Goblin Thunder Sport
Release 1.0 - September 2017

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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.

VERY IMPORTANT

In the Manual bag you will find a product card your with serial number. 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 issues arising with your model and will not provide support unless you register your serial number.

The Serial number is also engraved in the Aluminum Main Plate.

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

SAB Heli Division

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SPECIFICATIONS

Main rotor diameter: 1548mm (with 690mm Blades)
Tail rotor diameter: 305mm (with 115mm Tail Blades)
Air frame weight: 2670g
Motor size: Maximum 64mm diameter, maximum height 64mm.
Battery compartment: 60x38x350mm.
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:

- **Important**
- Bag xx Indicates that for this assembly phase you need materials that are in bag xx.

- Use retaining compound (SAB HA115-S)
- Use Thread Locker Medium Strength (SAB HA116-S)
- Use CA Glue
- Use Proper Lubricant
ADDITIONAL COMPONENTS REQUIRED

*690-710mm Main Blade.
*105-115mm Tail Blade.
*Electric Motor: 125 – 480/600Kv
  Maximum diameter 64mm,
  Maximum height 64mm,
  Pinion shaft diameter 6/8mm
*Speed controller: minimum 120A to be safe
*Batteries: 125 – 3700/5500mAh
*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)

Inside the main box there are:

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 assembly process is described in the following chapters. Each chapter provides you with the box, bag and/or foam tray numbers you will need for that chapter. The information is printed in a green box in the upper right hand corner of the page at the beginning of every chapter.
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 4, Carbon Frame

Left Main Frame Assembly

Note:
You can use Super Glue to lock the nuts in correct position.

Right Main Frame Assembly

Plastic Landing Gear Assembly

Note:
You can use Super Glue to lock the nuts in correct position.
Chapter 4, Carbon Frame

- **Plastic Landing Gear Assembly**
- **Set Screw M4x4mm (HC152-S)**
- **Set Screw M4x4mm (HC152-S)**
- **Use This Hole**
- **Use This Hole**
- **Finishing Washer M3 (H0007-S)**
- **Finishing Washer M3 (H0007-S)**
- **Socket Head Cap Screws M3x14mm [HC064]**
- **Socket Head Cap Screws M3x14mm [HC064]**

**BAG 1.3**
Chapter 5, Transmission Assembly
Chapter 5, Transmission Assembly

Note:

- Bearing Ø12xØ24x6mm (HC426-S)
- Bearing Support Assembly (H0024-S) - Already Assembled
- Flat Head Cap Screw M2.5x5mm (HC128-S)
- Socket Head Cap Screw M3x10mm (HC056-S)
- Flat Head Cap Screw M2.5x5mm (HC128-S)
- Socket Head Cap Screw M3x10mm (HC056-S)
- Socket Head Cap Screw M3x10mm (HC056-S)
- Column (H0018-S)
- Bearing Ø10xØ19x5mm (HC422-S) - Already Assembled
- Button Head Cap Screw M3x4mm (HC038-S)
- Swash plate Anti-Rotation Guide (H0017-S)
- Finishing Washer M3 (H0007-S)
- Socket Head Cap Screw M3x8mm (HC050-S)
- Main Structure (H0009-S)
- Socket Head Cap Screw M3x10mm (HC056-S)
- Bearing Ø12xØ24x6mm (HC426-S) - Already Assembled
- Button Head Cap Screw M3x4mm (HC038-S)
**Chapter 5, Transmission Assembly**

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

It is very important to lubricate these two elements with a lubricant (Dry Fluids Gear or similar).

---

**60T Pulley Assembly (H0171-S)**

- Bearing Ø 10x Ø 15x4mm (HC420-S)
- One Way Bearing Ø 10x Ø 14x12mm (HC442-S)
- Bearing Ø 10x Ø 15x4mm (HC420-S)

**Front Tail Pulley Assembly (H0172-S)**

- Socket Head Cap Screw M2x10mm (HC110-S)
- Metric Hex Nylon Nut M3 (HC206-S)
- 19T Drive Pinion (H0156-S)

**Main Structure Assembly 1**

- Main Gear (H0405-S)
- 60T Pulley (H0171-S)
- 37T Pulley (H0172-S)

**Secondary Shaft (H0157-S)**

- M4 Locking Collar (H0121-S)
- Metric Hex Nylon Nut M4 (HC212-S)

---

**Note:** Correct insertion of the one-way pulley

---

**Main Shaft (H0122-S)**

- Metric Hex Nylon Nut M3 (HC206-S)
- 19T Drive Pinion (H0156-S)

---

**Front Tail Pulley Assembly (H0172-S)**

- Socket Head Cap Screw M2x10mm (HC110-S)
- Metric Hex Nylon Nut M3 (HC206-S)

**Secondary Shaft (H0157-S)**

- 19T Drive Pinion (H0156-S)
- Main Gear (H0405-S)

---

**Socket Head Cap Screw Shouldered M3x18mm (HC079-S)**

- Dry Fluids

---

**Socket Head Cap Screw Shouldered M4x24mm (HC111-S)**

- Dry Fluids

---

**Socket Head Cap Screw M4x22mm (HC104-S)**

- Metric Hex Nylon Nut M4 (HC212-S)

---

**60T Pulley Assembly (H0171-S)**

- Bearing Ø 10x Ø 15x4mm (HC420-S)
- One Way Bearing Ø 10x Ø 14x12mm (HC442-S)
- Bearing Ø 10x Ø 15x4mm (HC420-S)

**Front Tail Pulley Assembly (H0172-S)**

- Socket Head Cap Screw M2x10mm (HC110-S)
- Metric Hex Nylon Nut M3 (HC206-S)

**Secondary Shaft (H0157-S)**

- M4 Locking Collar (H0121-S)
- Metric Hex Nylon Nut M4 (HC212-S)

---

**Note:**
Put a small amount of grease every 30/40 flights on the main gear (for example Tri-flow Synthetic grease).

The perfect play is 0.5mm add or remove shim for this.

---

**Chapter 5, Transmission Assembly**

**BAG 3**
**Note:** Position without preload. Insert the screw in the hole through the aluminum support as in the picture.
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 cut-off disc.

Additionally, ensure the motor shaft has an appropriate ‘flat’ for one of the set screws.
**Uniball Arm Assembly**  ... x2

- Flanged Bearing Ø 2.5x Ø 6x2.5mm (HC400-S)
- Uniball Radius Arm [H0205]
- Washer Ø 3x Ø 4x0.5mm (HC176-S)
- Radius Arm Assembly
- Socket Head Cap Screw M3x16mm (HC068-S)
- Socket Head Cap Screw M2.5x18mm (HC032-S)
- Socket Head Cap Screw M3x16mm (HC068-S)
- Uniball Arm Assembly
- Spacer Arm Ø 2.5x Ø 4x6.3mm [H0253]

**Radius Arm Assembly**  ... x2

- Flanged Bearing Ø 3x Ø 7x3mm (HC402-S)
- Radius Arm (H0132BM-S)
- Washer Ø 3x Ø 5x2.7mm [H0134]
- Radius Arm Assembly
- Bearing Ø 10x Ø 19x5mm (HC422-S)
- Washer Ø 6x Ø 14 x1.5mm (HC194-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)

**Center Hub Assembly**

- Center Hub (H0135BM-S)
- Oring (HA024)
- Damper Derlin (H0426-B)
- Center Hub Assembly
- Washer Ø 3x Ø 5x2.7mm [H0134]
- Spacer Arm Ø 3x Ø 5x2.7mm [H0134]

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

- Blade Grip (H0719BM-S)
- Blade Grip Arm (H0183BM-S)
- Bearing Ø 10x Ø 19x5mm (HC422-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Socket Head Cap Screw M4x10mm (HC102-S)
- Linkage Rod Assembly
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 6x Ø 14 x1.5mm (HC194-S)
- Linkage Rod M3x50mm (H0417-S)
- Plastic Ball Link (H0402-S)

**Main Blade Grip Assembly**

- Main Blade Grip Assembly
- Linkage Rod Assembly
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 10x Ø 16x1mm (HC230-S)
- Washer Ø 6x Ø 14 x1.5mm (HC194-S)

**Note:**
The HPS head should be assembled with one, 1mm shim (HC230) and one, 0.2mm shim (HC232) on each side. The blade grips must move freely, but they should not move just under their own weight. If the blade grips are too tight, you can remove the 0.2mm shim (HC232) from each side. After approximately 10/20 flights, please check preload, you can add one or two 0.2mm shim (HC232) if preload has changed.

**Approx 76.6mm**

(Initial length for the rods from the swashplate to the Blade Grip.)
Chapter 7, Assembling The Modules

Note:
Use Loctite in all Screw

eg: Microlube GL261
**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.**

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 ASSEMBLY 1, 2, 3**

- Uniball M2 ⌀ SH6 (H0064-S)
- Socket Head Cap Screw M2x8mm (HC004-S) or Socket Head Cap Screw M2x6mm (HC004-S) without Uniball Spacer
- Uniball Spacer [H0031] (H0064-S)
- Socket Head Cap Screw M3x6mm (HC044-S) or Socket Head Cap Screw M2x6mm (HC008-S) without Uniball Spacer
- Socket Head Cap Screw M2.5x12mm (HC020-S)
- Servo 1
- Servo 2
- Servo 3
- Servo Spacer (H0075-S)
- Servo 1
- Servo 2
- Servo 3

---

**Chapter 8, Installation Of Swashplate Servos**
Head HPS Version Preliminary Setup

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

---

**Linkage Rod A Assembly**  ... x2

- Approx 76.6mm
- Plastic ball link (H0402-S)
- Linkage Rod (H0417-S)
- Plastic ball link (H0402-S)

Initial length for the rods from the swashplate to the blade grips.

---

**Linkage Rod B Assembly**  ... x3

- Approx. 49 mm
- Set Screw M2.5x18mm (HC140-S)
- Plastic ball link (H0066-S)
- Plastic ball link (H0066-S)

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

---

The wire for the front servo must be positioned here.
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:

<table>
<thead>
<tr>
<th>Reduction Ratio</th>
<th>Pinion</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0175-18-S - 18T</td>
<td>Pinion = ratio 11.9:1</td>
<td></td>
</tr>
<tr>
<td>H0175-19-S - 19T</td>
<td>Pinion = ratio 11.3:1</td>
<td></td>
</tr>
<tr>
<td>H0175-20-S - 20T</td>
<td>Pinion = ratio 10.7:1</td>
<td></td>
</tr>
<tr>
<td>H0175-21-S - 21T</td>
<td>Pinion = ratio 10.2:1</td>
<td></td>
</tr>
<tr>
<td>H0175-22-S - 22T</td>
<td>Pinion = ratio 9.8:1</td>
<td></td>
</tr>
<tr>
<td>H0175-23-S - 23T</td>
<td>Pinion = ratio 9.3:1</td>
<td></td>
</tr>
<tr>
<td>H0175-24-S - 24T</td>
<td>Pinion = ratio 8.9:1</td>
<td></td>
</tr>
<tr>
<td>H0175-25-S - 25T</td>
<td>Pinion = ratio 8.6:1</td>
<td></td>
</tr>
</tbody>
</table>

Some example configurations:

GOBLIN THUNDER SPORT CONFIGURATIONS

<table>
<thead>
<tr>
<th>Battery</th>
<th>Motor</th>
<th>ESC</th>
<th>Pinion ( a, b, c )</th>
<th>RPM Max ( a, b, c )</th>
<th>Pitch</th>
</tr>
</thead>
<tbody>
<tr>
<td>12S 4200/5500 mAh</td>
<td>Xnova 4530-525</td>
<td>CC Edge HV 160 HW-160A-V4</td>
<td>22T / 23T / 24T</td>
<td>2100/2200/2300</td>
<td>± 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kosmik 160</td>
<td>21T / 22T / 23T</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Scorpion HKIII 4525-520</td>
<td>CC Edge HV 160 HW-160A-V4</td>
<td>22T / 23T / 24T</td>
<td>2100/2200/2300</td>
<td>± 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kosmik 160</td>
<td>21T / 22T / 23T</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Kontronik Pyro 800-480</td>
<td>CC Edge HV 160 HW-160A-V4</td>
<td>23T / 24T</td>
<td>2100/2200/2300</td>
<td>± 13</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Kosmik 160</td>
<td>22T / 23T / 24T</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**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.

**Note:**

Check for vertical alignment of the motor pulley. To do this, simply turn the motor several times and check to see if the belt is aligned with the big pulley (one way bearing pulley). If the belt is riding too high, simply loosen up the motor pulley and drop it just a little bit, if it is riding too low, loosen up the motor pulley and raise it a bit.
DE-BURR THE SIDE FRAMES

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

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.

Figure 2: Show the installation of the ESC.

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

Route the ESC throttle wire as shown, it is recommended to use cable ties to keep the wire in place. This is very important near the tail belt.
Chapter 11, Installation Of Flybarless Unit and RX

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.

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

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 Rotor Hub Assembly**

- Tail Shaft (H0325-S)
- Oring (HC33S-S)
- Flanged Bearing Ø8xØ12x3.5mm (HC413-S)
- Spacer Ø8.1xØ9.2x3.2mm (H0029)

**Tail Pitch Slider Assembly**

- Flanged Bearing Ø8xØ12x3.5mm (HC413-S)
- Tail Pitch Slider 01 (H0055BM)
- Tail Pitch Slider 02 (H0407-S)
- Tail Pitch Slider 03 (H0054)

**Tail Pitch Slider Link Assembly**

- Tail Pitch Slider Assembly
- Spindle Shaft (H0329-S)
- Oring (HC33S-S)
- Flanged Bearing Ø8xØ12x3.5mm (HC413-S)
- Spacer Ø8.1xØ9.2x3.2mm (H0029)

**Note:**

- It is a 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.

**Bag 10**
Note: The set screw should align with the hole in the tail shaft.
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.
In this way when you will assemble the tail servo it will be easier to tighten the screws into the plastic parts.
Check the tail servo can fit, if necessary carefully sand the hole.

DETAIL B

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

DETAIL C

Double Sided Tape

Locking Element Tail Assembly

Already Assembled

Locking Element Tail (H0041-S)

Metric Hex Nylon Nut M3 (HC206-S)

Note:
Note: Before put plastic ball in threaded rod, please wait 12 hours after bonding.
The distance between the axis and the ball must be between 15-16 mm.

**Note:** Please note that the boom edges might be rough and can eventually chafe or cut your tail servo lead - we recommend protecting the leads with heat shrink or even electrical tape.
Chapter 13, Installation Of The Boom

**BOOM ASSEMBLY**

*Insert the tail boom assembly.*
*Lock the M8 nuts with the HA016 special tool supplied.*
*Firmly lock the lateral screws M3x12mm. Use Loctite 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.*

---

**Note:** Between the boom and the aluminum plate, there is a space of around 0.75mm. Look the picture.
**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, 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 a bit smaller. You can enlarge the hole slightly to optimize the vertical position of the canopy itself.

The canopy is locked at the point shown in figure 8 and with two H0036 knobs Fig.9. Confirm the canopy is secure prior to each flight.
BATTERIES

The battery tray system in the Goblin 700 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.

Note: Using sandpaper, sand the slot where you insert the battery strap. This helps increase the life of the strap.
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, 1800 RPM. After this first flight, do a general check of the helicopter. Verify that all screws are correctly tightened.

IN FLIGHT

During its first flights the Goblin has to be “run in”. The Damper, the main gear, the uniball and other parts must undergo some slight wear to operate smoothly. It is likely that during the very first flights the model may exhibit a swaying phenomena, particularly at low head speed. This phenomena disappears after a few flights.

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

However, if you prefer flying at low speed [< 2100 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-B. (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.
**Battery Tray [H0002-S]**
- 1 x CF Battery Tray.
- 6 x Flat Head Cap Screws M2.5x5mm.

**Frame Spacer [H0003-S]**
- 3 x Frame Spacers.

**Finishing Washer M3 [H0007-S]**
- 10 x Finishing Washers M3.

**Main Structure [H0009-S]**
- 1 x Main Structure.

**Servo Support [H0010-S]**
- 1 x Servo Support.

**Swashplate Anti-Rotation Guide [H0017-S]**
- 1 x CF Swashplate Anti-Rotation Guide.
- 1 x Finishing Washer M3.
- 1 x Socket Head Cap Screw M3x6mm.

**Column [H0018-S]**
- 4 x Columns.

**Bearing Support [H0024-S]**
- 1 x Bearing Support.
- 1 x Bearing Ø12xØ24x6mm.
- 3 x Flat Head Cap Screws M2.5x5mm.

**Safety Lock Tail Boom [H0038-S]**
- 1 x Safety Lock Tail Boom.
- 1 x Finishing Washer M3.
- 1 x Socket Head Cap Screw M3x6mm.

**Tail Servo Lock [H0040-S]**
- 2 x Tail Servo Locks.
- 4 x Socket Head Cap Screws M2.5x12mm.

**Locking Element Tail [H0041-S]**
- 2 x Locking Element Tails.
- 4 x Metric Hex Nylon Nuts M3.
- 2 x Double Sided Tapes.

**Spacer Flybarless [H0043-S]**
- 3 x Spacer Flybarless.
- 1 x Supporto Flybarless.
- 3 x Flat Head Cap Screw M3x8mm.
- 5 x Socket Head Cap Screws M3x6mm.

**Linkage Tail Support [H0045-S]**
- 1 x Linkage Tail Support.
- 2 x Socket Head Cap Screws M2.5x6mm.

**Antenna Guide [H0050-S]**
- 2 x Antenna Guide.
- 2 x Button Head Cap Screws M3x4mm.

**Aluminum Bell Crank Base (H0058BM-S)**
- 1 x Aluminum Bell Crank Base.
- 4 x Socket Head Cap Screws M3x4mm.

**Tail Case Spacer [H0061-S]**
- 2 x Tail Case Spacers.
- 4 x Socket Head Cap Screws M3x8mm.

**Uniball M3x4 5H18 [H0063-S]**
- 2 x Uniball M3x4 5H18.
- 5 x Uniballs M2 5H6.
- 5 x Uniball Spacers.
- 5 x Socket Head Cap Screws M2x8mm.
- 5 x Socket Head Cap Screws M2x6mm.

**Uniball M2 5H6 [H0064-S]**
- 5 x Uniballs M2 5H6.

**Uniball M3x4 5H3 [H0065-S]**
- 5 x Uniballs M3x4 5H3.5.

**Plastic Ball Link [H0066-S]**
- 10 x Plastic Ball Link.
### Chapter 17, Spare Parts

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<th>Description</th>
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<td>H0075-S</td>
<td>- 10 x Servo Spacers.</td>
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<tr>
<td>Washer Ø3.1x Ø12x1.8mm</td>
<td>H0078-S</td>
<td>- 4 x Washers Ø3.1x Ø12x1.8mm.</td>
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<tr>
<td>Boom Spacer</td>
<td>H0082-S</td>
<td>- 2 x Boom Spacer.</td>
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<tr>
<td>Spindle</td>
<td>H0097-S</td>
<td>- 1 x Spindle Shaft.</td>
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<tr>
<td>26T Tail Pulley</td>
<td>H0103-S</td>
<td>- 1 x 25T Tail Pulley.</td>
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<tr>
<td>Bush One Way</td>
<td>H0110-S</td>
<td>- 4 x Bush One Ways.</td>
</tr>
<tr>
<td>M4 Locking Collar</td>
<td>H0121-S</td>
<td>- 1 x M4 Locking Collar.</td>
</tr>
<tr>
<td>Main Shaft</td>
<td>H0122-S</td>
<td>- 1 x Main Shaft.</td>
</tr>
<tr>
<td>Radius Arm</td>
<td>H0132BM-S</td>
<td>- 2 x Radius Arms.</td>
</tr>
<tr>
<td>Center Hub</td>
<td>H0135BM-S</td>
<td>- 1 x Center Hub.</td>
</tr>
<tr>
<td>Motor Support</td>
<td>H0142-S</td>
<td>- 1 x Bearing Support.</td>
</tr>
<tr>
<td>Bearing Support</td>
<td>H0143-S</td>
<td>- 1 x Bearing Support.</td>
</tr>
<tr>
<td>Battery Tray</td>
<td>H0149-S</td>
<td>- 1 x Battery Plate.</td>
</tr>
<tr>
<td>Stop Battery Tray</td>
<td>H0150-S</td>
<td>- 1 x Stop Battery Tray.</td>
</tr>
<tr>
<td>Carbon Fiber ESC Support</td>
<td>H0153-S</td>
<td>- 1 x Carbon Fiber ESC Support.</td>
</tr>
<tr>
<td>19T Drive Pinion</td>
<td>H0156-S</td>
<td>- 1 x 19T Drive Pinion.</td>
</tr>
<tr>
<td>Aluminum Blade Spacer</td>
<td>H0158-S</td>
<td>- 4 x Aluminum Blade Spacer.</td>
</tr>
<tr>
<td>Double Bearing One Way Pulley</td>
<td>H0171-S</td>
<td>- 1 x Double Bearing One Way Pulley Assembly.</td>
</tr>
</tbody>
</table>

### Item List

- 26T Tail Pulley [H0103-S]:
  - 1 x 25T Tail Pulley.
  - 6 x Socket Head Cap Screws M2x5mm.

- Boom Spacer [H0082-S]:
  - 1 x Set Screw M3x20mm.

- 4 x Washers Ø3.1x Ø12x1.8mm.

- M4 Locking Collar [H0121-S]:
  - 1 x M4 Locking Collar.
  - 1 x Socket Head Cap Screw M4x22mm.

- Main Shaft [H0122-S]:
  - 1 x Main Shaft.
  - 1 x M4 Locking Collar.
  - 2 x Socket Head Cap Screws M4x22mm.

- 1 x Bearing Support:
  - 1 x Motor Support.
  - 1 x Flanged Bearing Ø6x Ø13x5mm.

- Center Hub [H0135BM-S]:
  - 1 x Center Hub.
  - 2 x Head Cap Screw M3x12mm.

- Motor Support [H0142-S]:
  - 1 x Bearing Support.
  - 1 x Flanged Bearing Ø6x Ø13x5mm.
  - 1 x 19T Drive Pinion.

- Battery Tray [H0149-S]:
  - 1 x Battery Plate.
  - 1 x Battery Protection.
  - 2 x Flat Cap Screw M2.5x5mm.

- Stop Battery Tray [H0150-S]:
  - 1 x Stop Battery Tray.
  - 2 x Flat Cap Screw M2.5x5mm.

- Aluminum Blade Spacer [H0158-S]:
  - 1 x Aluminum Blade Spacer.

- 1 x Aluminum Double Bearing One Way Pulley Assembly.
  - 3 x Shims Ø10x Ø16x0.2mm.
  - 1 x One Way Brass Bushing.
18T Pulley [H0175-18-S]
- 1 x 18T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

19T Pulley [H0175-19-S]
- 1 x 19T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

20T Pulley [H0175-20-S]
- 1 x 20T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

21T Pulley [H0175-21-S]
- 1 x 21T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

22T Pulley [H0175-22-S]
- 1 x 22T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

23T Pulley [H0175-23-S]
- 1 x 23T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

24T Pulley [H0175-24-S]
- 1 x 24T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

25T Pulley [H0175-25-S]
- 1 x 25T Pulley.
- 1 x Set Screws M4x4mm.
- 1 x Set Screws M4x6mm.
- 1 x Bushing.

Blade Grip Arm [H0183BM-S]
- 2 x Blade Grip Arm.
- 2 x Socket Head Cap Screw M4x10mm.
- 2 x Uniball M3x4 Ø5 H3.5.
- 2 x Uniball Radius Arm.

Uniball Radius Arm [H0205-S]
- 2 x Uniball Radius Arm.

Plastic Tail Linkage [H0261-S]
- 2 x Plastic Tail Linkage.
- 2 x Grip Link Bushing.
- 2 x Head Cap Screws M2x6mm.

Steel Tail Shaft [H0325-S]
- 1 x Steel Tail Shaft.
- 1 x Tail Hub.
- 2 x Tail Oring Damperner.
- 1 x Set Screws M4x6mm.

Aluminum Tail Blade Grip [H0327BM-S]
- 2 x Aluminum Tail Blade Grip.
- 4 x Bearing Ø5xØ10x4mm.
- 2 x Thrust bearing Ø5xØ10x4mm.
- 2 x Button Head Cap M4x8mm.
- 2 x Socket Head Cap M2x6mm.
- 2 x Washer Ø5xØ8.9x0.75mm.
- 2 x Washer Ø7.5xØ10x0.5mm.

Tail Spindle [H0329-S]
- 1 x Tail Spindle.
- 2 x Button Head Cap M4x6mm.

Tail Boom Support [H0358-S]
- 1 x Tail Boom Support.
- 1 x Nylon screw M8x20mm.
- 1 x Flat Head Cap Screws M3x8.

Aluminum Tail Side Plate [H0359BM-S]
- 1 x Aluminum Tail Side Plate.
- 1 x Flanged bearing Ø6xØ13x5mm.

Aluminum Tail Case Spacer [H0360BM-S]
- 1 x Aluminum Tail Case Spacer.
- 4 x Socket Head Cap M3x8mm.
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**Bell Crank Lever [H0406BM-S]**
- 2 x Tail Pin.
- 1 x Uniball M2.
- 1 x Uniball Spacer.
- 1 x Bell Crank Lever.
- 2 x Flanged Bearing Ø3x Ø7x3mm.
- 1 x Head Cap Screws M3x22mm.
- 1 x Head Cap Screws M2x8mm.
- 1 x Washer Ø3x Ø4x0.5mm.
- 1 x Spacer Ø3x Ø4x0.6mm.

**CNC Derlin Main Gear [H0405-S]**
- 1 x CNC Derlin Main Gear Set.

**Swashplate Set HPS [H0422BM-S]**
- 1 x Swashplate Assembly.
- 2 x Bearings Ø30x Ø37x4mm.
- 6 x Uniballs M3x4 5 H3.
- 1 x Uniball M3x4 5 H18.
- 3 x Head Cap Screws M2x5mm.
- 3 x Swasher Ø2x Ø5x0.5mm.

**Damper [H0426-S]**
- 3 x H0426-A.
- 3 x H0426-B.
- 3 x H0426-C.
- 3 x Washers Ø10x Ø16x1mm.
- 3 x Washers Ø10x Ø16x0.2mm.
- 3 x Orings 3050.

**Boom Thunder Sport [H0930-S]**
- 2 x Head Cap Screws M3 x 12mm.
- 2 x Nylon Screw M8x20mm.
- 1 x Flat Head Cap Screws M3x8mm.
- 2 x Boom spacers.

**Canopy Thunder Sport [H0929-S]**
- 1 x Canopy Thunder Black.
- 1 x Canopy Grommet.
- 1 x Canopy Mousse.
- 1 x Canopy Edge Protection.

**Vertical Fin [H0684-S]**
- 2 x Head Cap Screws M3 x 12mm.
- 2 x Nylon Screw M8x20mm.
- 1 x Flat Head Cap Screws M3x8mm.
- 1 x Vertical Fin.
- 2 x Sticker.

**Main Frame [H0931-S]**
- 1 x Main Frame.
<table>
<thead>
<tr>
<th>Part Code</th>
<th>Screw Type</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC002-S</td>
<td>Socket Head Cap</td>
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<tr>
<td>HC004-S</td>
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<td>HC008-S</td>
<td>Socket Head Cap</td>
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<tr>
<td>HC010-S</td>
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<td>HC018-S</td>
<td>Socket Head Cap</td>
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<td>HC020-S</td>
<td>Socket Head Cap</td>
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<td>Socket Head Cap</td>
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<td>Button Head Cap</td>
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<td>Set Screws</td>
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<td>Cup Poin Set</td>
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<td>Nylon Screw</td>
<td>M8x20mm</td>
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<td>HC140-S</td>
<td>Washer Ø2.2xØ5x0.3mm</td>
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<td>HC147-S</td>
<td>Washer Ø3.3xØ6x0.5mm</td>
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<td>HC152-S</td>
<td>Washer Ø5.3xØ15x1mm</td>
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<td>HC153-S</td>
<td>Washer Ø5.3xØ15x1mm</td>
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<td>- 8 x Washer Ø6.3xØ15x1mm.</td>
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<tr>
<td>HC200-S</td>
<td>- 8 x Metric Hex Nylon Nuts M2,5H5,5.</td>
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<tr>
<td>HC206-S</td>
<td>- 8 x Metric Hex Nylon Nuts M3H4.</td>
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<tr>
<td>HC212-S</td>
<td>- 8 x Metric Hex Nylon Nuts M4H5.</td>
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<tr>
<td>HC218-S</td>
<td>- 8 x Metric Hex Nylon Nuts M5H4.5.</td>
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<tr>
<td>HC230-S</td>
<td>- 5 x Shims Ø10xØ16x0.2mm.</td>
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<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<td>HC232-S</td>
<td>- 1 x Carbon Rod Ø4xØ2.5x702mm.</td>
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<tr>
<td>HC239-S</td>
<td>- 2 x Plastic Ball Linkage.</td>
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<tr>
<td>HC242-S</td>
<td>- 2 x Thread Rod M2.5x40mm.</td>
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<td>HC309-S</td>
<td>- 1 Motor Belt 240-3MGT 19mm.</td>
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<td>HC315-S</td>
<td>- 2 x Spring 5.8/df 0.3.</td>
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<td>HC324-S</td>
<td>- 1 x Belt Gates 1926-3GT-06mm.</td>
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<tr>
<td>HC335-S</td>
<td>- 4 x Tail Oiring Damper.</td>
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<tr>
<td>HC400-S</td>
<td>- 4 x Flanged Bearings Ø2.5xØ6x2.6mm.</td>
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<tr>
<td>HC402-S</td>
<td>- 4 x Flanged Bearings Ø3xØ7x3mm.</td>
</tr>
<tr>
<td>HC406-S</td>
<td>- 4 x Flanged Bearings Ø5xØ9x3mm.</td>
</tr>
<tr>
<td>HC420-S</td>
<td>- 4 x Bearings Ø5xØ10x4mm.</td>
</tr>
<tr>
<td>HC422-S</td>
<td>- 2 x Flanged Bearings Ø6xØ13x4mm.</td>
</tr>
<tr>
<td>HC426-S</td>
<td>- 2 x Flanged Bearings Ø8xØ12x3.5mm.</td>
</tr>
<tr>
<td>HC435-S</td>
<td>- 2 x Thrust Bearings Ø9xØ18x5.5mm.</td>
</tr>
<tr>
<td>HC442-S</td>
<td>- 2 x Thrust Bearings Ø10xØ19x5mm.</td>
</tr>
<tr>
<td>HC447-S</td>
<td>- 1 x One Way Bearings Ø10xØ14x12mm.</td>
</tr>
<tr>
<td>HC450-S</td>
<td>- 1 x Spherical Bearing Ø12xØ22x7mm.</td>
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<tr>
<td>HC457-S</td>
<td>- 1 x Foam Blade Holder.</td>
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<tr>
<td>HA001-S</td>
<td>- 1 x Canopy Mousse.</td>
</tr>
<tr>
<td>HA016-S</td>
<td>- 2 x Thrust Bearings Ø5xØ10x4mm.</td>
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<tr>
<td>HA025-S</td>
<td>- 2 x Big Straps.</td>
</tr>
<tr>
<td>HA026-S</td>
<td>- 4 x Heats Sink.</td>
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<tr>
<td>HA030-S</td>
<td>- 4 x Canopy Grommet.</td>
</tr>
<tr>
<td>HA035-S</td>
<td>- 4 x OR 3050.</td>
</tr>
<tr>
<td>HA040-S</td>
<td>- 2 x Big Straps.</td>
</tr>
<tr>
<td>HA045-S</td>
<td>- 2 x Carbon Rod Ø4xØ2.5x702mm.</td>
</tr>
<tr>
<td>HA050-S</td>
<td>- 2 x Plastic Ball Linkage.</td>
</tr>
<tr>
<td>HA055-S</td>
<td>- 2 x Thrust Bearings Ø9xØ18x5.5mm.</td>
</tr>
<tr>
<td>HA060-S</td>
<td>- 2 x Thrust Bearings Ø10xØ19x5mm.</td>
</tr>
<tr>
<td>HA065-S</td>
<td>- 1 x Spherical Bearing Ø12xØ22x7mm.</td>
</tr>
<tr>
<td>HA070-S</td>
<td>- 1 x Foam Blade Holder.</td>
</tr>
<tr>
<td>HA075-S</td>
<td>- 1 x Carbon Rod Ø4xØ2.5x702mm.</td>
</tr>
<tr>
<td>HA080-S</td>
<td>- 2 x Plastic Ball Linkage.</td>
</tr>
<tr>
<td>HA085-S</td>
<td>- 2 x Thrust Bearings Ø5xØ10x4mm.</td>
</tr>
<tr>
<td>HA090-S</td>
<td>- 2 x Thrust Bearings Ø9xØ18x5.5mm.</td>
</tr>
<tr>
<td>HA095-S</td>
<td>- 1 x Spherical Bearing Ø12xØ22x7mm.</td>
</tr>
</tbody>
</table>
UPGRADES and ACCESSORIES

Swashplate Leveler G700 [H0707-S]
- 1 x Swashplate Leveler G700.

SAB HELIDIVISION Futaba Servo Horn [HA050]
- 1 x Plastic Servo Horn.

SAB HELIDIVISION JR Servo Horn [HA050]
- 4 x JR Servo Horn.

SAB HELI DIVISION New Black T-shirt [HM025-S-M-L-XL-XXL]
- SAB HELI DIVISION New Black T-shirt.

SAB HELI DIVISION Black Polo Shirt [HM027-S-M-L-XL-XXL]
- SAB HELI DIVISION Black Polo Shirt.

SAB HELI DIVISION Black Hoodies [HM029-S-M-L-XL-XXL]
- SAB HELI DIVISION Black Hoodies.

SAB HELI DIVISION Neck Strap [HM034]
- 1 x Neck Strap.

CAP [HM001,HM002,HM003]
- 1 x SAB HELI DIVISION CAP.

SAB Goblin 630/700/770/ Urukay Competition/Speed Carry Bag [HM060]
- 1 x Carry Bag.
- 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 or obstacles.
- 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.