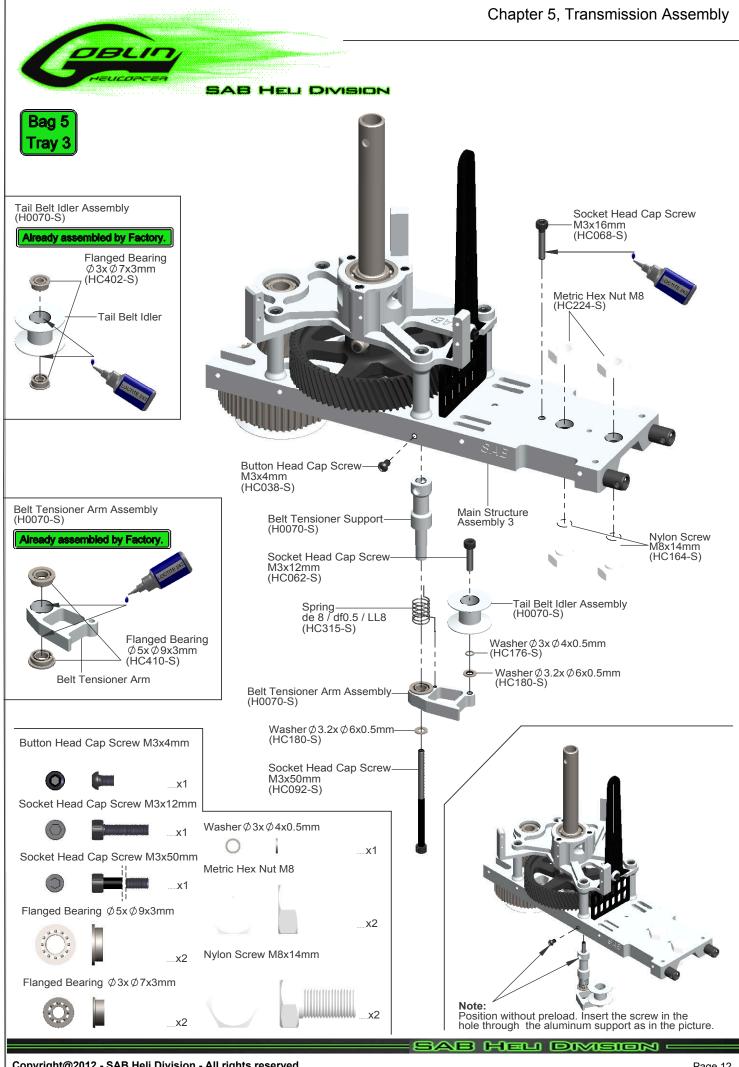


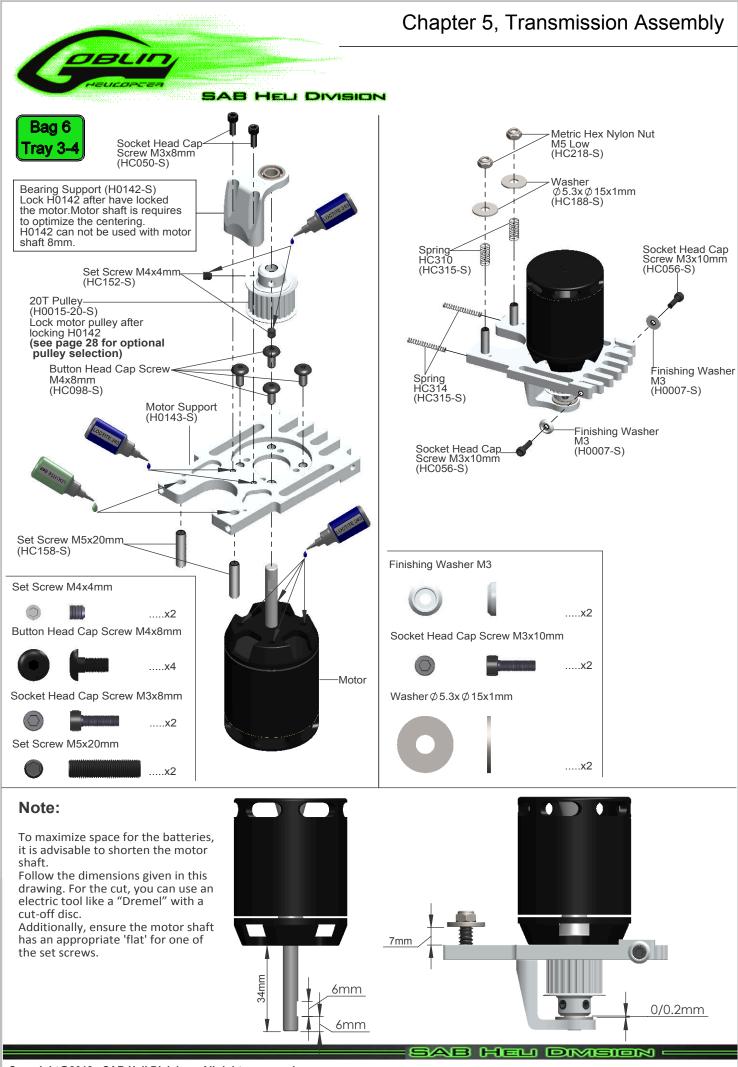


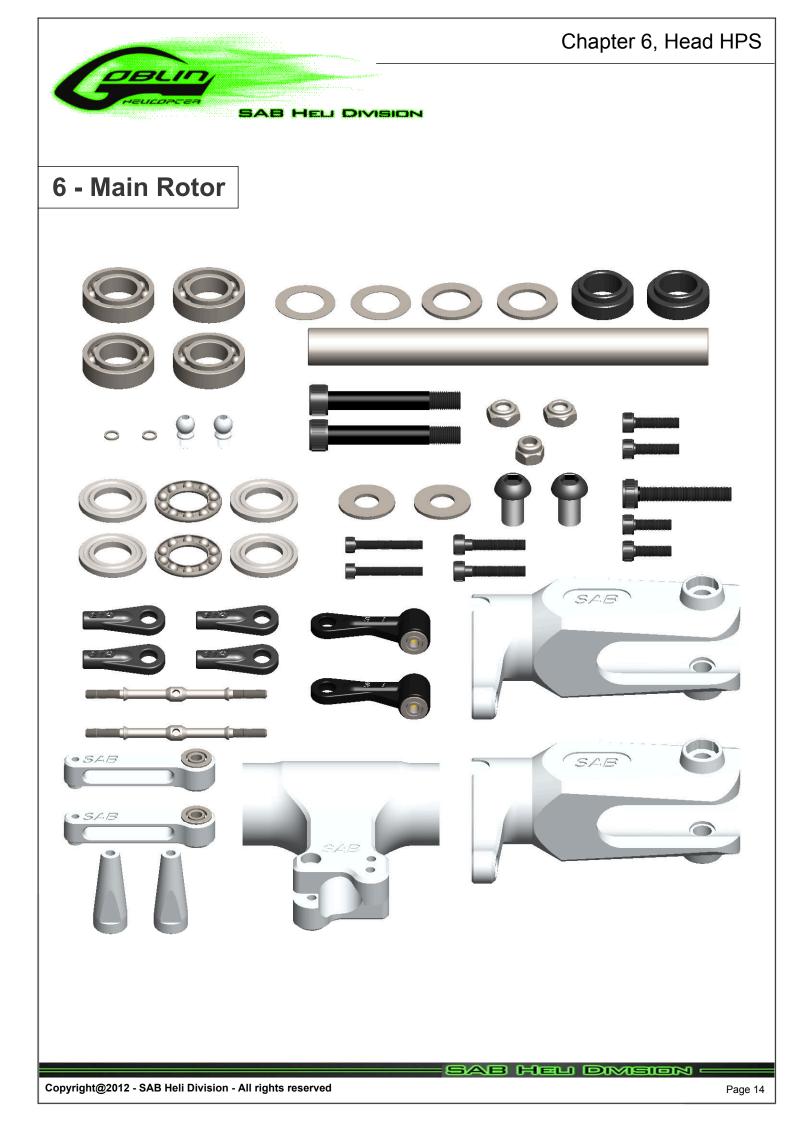


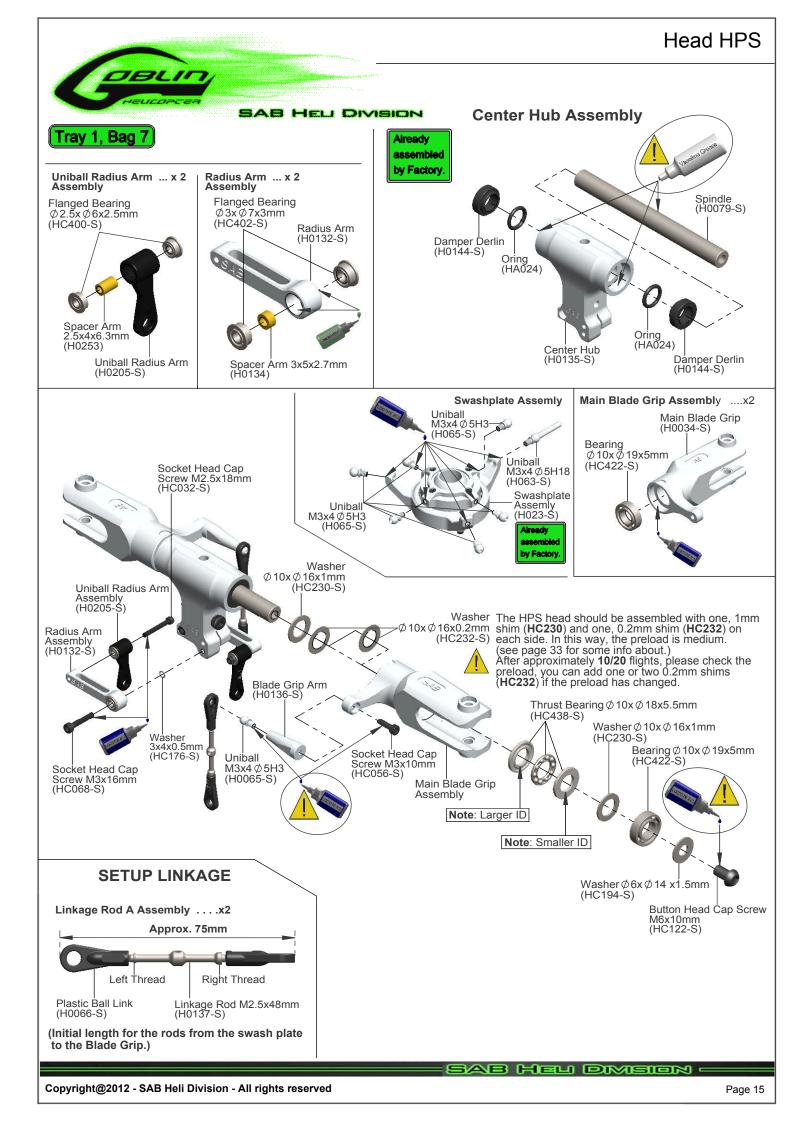


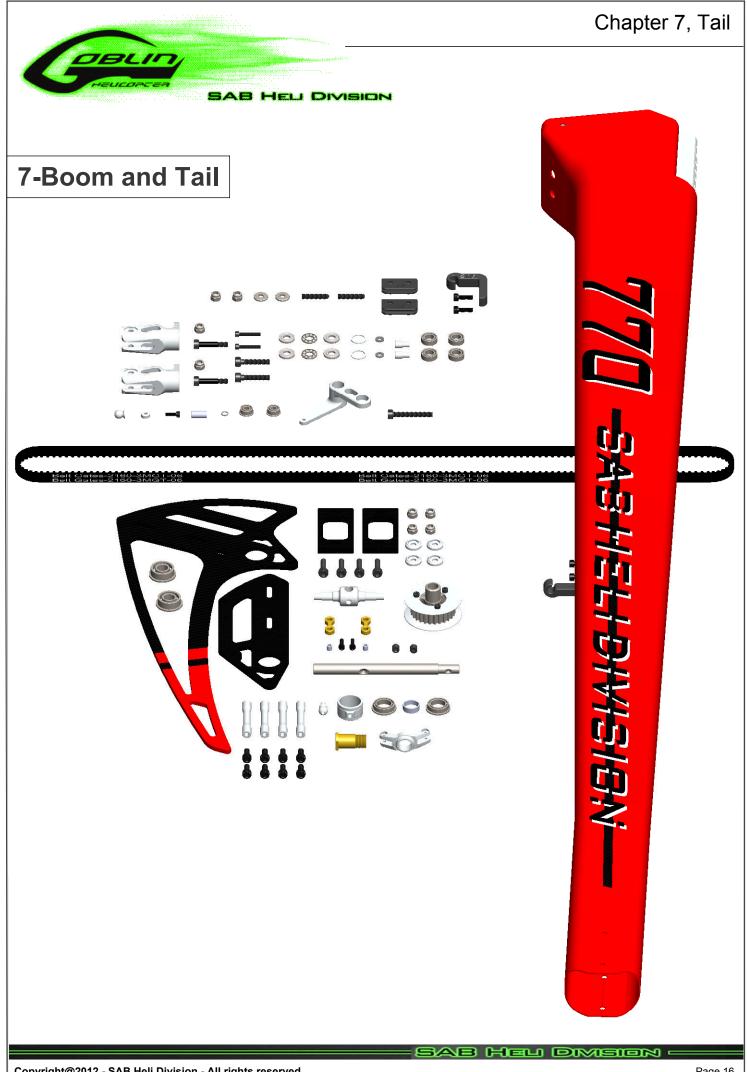


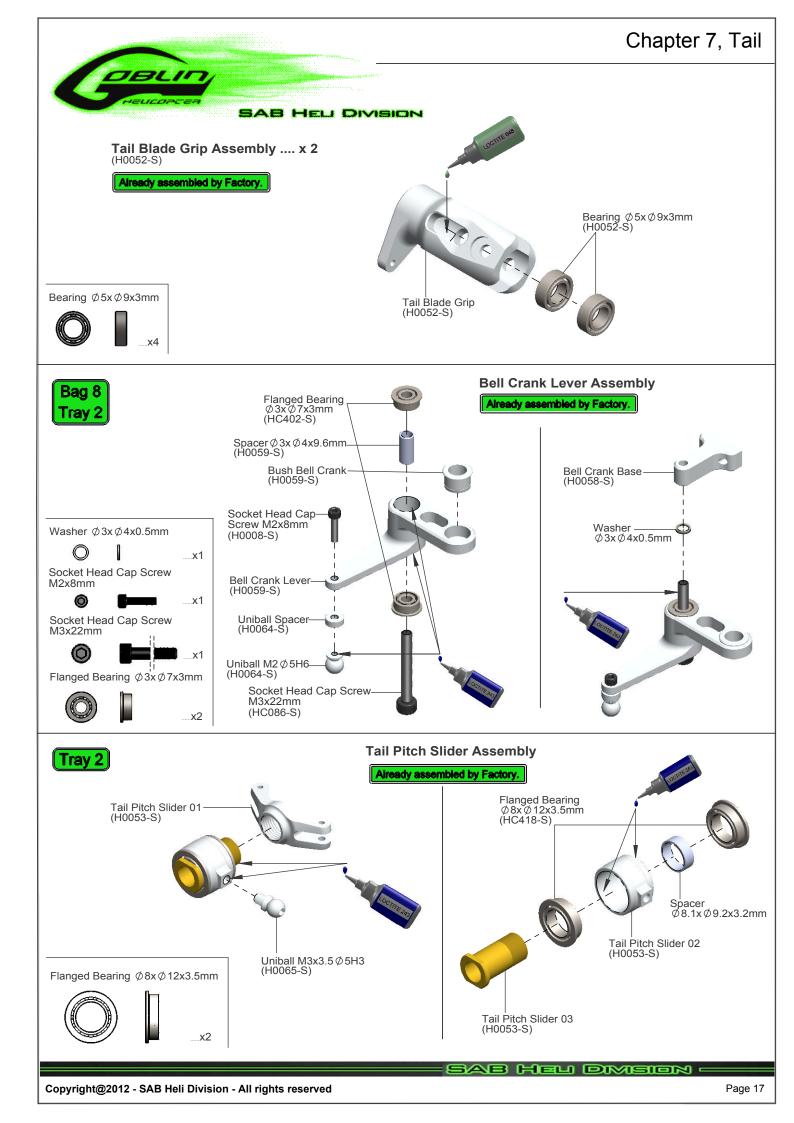


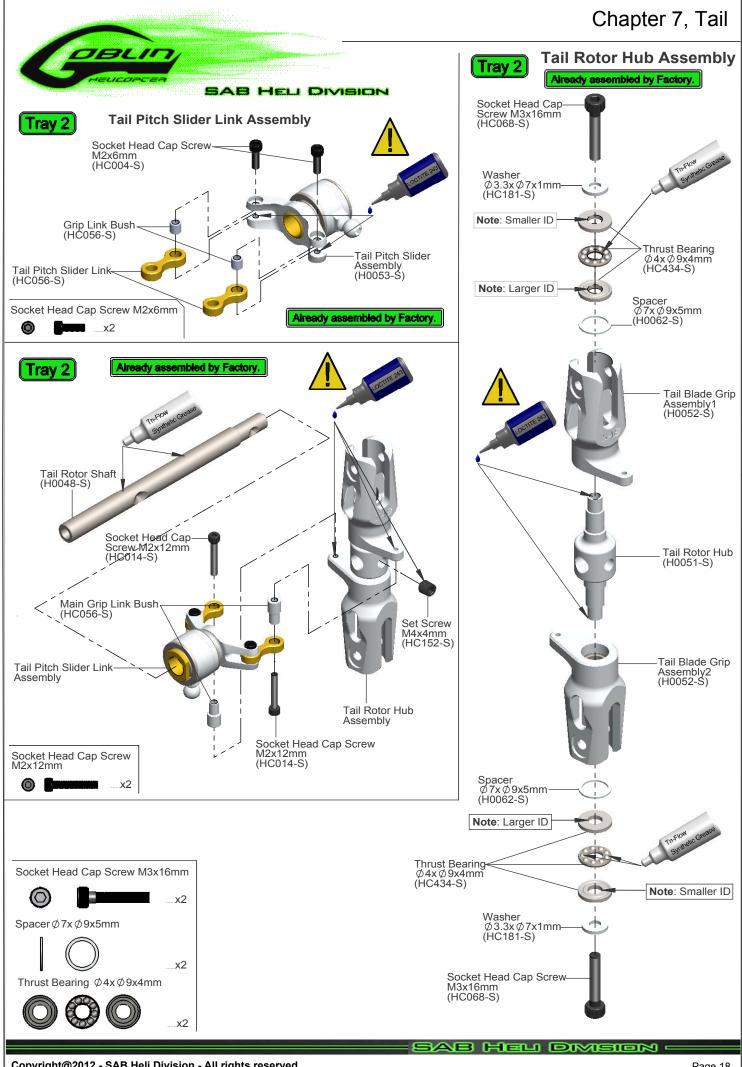


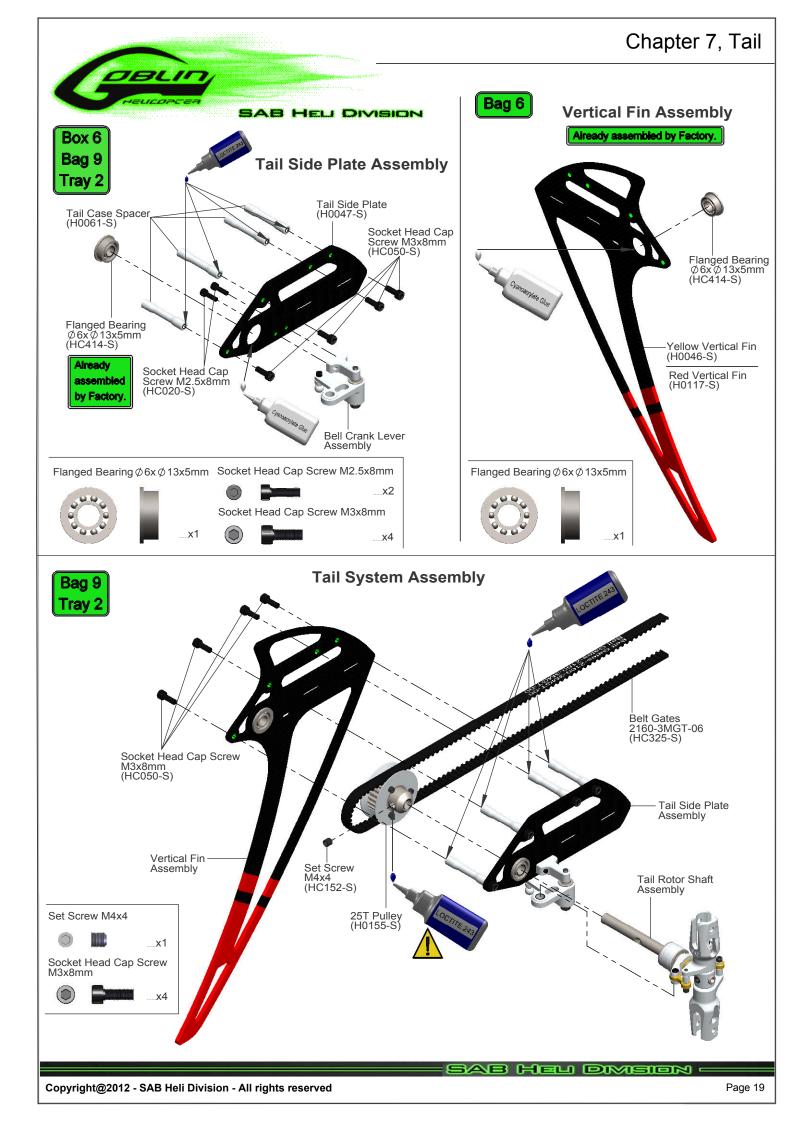


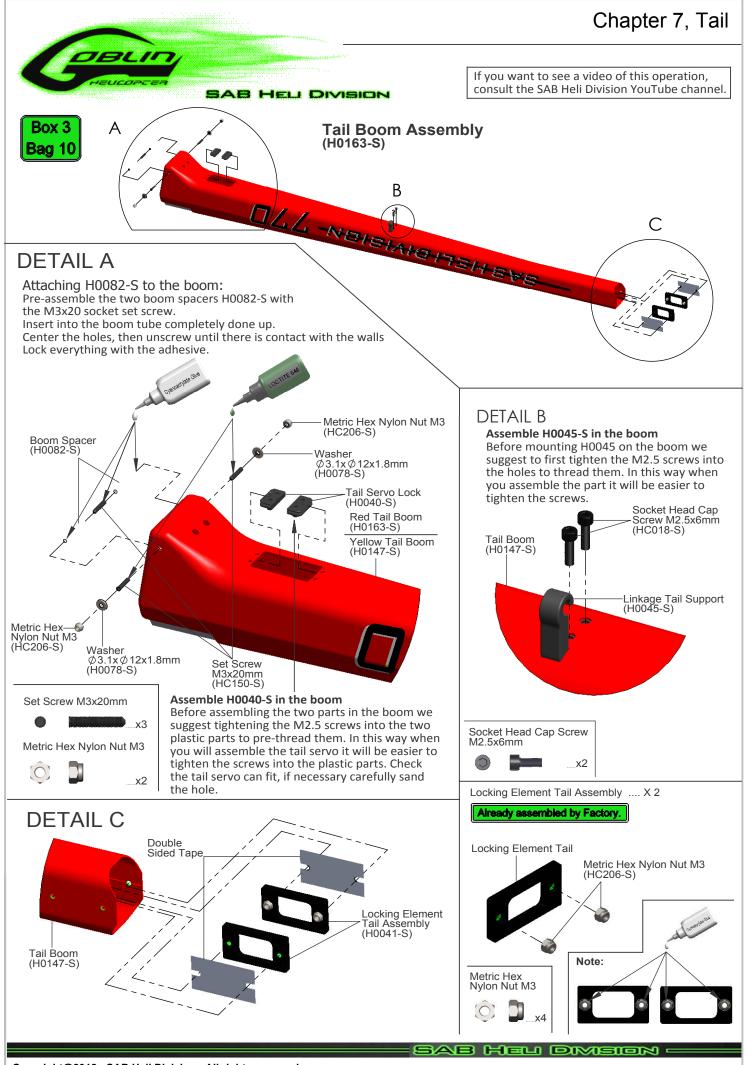


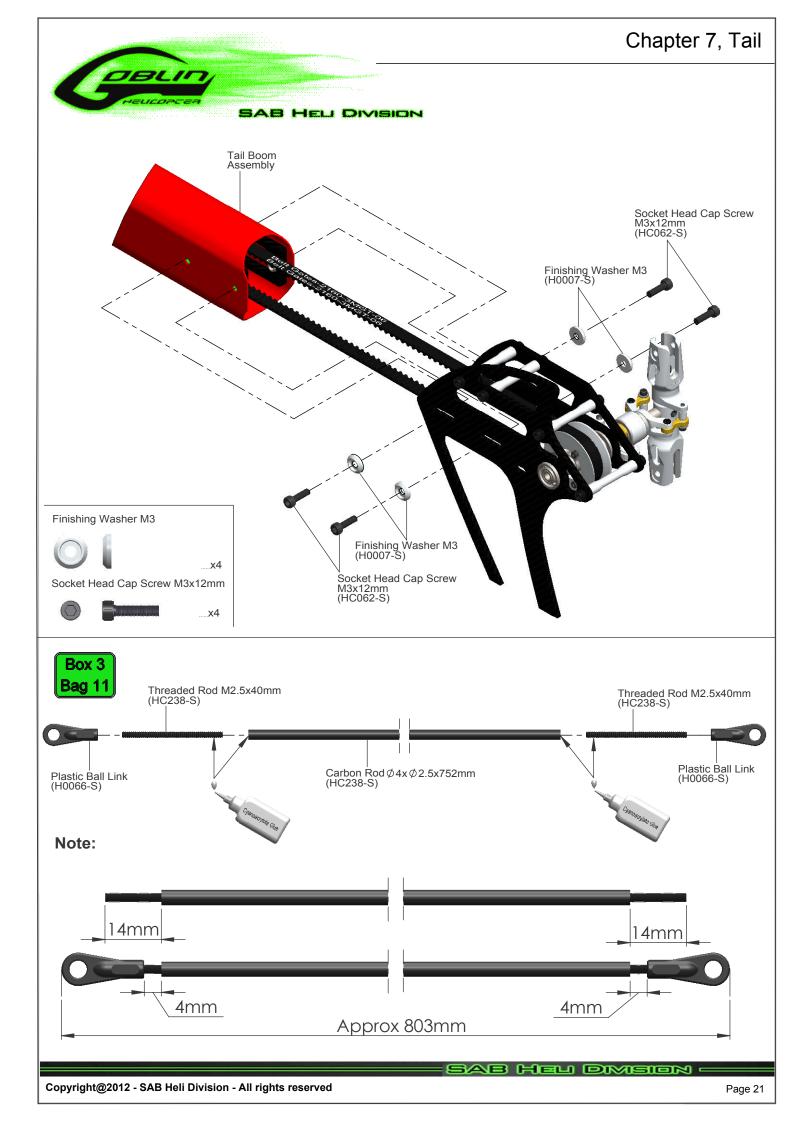


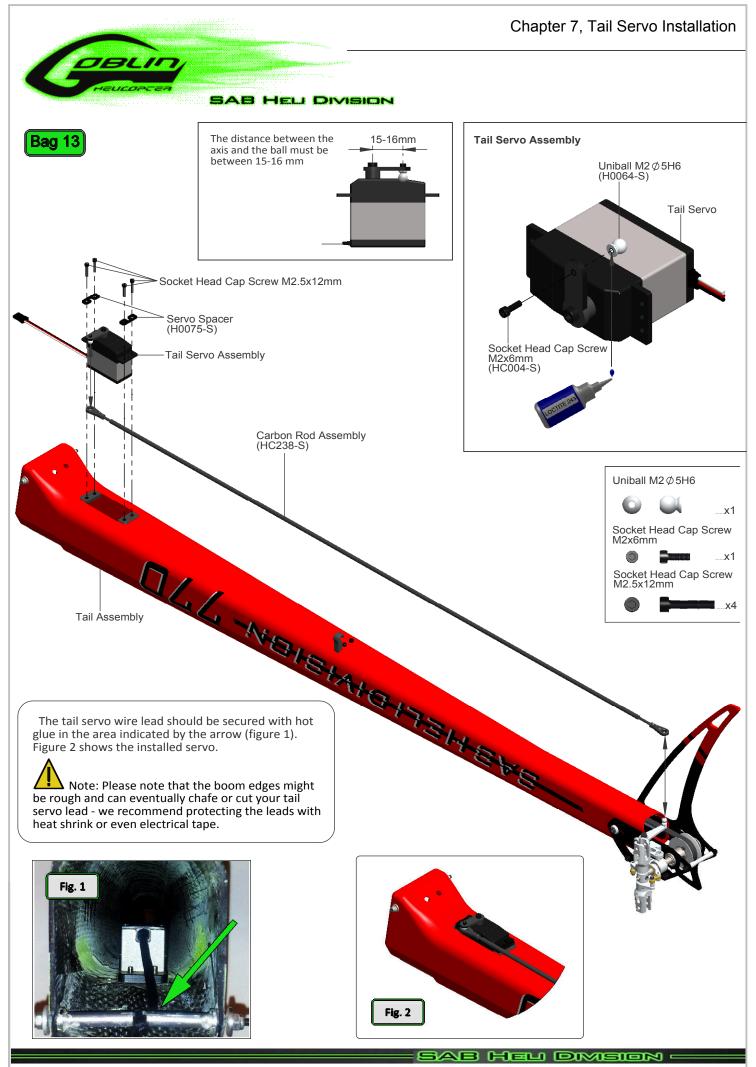




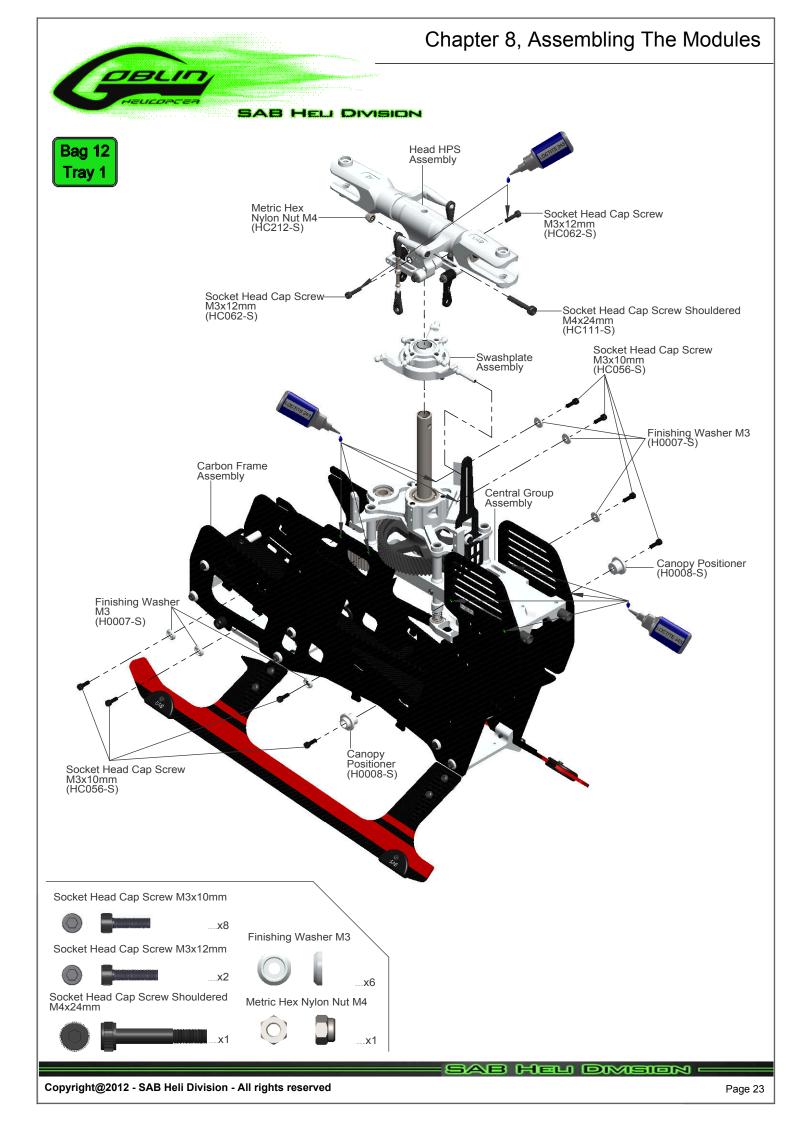








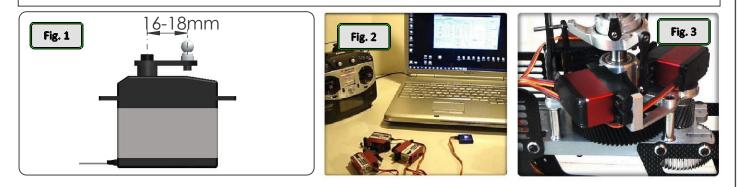
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INSTALLATION OF SWASHPLATE SERVOS

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



Assembly of the Ball on the Horn.

Fig. 4

Servo 2

Bag 13

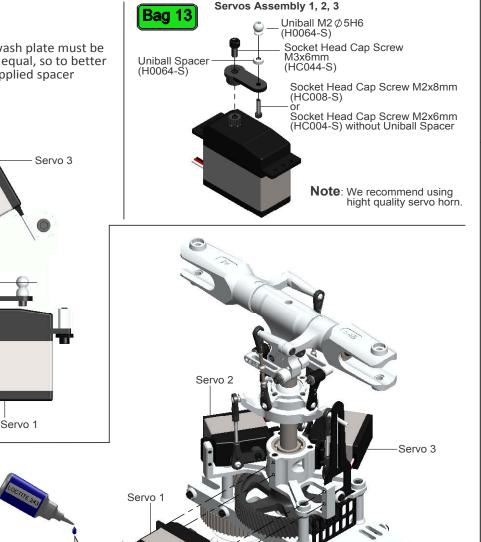
The rods going from the servos to the swash plate must be as vertical as possible. Not all servos are equal, so to better align them you can choose to use the supplied spacer H0031. Figure 4 illustrates this.

000

Socket Head Cap

Screw M2.5x8mm (HC020-S)

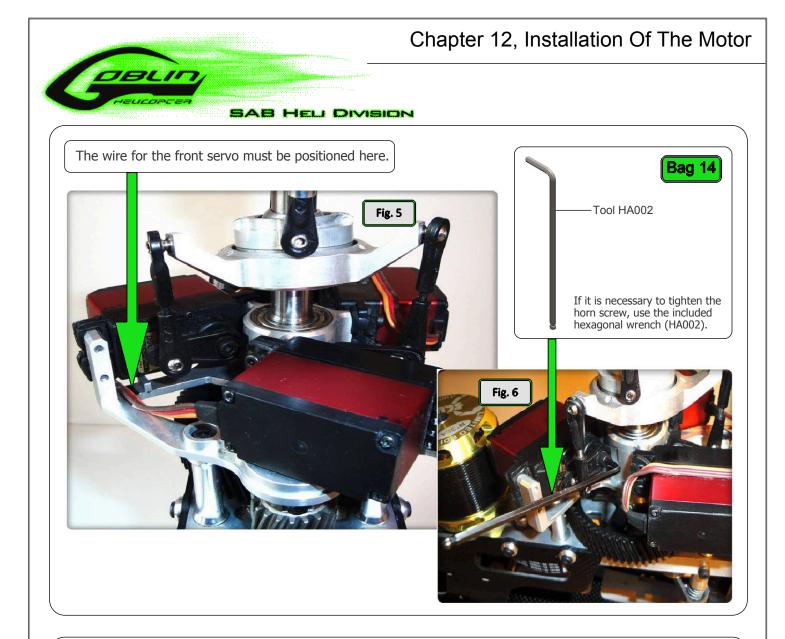
> Socket Head Cap Screw M2.5x12mm (HC026-S)

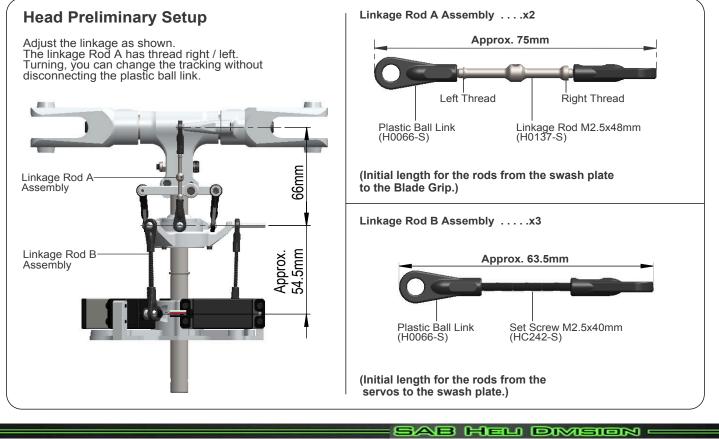




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-Servo Spacer (H0075-S)





Chapter 10, Installation Of The ESC



DE-BURR THE SIDE FRAMES

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

ESC INSTALLATION

There are two mounting options:

Mount using part # H0004 (ESC Aluminum Support) Typically used for Kontronik Jive 120. The speed controller is placed on top of the aluminum support. (Fig. 1)

Mount using part #H0153 (ESC Carbon Support) (Fig. 2) Typically used for ESCs with aluminum cases, such as Kontronik Kosmik (Fig. 3). The speed controller is attached under the carbon fiber plate.

A heat sink upgrade is available for the YGE 160 controller (Part #H0165-S) (Fig. 4)

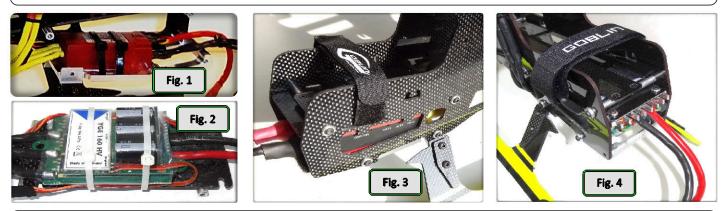
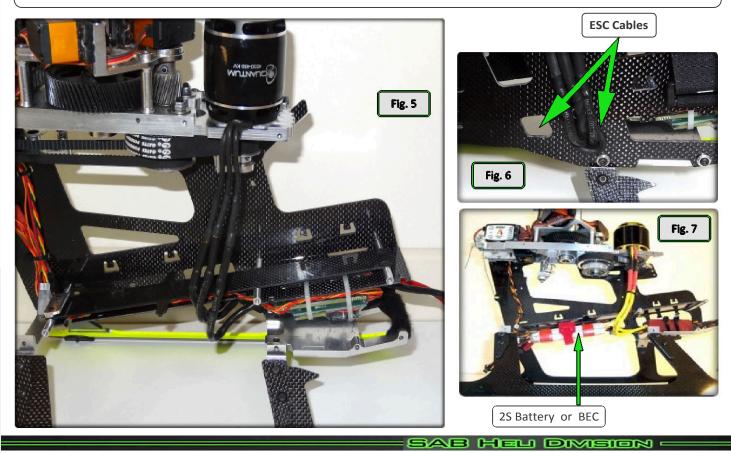


Figure 5: Shows the wiring which connects the receiver and ESC (in this picture one frame has been removed). If the BEC used is combined with the ESC, it is recommended to use a dual wire connection.Figure 6: The passage of the controller wires to the motor is highlighted.

- Figure 6: The passage of the controller wires to the motor is highlighted.
- **Figure 7**: Shows the installation of a 2S battery for the flight control system. Alternatively, a BEC could be placed in the same area.



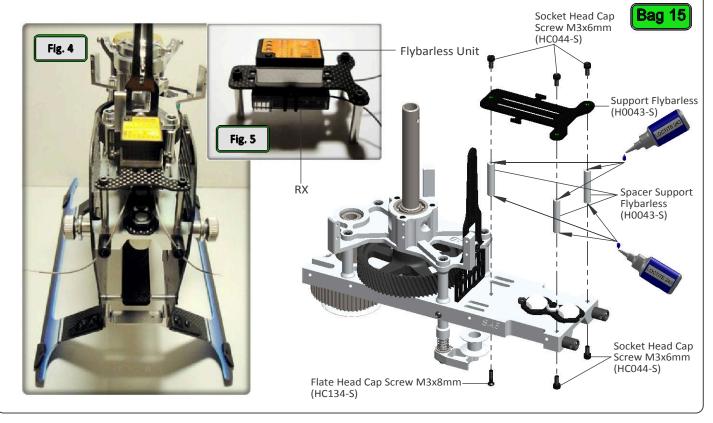


FLYBARLESS CONTROL UNIT AND RX INSTALLATION

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

<image><image><image><image>

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



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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 **215** teeth for the main gear (this takes into account the two stage reduction) and the tooth count of your pulley as the pinion count.

Below is a list of available reduction ratios:

H0015-18-S - 18T Pinion = ratio 11.93:1	H0015-22-S - 22T Pinion = ratio 9.75:1
H0015-19-S - 19T Pinion = ratio 11.3:1	H0015-23-S - 23T Pinion = ratio 9.35:1
H0015-20-S - 20T Pinion = ratio 10.75:1	H0015-24-S - 24T Pinion = ratio 8.95:1
H0015-21-S - 21T Pinion = ratio 10.25:1	H0015-26-S - 26T Pinion = ratio 8.25:1
H0015-xx-S is a motor pulloy for 6mm motor shaft	

H0015-xx-S is a motor pulley for 6mm motor shaft Avaible also H0126-xx-S, motor pulley for 8mm motor shaft.

Some example configurations:

GOBLIN 770 CONFIGURATIONS									
Rev 01									
Performance	Battery	Motor	ESC	Pinion	Gov	RPM Max	Pitch		
GENERAL	12S 5000/5500	Scorpion HK 5025-440	Ice 120 HV (V2)	22T	SET RPM	1820	± 12.5		
			Jive 120 HV YGE 160HV	21T	Gov @80%	1820	± 12.5		
		Quantum 4530-500	Ice 120 HV (V2)	20T	SET RPM	1850	<u>+</u> 12.5		
			Jive 120 HV YGE 160HV	19T	Gov @80%	1850	± 12.5		
		Kontronik	Ice 120 HV (V2)	19T	SET RPM	1820	<u>+</u> 12.5		
		Pyro 700-520	Jive 120 HV YGE 160HV	18T	Gov @80%	1820	± 12.5		
3D	12S 5000/5500	Scorpion HK 4525-520	Ice 120 HV (V2)	21T	SET RPM	2000	± 12.5		
			Jive 120 HV YGE 160HV	20T	Gov @75%	2000	± 12.5		
		Quantum	Ice 120 HV (V2)	21T	SET RPM	2000	<u>+</u> 12.5		
		4530-500 Scorpion 4530-500	Jive 120 HV YGE 160HV	20T	Gov @80%	2000	± 12.5		
		Kontronik	Ice 120 HV (V2)	22T	SET RPM	2000	± 12.5		
		Pyro 800-48	Jive 120 HV YGE 160HV	21T	Gov @80%	2000	± 12.5		
	14S 5000/5500	Scorpion HK 5025-440	YGE 160HV	21T	SET RPM	2000	<u>+</u> 12.5		
			KOSMIK 160	20T	Gov @75%	2000	± 12.5		
3D HARD 3D	14S 5000/5500	Quantum 4530-450 Scorpion 4530-450	YGE 160HV KOSMIK 160	20T	Gov @80%	2050	<u>+</u> 12.5		
		Kontronik Pyro 800-48	YGE 160HV KOSMIK 160	20T	Gov @75%	2100	± 12.5		
		Quantum HK 5330-450	YGE 160HV KOSMIK 160	21T	Gov @75%	2100	± 12.5		

Note: Although the Goblin can fly at high rpm, for safety reasons we suggest to not exceed 2000 rpm.

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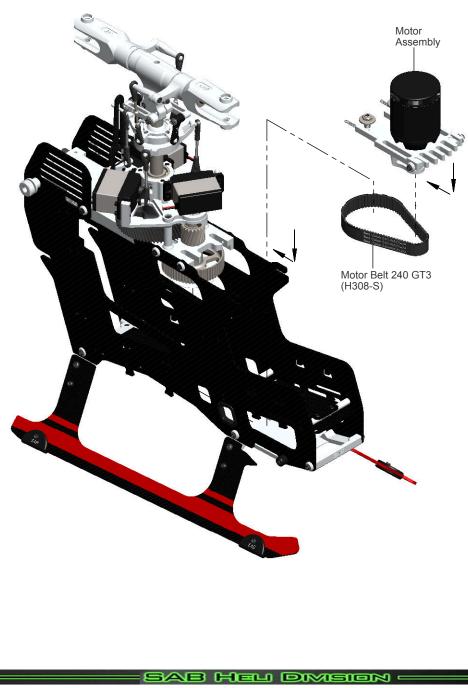


MOTOR BELT TENSION

- *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.

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











TAIL BELT TENSION

*Check the proper assembly of the tail boom.

- *Check that the aluminum part of the tube is against the M3 stop screw.
- *Loosen the tail group by loosening the 4 M3 screws. *Install the belt onto the pulley, taking care to respect the direction of rotation (figure 1).
- *Rotate the tail drive several times by hand. *Load the spring by 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 it is possible to remove the pulley H0016-S without loosening the tail unit. Remove the locking screw and pull down.



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BATTERIES

The battery tray system in the Goblin 770 is simple, but very effective. The battery should be attached to the tray (Part **H0149**) with heat shrink, tape or velcro. You can optionally use the battery protection tray (Part **H0151**) see **Fig. 1, 2**. Before permanently mounting the batteries onto the battery tray, check the ideal position for the best center of gravity. Cut the heat shrink around the carbon fiber tray locking pins. Fig. 3.

Battery Pack:

Slide the tray until it locks into the CNC stopper. **Fig. 4, 5**. Using the velcro straps, making sure that the two locking pins are stopped against the frame spacer (Part1**#H0003** and **#H0151**) **Fig.6, 7**.



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Chapter 14, Battery



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 [< 1800 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 [H0154-S].

Goblin 770 uses the HPS head.

The dampening system of this head allows for a wide range of head speeds to be used without sacrificing safety.

The dampers are composed of an o-ring and a technopolymer damper that defines the maximum possible movement of the spindle. The model response with change based on the preload, less preload (less shims) will allow for a softer feel and lower head speed, a high preload is used for hard 3D flight.

To increase the preload, you can add an additional 0.2mm shim on each side, to decrease the repload, you can remove a 0.2mm shim on each side. It is important that the blade grips do not have the axial play so you must always keep the 1mm shim on each side regardless.

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 Chapter 16, Maintenance

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.

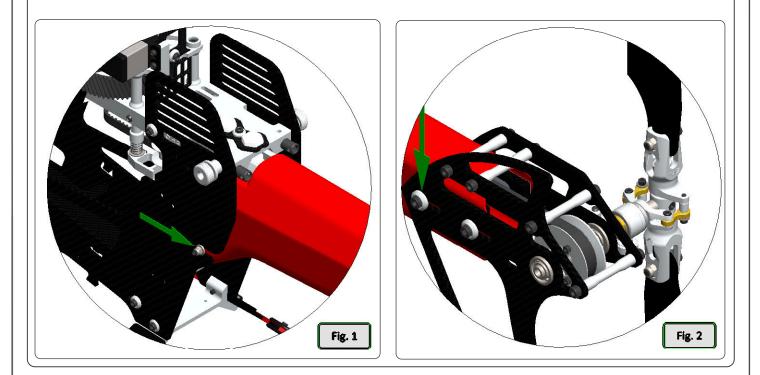
*Periodically lubricate the tail slide movement and its linkages as well as the swashplate movement and its linkages.

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

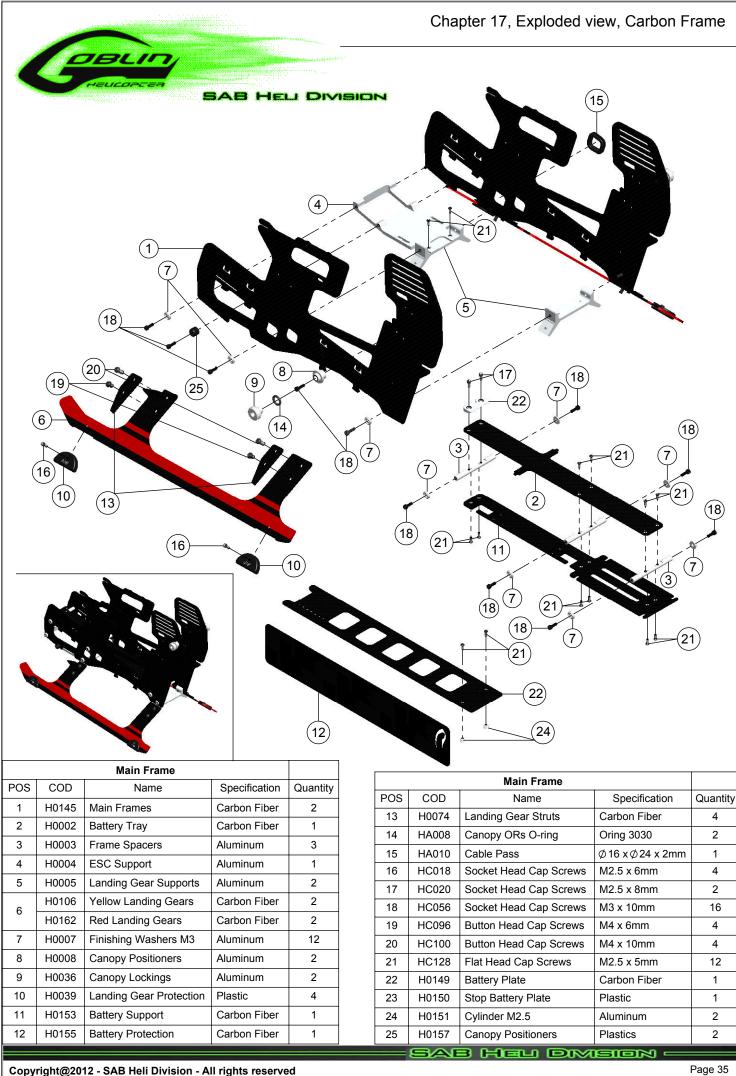
*Check the screws that are highlighted in the following images frequently, make sure you remain tight (fig.1 and fig.2).

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

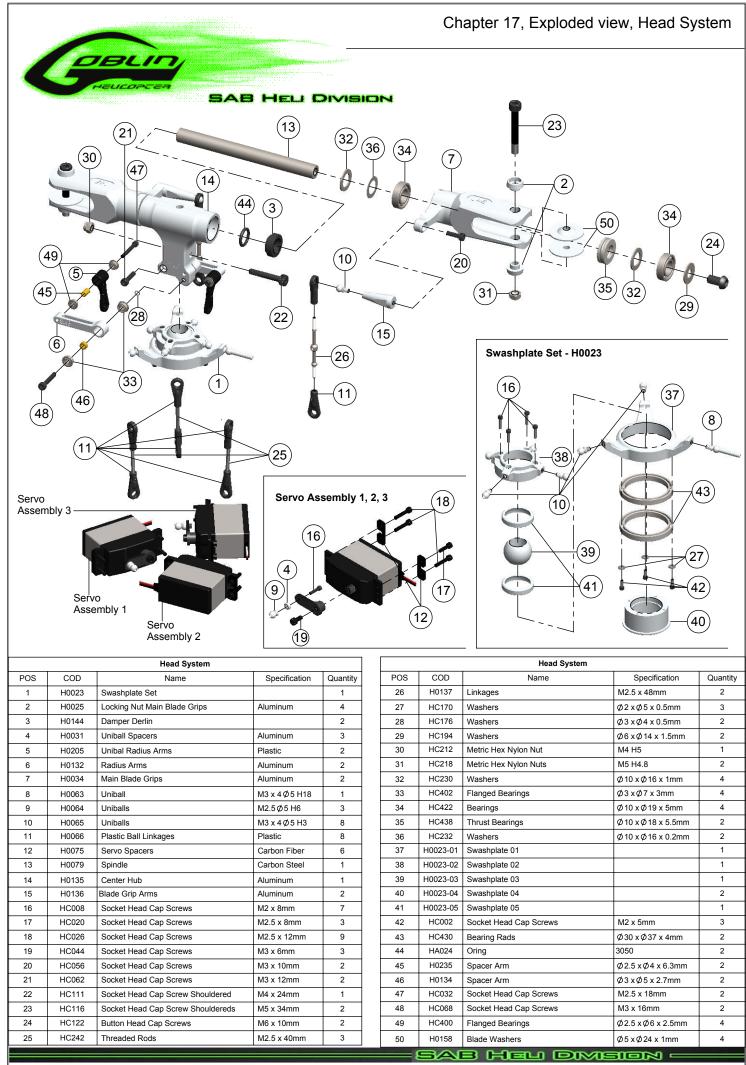
- * The maintenance of proper belt tension.
- * The proper isolation of wires from the carbon and aluminum parts.
- * That all screws remain tight.

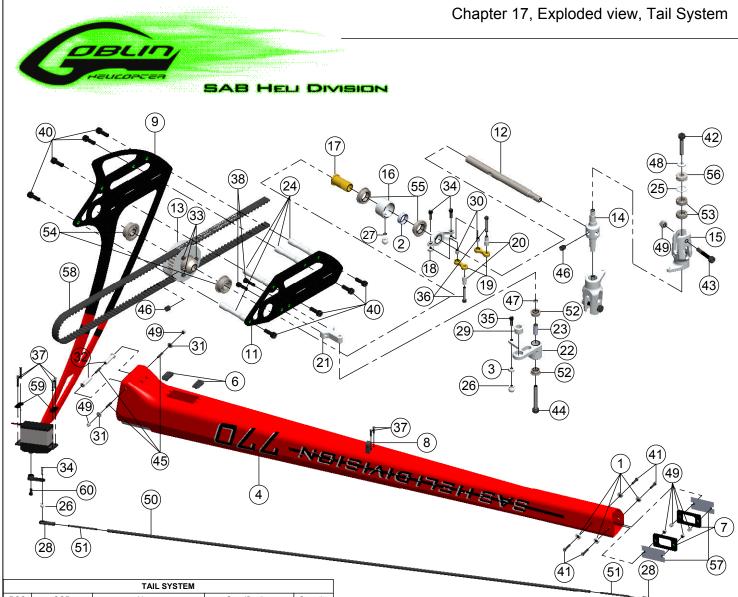


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	E	BLIM							
AB Hel DMBCN 40 12 40 60 <									
POS	COD	TRANSMISSION ASSEME Name	BLY Specification	Quantity	(13)	(31)	(39)	4	
1	H0007	Finishing Washers M3	Aluminum	4	POS	COD	TRANSMISSION ASSEMBLY Name	Specification	Quantity
2	H0009 H0010	Main Structure Servo Support	Aluminum	1	32	HC092	Socket Head Cap Screw	M3 x 50mm	Quantity 1
4	H0010	Motor Support	Aluminum	1	33	HC098	Button Head Cap Screws	M4 x 8mm	4
5	H0012	Main Gear	68T M1	1	34	HC111	Socket Head Cap Screw Shouldered	M4 x 24mm	1
6	H0156	Drive Pinion	19T M1	1	35	HC128	Flat Head Cap Screws	M2.5 x 5mm	3
7	H0104	Pulley	60T	1	36	HC134 HC152	Flat Head Cap Screw Set Screws	M3 x 8mm M4 x 4mm	1
8	H0015-20	Pulley	20T	1	37	HC152 HC158	Set Screws	M4 x 4mm M5 x 20mm	2
9	H0101	Pulley	37T	1	39	HC164	Vite Nylon Esa	M8 x 14mm	2
10 11	H0152 H0018	Swash plate Anti-Rotation Guide Columns	Carbon Fiber Aluminum	1	40	HC176	Washer	Ø3 x Ø4x0.5mm	1
12	H0018	Bush-One Ways	Ø10 x Ø13 x 1.4mm	2	41	HC180	Washers	Ø3.2 xØ6 x 0.5mm	2
13	H0121	M4 Locking Collar	Aluminum	1	42	HC188 HC200	Washers Metric Hex Nulon Nuts	Ø5.3 x Ø15 x 1mm	2
14	H0127	Main Shaft	Carbon Steel	1	43	HC200 HC206	Metric Hex Nylon Nuts Metric Hex Nylon Nuts	M2.5 H3.5mm M3 H4mm	1
15	H0157	Secondary Shaft	Carbon Steel	1	45	HC212	Metric Hex Nylon Nuts	M4 H5mm	2
16	H0024	Main Shaft Bearing Support	Aluminum	1	46	HC218	Metric Hex Nylon Nuts	M5 H4.8mm	2
17	H0038	Safety Locking Tail Boom	Carbon Fiber	1	47	HC224	Metric Hex Nuts Low	M8 H6.5mm	2
18 19	H0043 H0050	Spacers Flybarless Antenna Guide	Aluminum Plastic	3	48	HC308	Belt Gates	240-3MGT-13	1
20	H0050 H0069	Tail Belt Idler	Aluminum	1	49 50	HC310 HC312	Springs	De 5.8-df0.3-LL9 De 8-df0.5-LL8	2
21	H0070	Belt Tensioner Support	Aluminum	1	50	HC312 HC314	Spring Springs	De 8-df0.5-LL8	2
22	H0071	Belt Tensioner Arm	Aluminum	1	52	HC402	Flanged Bearings	Ø3 x Ø7 x 3mm	2
23	H0077	Flybarless Support	Carbon Fiber	1	53	HC410	Flanged Bearings	Ø5 x Ø9 x 3mm	2
24	HC033	Socket Head Cap Screw Shouldereds	M2.5 x 19mm	1	54	HC420	Bearings	Ø10 x Ø15 x 4mm	2
25 26	HC038 HC044	Button Head Cap Screws	M3 x 4mm M3 x 6mm	3 5	55	HC422	Bearings	Ø10 x Ø19 x 5mm	2
26	HC044 HC050	Socket Head Cap Screws Socket Head Cap Screws	M3 x 6mm M3 x 8mm	5	56 57	HC426 HC442	Bearings	Ø12 xØ24 x 6mm Ø10 xØ14 x 12mm	2
27	HC050	Socket Head Cap Screws	M3 x 10mm	4 9	57	HC442 H0142	One Way Bearing Support Bearing	Ø10 xØ14 x 12mm Aluminum	1
				· ·					
20	HC058	Socket Head Cap Screw	M3 x 12mm	1	59	HC082	Socket Head Cap Screw Shouldered	M3 x 20mm	1
			M3 x 12mm M3 x 16mm	1	59 60	HC082 HC414	Socket Head Cap Screw Shouldered Flanged Bearings	M3 x 20mm Ø6 x Ø 13 x 5mm	1
29	HC062	Socket Head Cap Screw							-

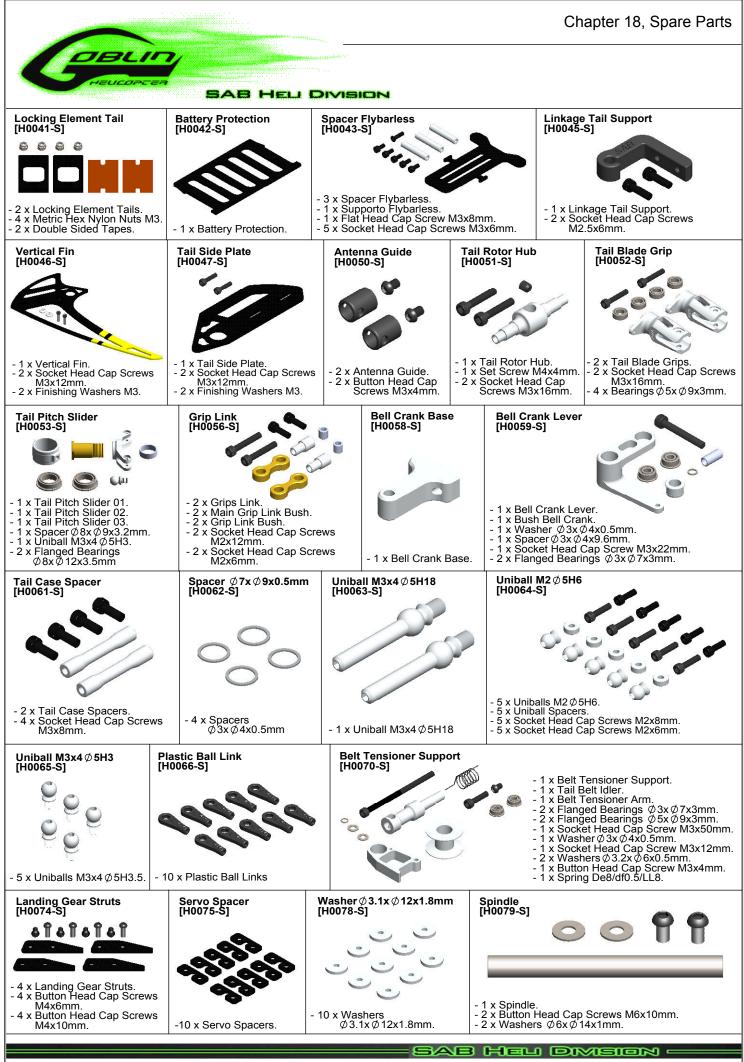




TAIL SYSTEM					
POS	COD	Name	Specification	Quantity	
1	H0007	Finishing Washer M3	Aluminum	4	
2	H0029	Spacer	Ø8.1 xØ9.2 x 3.2mm	1	
3	H0031	Uniball Spacer	Aluminum	1	
4	H0147	Yellow Tail Boom	Carbon Fiber	1	
4	H0163	Red Tail Boom	Carbon Fiber	1	
6	H0040	Tail Servo Locks	Plastic	2	
7	H0041	Locking Element Tails	Carbon Fiber	2	
8	H0045	Linkage Tail Support	Plastic	1	
•	H0046	Yellow Vertical Fin	Carbon fiber	1	
9	H0117	Red Vertical Fin	Carbon fiber	1	
11	H0047	Tail Side Plate	Carbon fiber	1	
12	H0048	Tail Rotor Shaft	Carbon Steel	1	
13	H0155	Tail Pulley	25T	1	
14	H0051	Tail Rotor Hub	Carbon Steel	1	
15	H0052	Tail Blade Grips	Aluminum	2	
16	H0053	Tail Pitch Slider 01		1	
17	H0054	Tail Pitch Slider 02		1	
18	H0055	Tail Pitch Slider 03		1	
19	H0056	Grip Links		2	
20	H0057	Main Grip Link Bushs		2	
21	H0058	Bell Crank Base	Aluminum	1	
22	H0059	Bell Crank Lever	Aluminum	1	
23	H0060	Spacer	Ø3 x Ø4 x 9.6mm	1	
24	H0061	Tail Case Spacers	Aluminum	4	
25	H0062	Spacers	Ø7 x Ø9 x 0.5mm	2	
26	H0064	Uniballs	M2.5Ø5H6	2	
27	H0065	Uniball	M3 x 4 Ø5 H3	1	
28	H0066	Plastic Ball Links	Plastic	2	
29	H0072	Bush Bell Crank		1	
30	H0076	Grip Link Bushs		2	
31	H0078	Washers	Ø3.1 xØ12 x 1.8mm	2	

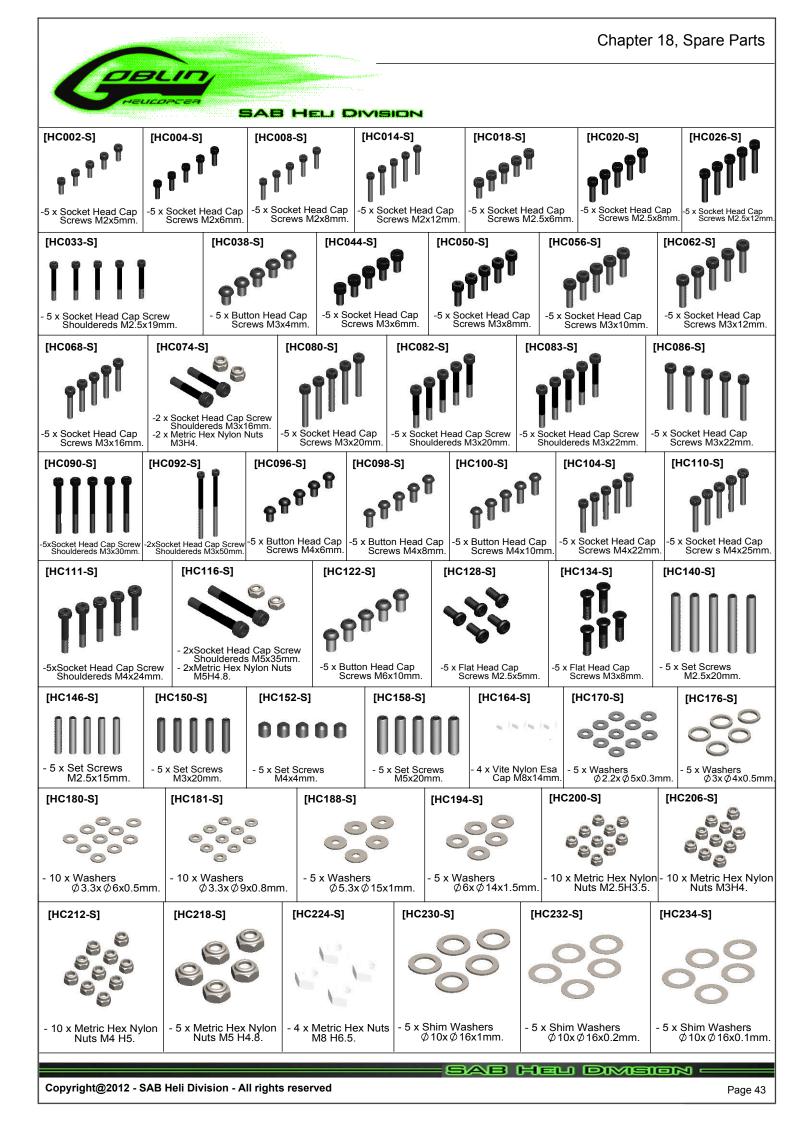
		TAIL SYSTEM		
POS	COD Name		Specification	Quantity
32	H0082	Boom Spacers	Aluminum	2
33	HC002	Socket Head Cap Screws	M2 x 5mm	6
34	HC004	Socket Head Cap Screws	M2 x 6mm	3
35	HC008	Socket Head Cap Screw	M2 x 8mm	1
36	HC014	Socket Head Cap Screws	M2 x 12mm	2
37	HC018	Socket Head Cap Screws	M2.5 x 6mm	2
38	HC020	Socket Head Cap Screws	M2.5 x 8mm	2
39	HC026	Socket Head Cap Screws	M2.5 x 12mm	4
40	HC050	Socket Head Cap Screws	M3 x 8mm	8
41	HC062	Socket Head Cap Screws	M3 x 12mm	4
42	HC068	Socket Head Cap Screws	M3 x 16mm	2
43	HC074	Socket Head Cap Screw Shouldereds	M3 x 16mm	2
44	HC086	Socket Head Cap Screw	M3 x 22mm	1
45	HC150	Set Screws	M3 x 20mm	3
46	HC152	Set Screws	M4 x 4mm	2
47	HC176	Washer	Ø3 x Ø4 x 0.5mm	1
48	HC181	Washers	Ø3.3 x Ø7 x 1mm	2
49	HC206	Metric Hex Nylon Nuts	M3	8
50	HC238	Carbon Rod	Ø2.5 x Ø4 x 752mm	1
51	HC242	Threaded Rods	M2.5 x 40mm	2
52	HC402	Flanged Bearings	Ø3 x Ø7 x 3mm	2
53	HC406	Bearings	Ø5 x Ø9 x 3mm	4
54	HC414	Flanged Bearings	Ø6 x Ø13 x 5mm	2
55	HC418	Flanged Bearings	Ø8 x Ø12 x 3.5mm	2
56	HC434	Thrust Bearings	Ø4 x Ø9 x 4mm	2
57	HA015	Double-Sided Tapes		2
58	HC325	Belt Gates	2160-3MGT-06	1
59	H0075	Servo Spacers	Carbon Fiber	2
60	HC044	Screw supplied with Servo	M3 x 6mm	1
	SA	B Heli Dimi		

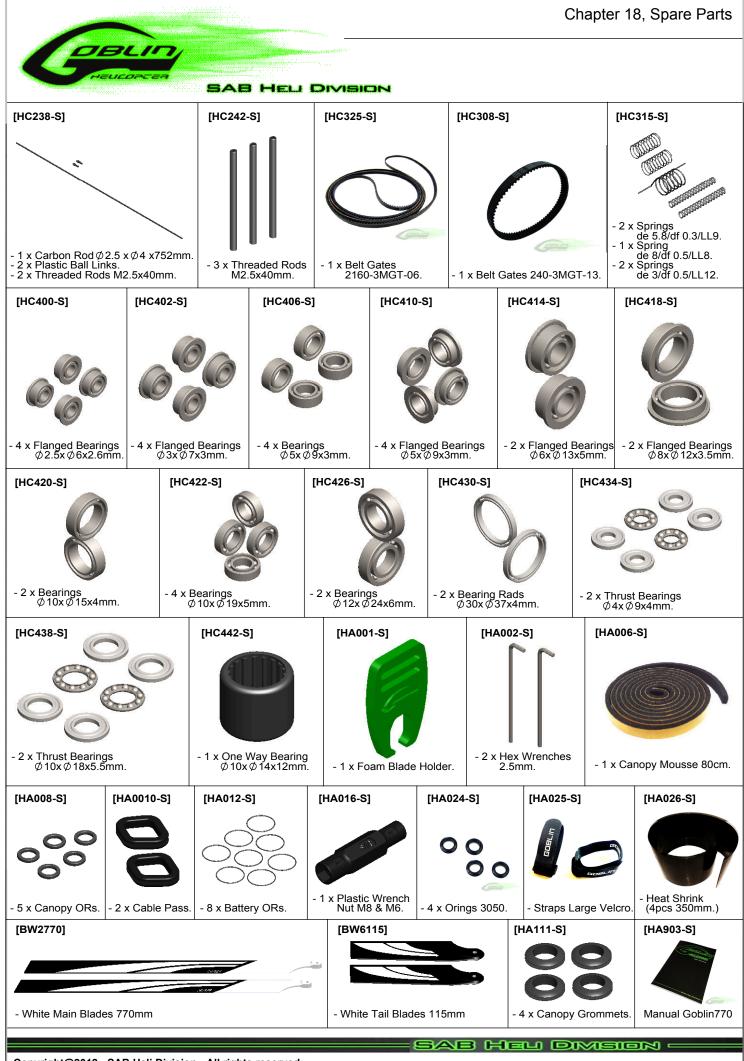












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